Case Presentations

Division of Disease Control
Annual Infectious Disease Conference
11/15/17

Stuck with STEC:
The Challenges of Shiga toxin-producing *E.coli*

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Case History

- 10 month old male, previously well child
- Onset of diarrhea on 5/15/17, occasionally bloody
- Provider visit 5/22/17
- No fever, no rash

Laboratory Studies

- Stool collected 5/22/17 as outpatient; submitted to local hospital lab
- Stool culture ordered
  - *Salmonella, Shigella, Campylobacter*, *E. coli* O157, *Aeromonas*
  - Shiga toxin *E. coli*
    - Culture independent diagnostic test (CIDT) on broth
    - If positive, submit broth to State Lab-Maine Health and Environmental Testing Lab (HETL)
- Parasite screen
  - Antigen test for Giardia and cryptosporidiosis
- Ova and parasites
  - Full microscopic exam

Preliminary Lab Results

- Negative for *Salmonella, Shigella, Campylobacter*
- **Hospital lab reports Shiga toxin 1 positive on 5/24/17**

Shiga toxin-producing *E.coli* (STEC)

- *E.coli* bacteria live in intestines of animals and people
- Some strains produce chemical toxin called "Shiga toxin"
- Many different serotypes, O157 is most familiar
  - O26, O45, O103, O111, O121, and O145 also common
- Fecal- oral transmission
  - Contaminated food or water, environment
- Symptoms include severe diarrhea (often bloody) and stomach cramps
- Organisms shed for varying duration, even without symptoms
- Hemolytic Uremic Syndrome (HUS) can develop in some; kidney dialysis and blood transfusions may be necessary

Recommendations

- Preliminary interview with provider
  - Past medical history
  - Not treated with antibiotics for current symptoms
  - **Daycare attendee**
- Preliminary interview with parents
- Child must remain out of daycare pending confirmation of STX-1 at HETL
- Neither parent works in high risk setting or has symptoms, so no restrictions are necessary

Provider and Case-Parent Interview

- Breast fed infant with recent introduction of some solid foods
  - Commercially prepared organic baby foods
  - Small tastes of egg, chicken breast, beef, veggies, fruits, berries, yogurt
- Domestic cat and dog at home; no livestock, poultry or reptiles
- No exposure to animal venues
- No travel; no recreational water exposure
- Parent may have had mild symptoms 1 week prior, not tested

Follow up

- HETL confirms STX-1 and *E.coli* serotyping is in progress
- Child must remain out of daycare until 2 stools collected at least 24 hours apart are negative for Shiga toxin-producing *E. coli*
- Case symptoms resolved after 2 weeks
- Primary care provider/parents collect required specimens and work with hospital lab to submit them to HETL

Daycare Interventions

- Spread of STEC in daycare is serious concern
- Children under 5 years of age are at greatest risk of HUS
- Notification to director
- Letter sent to staff, parents of attendees
- Practice recommendations
  - Strict hand hygiene
  - Environmental sanitation
  - Review of food hygiene practices
  - Gloves for diaper changes
  - Increase surveillance for diarrheal illness
  - Exclude and test any attendees or staff with diarrhea

Closing the Case

- *E.coli* O103 nonmotile was confirmed at HETL
- 29 stool specimens collected daily until 7/5/17, except during family vacation of 1 week
- Organism was shed/carried for more than 5 weeks
- 24 consecutive specimens were Shiga toxin positive and culture confirmed, next 3 were negative (final 2 did not need testing)
- On July 6, family, pediatrician and daycare informed of negative tests, return to daycare letter sent.

Challenges and Successes

- Specimen collection
- Logistics of transport
- Test turn around time
- Daycare restriction meant parental time off from work
- Timely reporting of notifiable condition by hospital lab
- Exclusions made in timely manner
- Parental cooperation
- Daycare practice review
- **No new cases of STEC were identified at daycare!**

Questions?

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Measles in Maine

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Measles Background

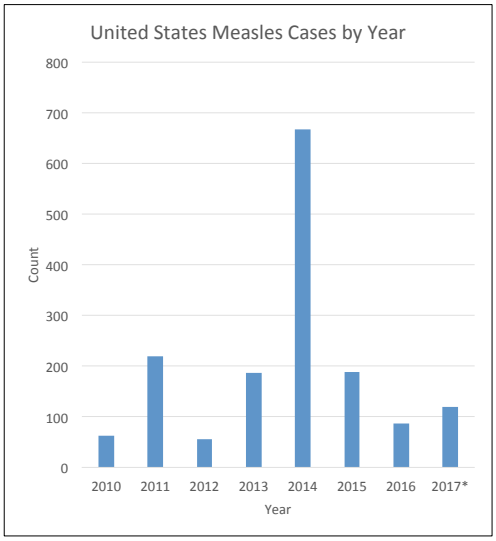
Measles Symptoms:

- Average incubation period 10-12 days
  - Initial Symptoms include:
    - high fever
    - cough
    - runny nose (coryza)
    - red, watery eyes (conjunctivitis)
    - prodrome, usually lasts 2-4 days
    - 2-3 days after symptoms begin tiny white spots (Koplik spots) may appear inside the mouth
  - Rash Onset
    - 2-4 after prodrome
    - persists 5-6 days
    - begins on face and head
    - maculopapular, becomes confluent
    - fades in order of appearance

Koplik spots

Measles rash

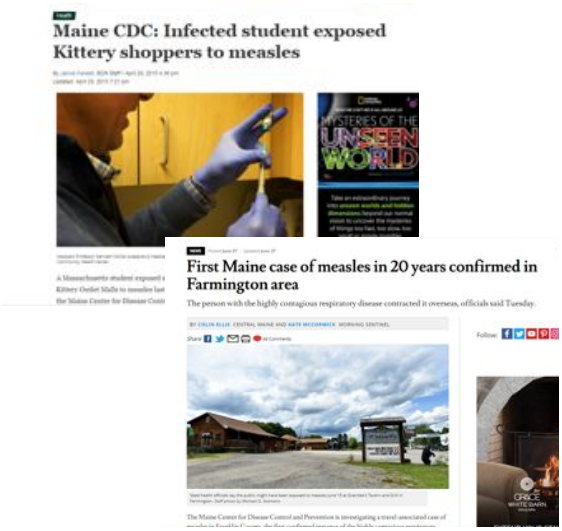
Measles Epidemiology in the United States



- Measles declared eliminated (absence of continuous disease transmission for greater than 12 months) from the United States in 2000
- Measles cases still occur in the United States
- The majority of people who acquired measles were unvaccinated
- Measles is still common in many parts of the world including some countries in Europe, Asia, the Pacific, and Africa.
  - Travelers with measles continue to bring the disease into the U.S.
  - Measles can spread when it reaches a community in the U.S. where groups of people are unvaccinated.

Measles in Maine

- Prior to 2017, no cases in 20 years
- Since 2010, 62 suspect measles cases were investigated by Maine CDC 61 (98%) were closed as not a case
- Participate in multi-state measles contact investigations
  - Kittery
  - Division of Global Migration and Quarantine (DGMQ) notifications for Maine residents with exposure



Timeline of Maine CDC activities related to the confirmed measles case

Friday June 23rd	Saturday June 24th	Sunday June 25th	Monday June 26th	Tuesday June 27th
• Measles suspect case identified • Symptomatic • Epi link/travel history • Additional laboratory testing recommended (IgG was negative) • Interviewed patient • Checked immunity status for close contacts	• Patient isolated • Lab results pending	• Patient isolated • Lab results pending	• PCR + (IgM later also positive) • Follow-up patient interview • Review close contacts and document immunity status • Draft press release and HAN	• Publish press release • Release HAN • Monitor for secondary cases for two incubation periods (42 days)

Control Measures

- Maine CDC identified exposed contacts and assessed for evidence of immunity.
- Messaging provided to the public:
  - Individuals who were potentially exposed (as defined by the table)
    - Review vaccine history and monitor for symptoms.
    - Individuals with symptoms should contact their providers for instructions before arriving at the providers' offices or hospitals.
    - Individuals without symptoms should not be tested.

The public may have been exposed to measles if they were at the following locations during the defined time periods:

Location	Date	Time
Narrow Gauge Cinema (Farmington, ME)	Thursday June 15	4-9pm
Grantlee's Tavern and Grill (Farmington, ME)	Thursday June 15	7-11pm
Farmington Farmers Market (Farmington, ME)	Saturday June 17	8am-12pm
The Kingfield Woodsman (Kingfield, ME)	Sunday June 18	10am-2pm
Restaurant la Chocolaterie (Lac-Megantic, Quebec, Canada)	Sunday June 18	12–4pm
Franklin Memorial Hospital Emergency Department	Sunday June 18	8-10:30pm
Franklin Memorial Hospital Laboratory	Monday June 19	12-2:30pm

Control Measures (continued)

- Vaccination recommendations:
  - **Children.** All children should receive two doses of MMR. The first dose should be given at 12 through 15 months of age and the second at 4 through 6 years of age. Children who are 6 through 11 months of age who will be traveling internationally should receive 1 dose of MMR vaccine. Every effort should be made to identify and vaccinate children who are not up-to date.
  - **Adults.** All adults should have acceptable proof of immunity to measles. For adults with no evidence of immunity to measles, 1 dose of MMR vaccine is recommended, unless the adult is in a high risk group (e.g., international travelers, health care workers, and college students), in which case 2 doses of MMR vaccine are recommended. Women are advised to not receive any live virus vaccine during pregnancy, including MMR.

Takeaways

- Early reporting is helpful to establish an efficient and timely investigation
- Establish a primary contact at the facility
- Keep staff informed and resources available

Reporting Requirements

Report suspect cases to Maine CDC **immediately** by telephone on recognition or strong suspicion of disease

24/7 Disease Reporting and Consultation Line:

1-800-821-5821

Laboratory Specimen Recommendations

Obtain specimens for testing and submit to Maine's Health and Environmental Testing Laboratory (HETL):

1. Oropharyngeal, nasopharyngeal, or nasal swab for polymerase chain reaction (PCR)
   a) Collect samples within 7 days of rash onset
   b) Use ONLY synthetic-tipped swabs (Polyester, Rayon, and Dacron), swabs should be submitted in viral transport media.
2. Serum for IgM serology.
   a) Collect 5-10 ml of blood in a serum separator tube. Allow sample to clot at room temperature. Centrifuge sample so that the red blood cells are separated from the serum.

(http://www.maine.gov/dhhs/mecdc/public-health-systems/health-and-environmental-testing/micro/submitting_samples.htm)

Questions?

Thank you!
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Public Health Implications of Varicella in Group Settings

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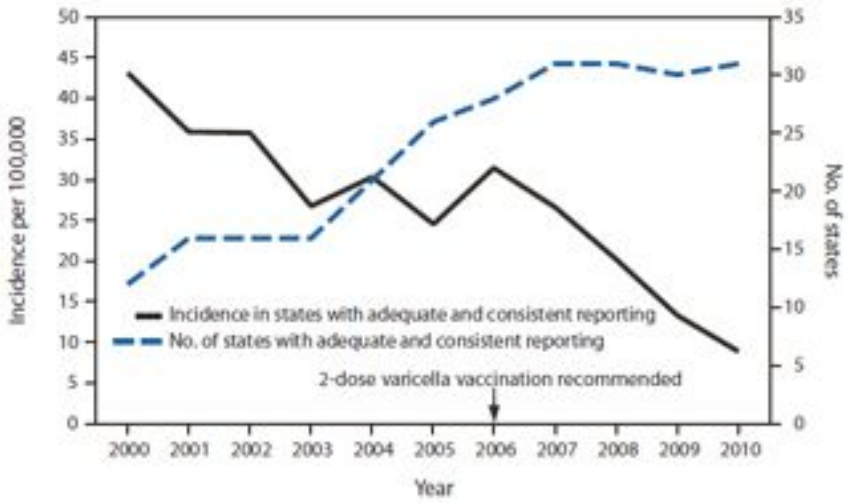
Varicella (Chickenpox)

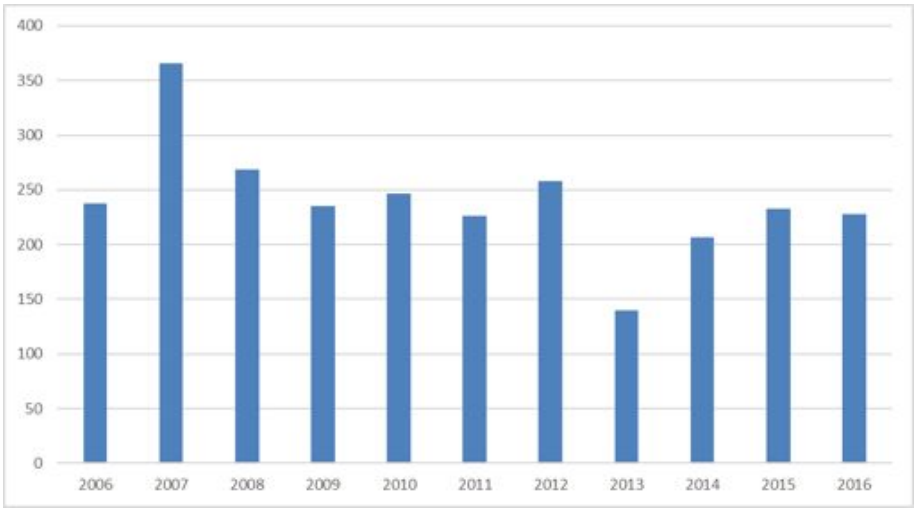
- Symptoms
  - Fever, pruritic generalized maculo-papulo-vesicular rash, 200-500 lesions
  - Breakthrough: > 42 days after vaccination, few vesicles, < 50 lesions
- Incubation period
  - 10-21 days after exposure (usually 14-16 days)
- Infectious period
  - 1-2 days prior to rash onset until all lesions are crusted (usually 5 days)
- Secondary attack rate
  - 60% - 100%
- High-risk
  - > 15 years of age
  - Infants
  - Immunocompromised persons
  - Newborns of women with onset 5 days prior to 2 days after delivery

Varicella Incidence – U.S., 2000 - 2010

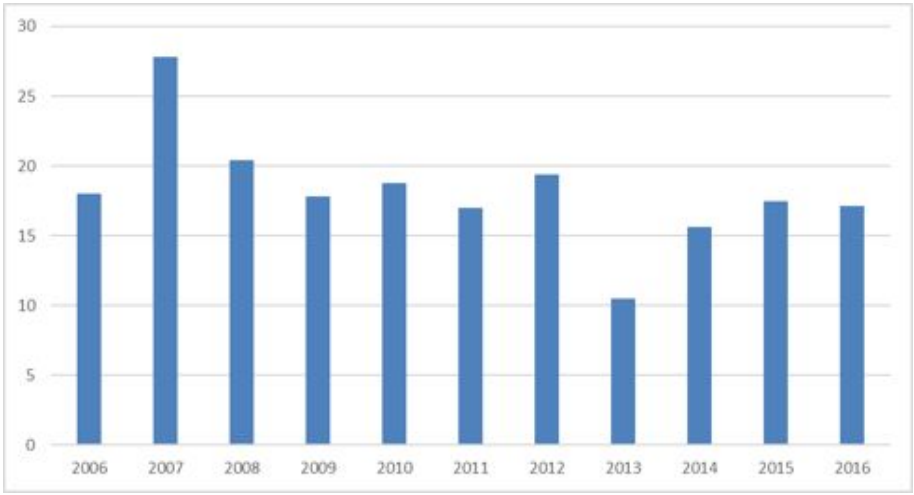


https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6132a2.htm

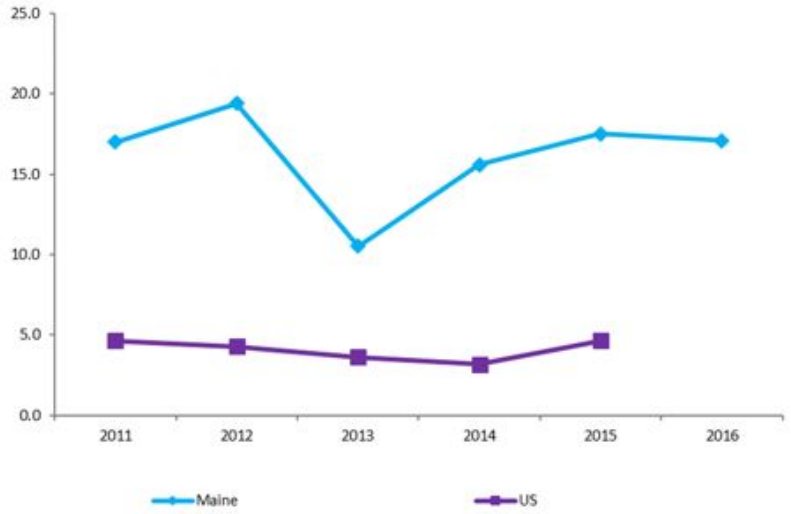
Varicella Cases – Maine, 2006-2016



Varicella Rates (per 100,000) – Maine, 2006-2016



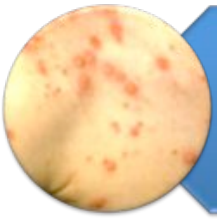
Varicella Rates (per 100,000) – Maine and U.S., 2011-2016



Importance of Varicella Surveillance

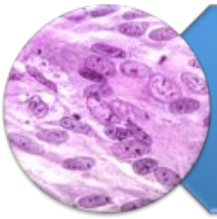
- Monitor changing epidemiology
- Evaluate immunization strategies
- Assess disease severity and complications
- Protect high-risk individuals
- Control outbreaks

Surveillance Criteria



Clinical

Acute onset of diffuse (generalized) maculo-papulovesicular rash without other apparent cause



Laboratory

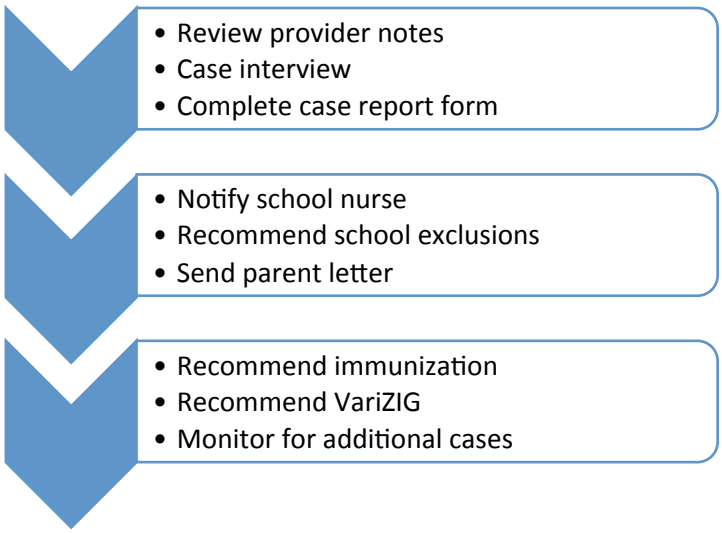
Culture

- Antigen detected by DFA
- Nucleic acid detected by PCR
- Significant rise in serum anti-varicella IgG

Surveillance Classification Definitions

Probable	Confirmed	Outbreak
Clinical +	Clinical +	3 confirmed cases within one incubation period in a closed setting
No lab +	Positive lab or	
No epi link	Epi link	

Outbreak Investigations/Control



School and Childcare Exclusions

Case	Non-immune Students
• Until lesions crust (5 days) • No new lesions with resolution for breakthrough disease	• 21 days from onset of last known case

- State Law
  - Joint Rules – ME CDC and DOE
  - Childcare licensing rules
- Recommended by ME CDC
- Coordinated through school nurse/childcare administrator
- Enforced by superintendent/childcare administrator
- Classroom, building, bus considerations

Varicella Outbreak in a York County Daycare, 2017

April 13
Lab-confirmed case with onset 4/8

April 14
2 new cases with onset 4/2 and 4/7
3 children vaccinated
6 children excluded

May 1
2 more cases reported with onset 4/28 and 5/1

- 8 children with no varicella vaccine (5 infants)
- 10% attack rate (6/58)
- Missed window for VariZIG due to reporting lag

Providers Have an Important Role

- Evaluation
- Diagnosis
- Testing
- Treatment
- Reporting – upon suspicion or recognition
- Isolation instructions
- Clinical management of contacts
- Routine vaccination
- Documentation of immunity

Questions?

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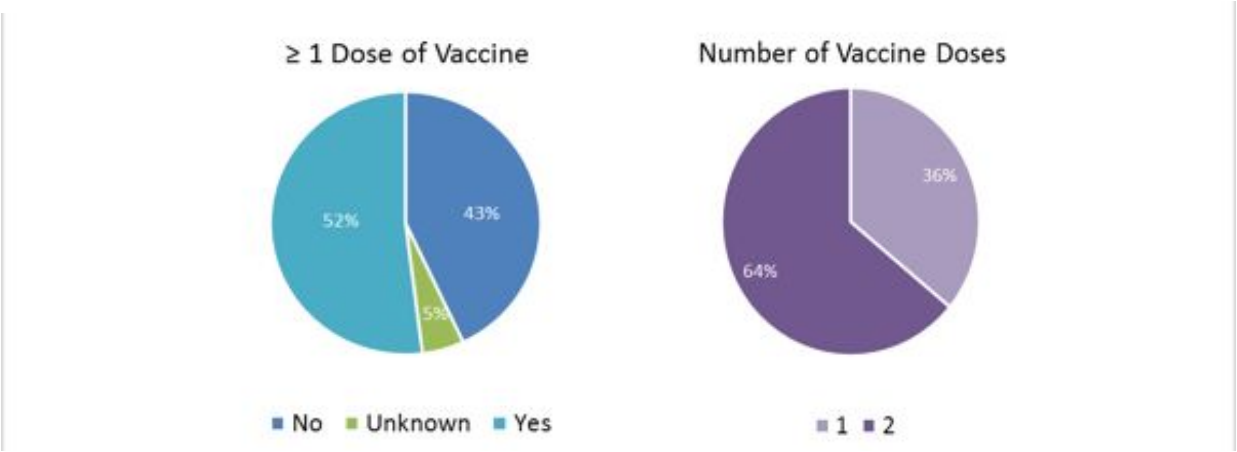
Maine Varicella Immunization Coverage with ≥ 1Dose of Varicella Vaccine

- National Immunization Survey 2015
  - 19-35 months of age 93.8% ± 3.6% (n=221)
- Maine School Assessment 2016-17
  - Kindergarten 96.7% (n= 12,473)
  - First grade 97.0% (n=12,472)
  - Seventh grade 98.4% (n=13,284)
  - School variation (range 33.3% - 100%)
- Maine Childcare Facility Assessment 2016
  - ≥ 2 years of age 89.0% (n=9,445)
  - County variation (range 78%-99%)

http://www.maine.gov/dhhs/mecdc/infectiousdisease/immunization/publications/index.shtml

Vaccination Status of Maine Varicella Cases - 2016



Multidrug-Resistant Organism Outbreaks in Healthcare Facilities

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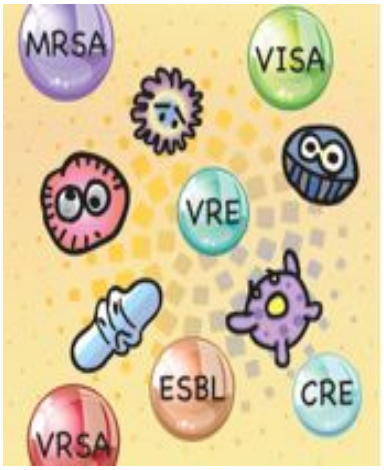
MDRO Definition

- MDRO = Multidrug-Resistant Organisms
- Microorganisms resistant to one or more classes of antimicrobial agents
- Predominantly bacteria
- Special attention needed in healthcare settings



Bad Bugs, No Drugs, No **ESKAPE**!

- **Currently, 2/3 of all healthcare-associated infections (HAIs) are caused by just six MDROs**

- **E** is for *Enterococcus faecalis & faecium* resistant to vancomycin (**VRE**)
- **S** is for *Staphylococcus aureus* resistant to (methicillin) oxacillin (**MRSA**)
  - VISA and VRSA (vancomycin intermediate- and resistant *S. aureus*)
- **K** is for *Klebsiella* spp and *Escherichia coli* producing **ESBL** and/or resistant to carbapenems **(CRE)**
- **A** is for *Acinetobacter baumannii* resistant to multiple antibiotics
- **P** is for *Pseudomonas aeruginosa* resistant to multiple antibiotics
- **E** is for *Enterobacter* spp. producing **ESBL** and/or resistant to carbapenems **(CRE)**
- **S** is for *Stenotrophomonas maltophila* resistant to multiple antibiotics

Emerging Pathogens of Concern

Colonization vs. Infection

- **Colonization**
  - Germ is present but no signs of infection
  - Can live in harmony with germ for quite some time
  - Need a lab test to know if colonization present
  - Treatment not usually warranted

- **Infection**
  - Germ is present
  - Signs of infection are present
  - Need a lab test to identify type of germ and recommended treatment
    - Can start empiric treatment prior to lab results

Situations Most Commonly Seen in ME

Outbreak Investigation Steps

1. Identify investigation team and resources
2. Establish the existence of an outbreak
3. Verify the diagnosis
4. Construct a case definition
5. Find cases and develop a line listing
6. Perform descriptive epidemiology and develop hypotheses
7. Evaluate hypotheses and perform additional studies
8. Implement control measures
9. Communicate findings of investigation
10. Maintain surveillance

MDRO Prevention and Control

- Prevention
  - Prevent infections
- Control
  - Administrative support
  - Education
  - Judicious use of antimicrobial agents
  - MDRO surveillance
  - Infection control precautions
  - Environmental measures
  - Decolonization

Data Utilization

- Internal process improvement
  - New policies and procedures
- Education
  - Targeted or statewide
  - Emerging pathogens
  - Gaps found during infection control assessments
  - Gaps found during outbreak investigations

Questions?

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Infectious Disease Program
24/7 Disease Reporting & Consultation Line: **1-800-821-5821**
http://www.maine.gov/dhhs/mecdc/