Escherichia coli O157:H7 Outbreak Associated with Bagged Salad, Tennessee, 2012

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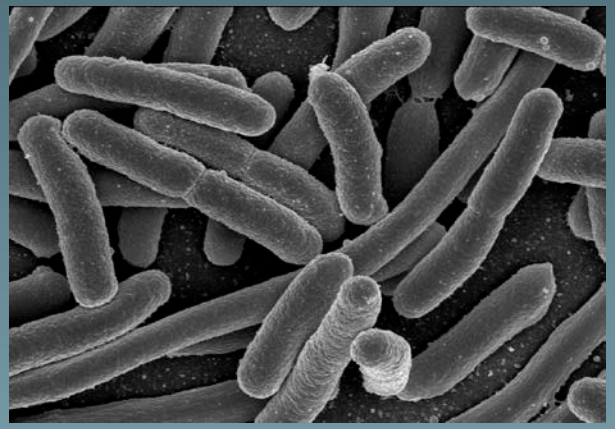
E. coli O157:H7

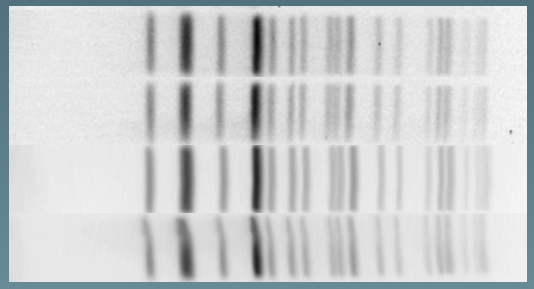
- Most common serotype of Shiga toxin-producing *E. coli*
- Causes diarrhea, bloody stool, cramps
  - Children <5 years at highest risk of HUS
- Outbreaks associated with beef, lettuce, spinach, sprouts



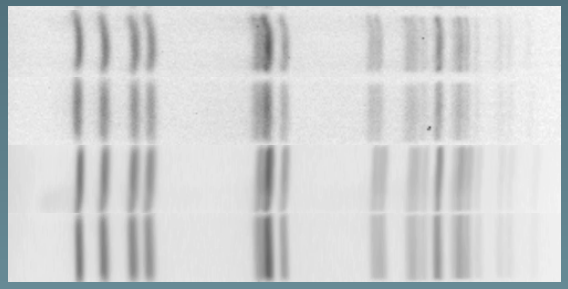
May 3, 2012

- Routine surveillance identified cluster of 3 cases of *E. coli* O157:H7, PFGE pattern “A”
- All attended “Daycare 1”

PFGE-XbaI



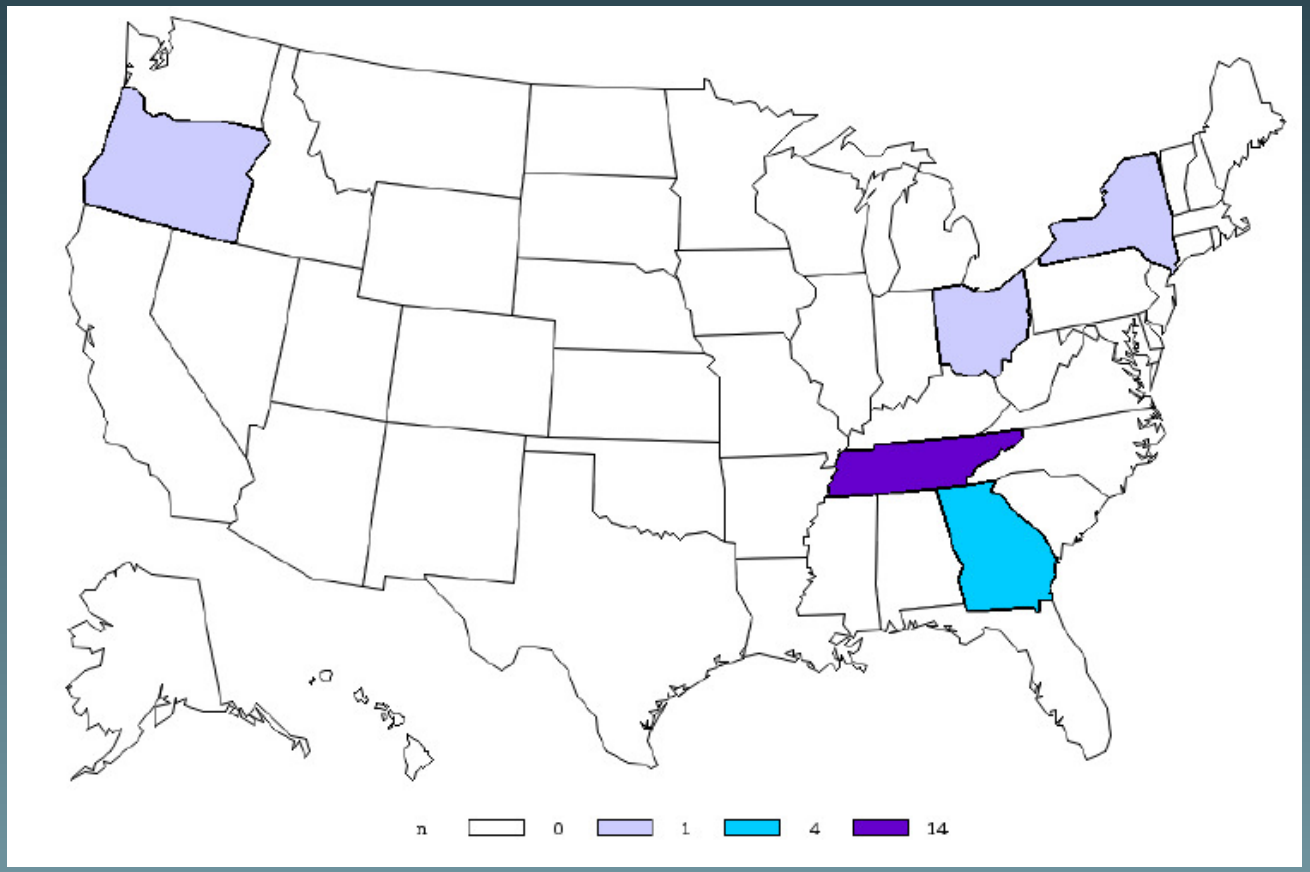
PFGE-BlnI



May 20, 2012

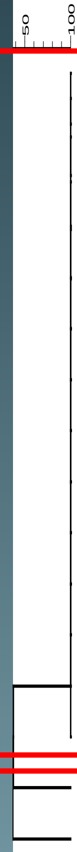
- 14 cases in Tennessee
- Subclusters
  - 2 daycares
  - 2 private schools
  - 2 public schools

E. coli O157:H7 Pattern “A” Cases – United States, April-May, 2012



MLVA

MLVA_composite



VNTR_vals:VNTR_3	VNTR_vals:VNTR_34	VNTR_vals:VNTR_9	VNTR_vals:VNTR_25	VNTR_vals:VNTR_17	VNTR_vals:VNTR_19	VNTR_vals:VNTR_36	VNTR_vals:VNTR_37
9.0	9.0	10.0	4.0	8.0	4.0	12.0	8.0
9.0	9.0	10.0	4.0	8.0	4.0	12.0	8.0
9.0	9.0	10.0	4.0	8.0	4.0	12.0	8.0
9.0	9.0	10.0	4.0	8.0	4.0	12.0	8.0
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9.0	9.0	10.0	4.0	8.0	4.0	12.0	8.0
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9.0	9.0	10.0	4.0	8.0	4.0	12.0	8.0
9.0	9.0	10.0	4.0	8.0	4.0	12.0	8.0
9.0	9.0	10.0	4.0	8.0	4.0	12.0	8.0
11.0	9.0	10.0	3.0	7.0	4.0	9.0	7.0
12.0	9.0	10.0	4.0	9.0	6.0	-2.0	-2.0

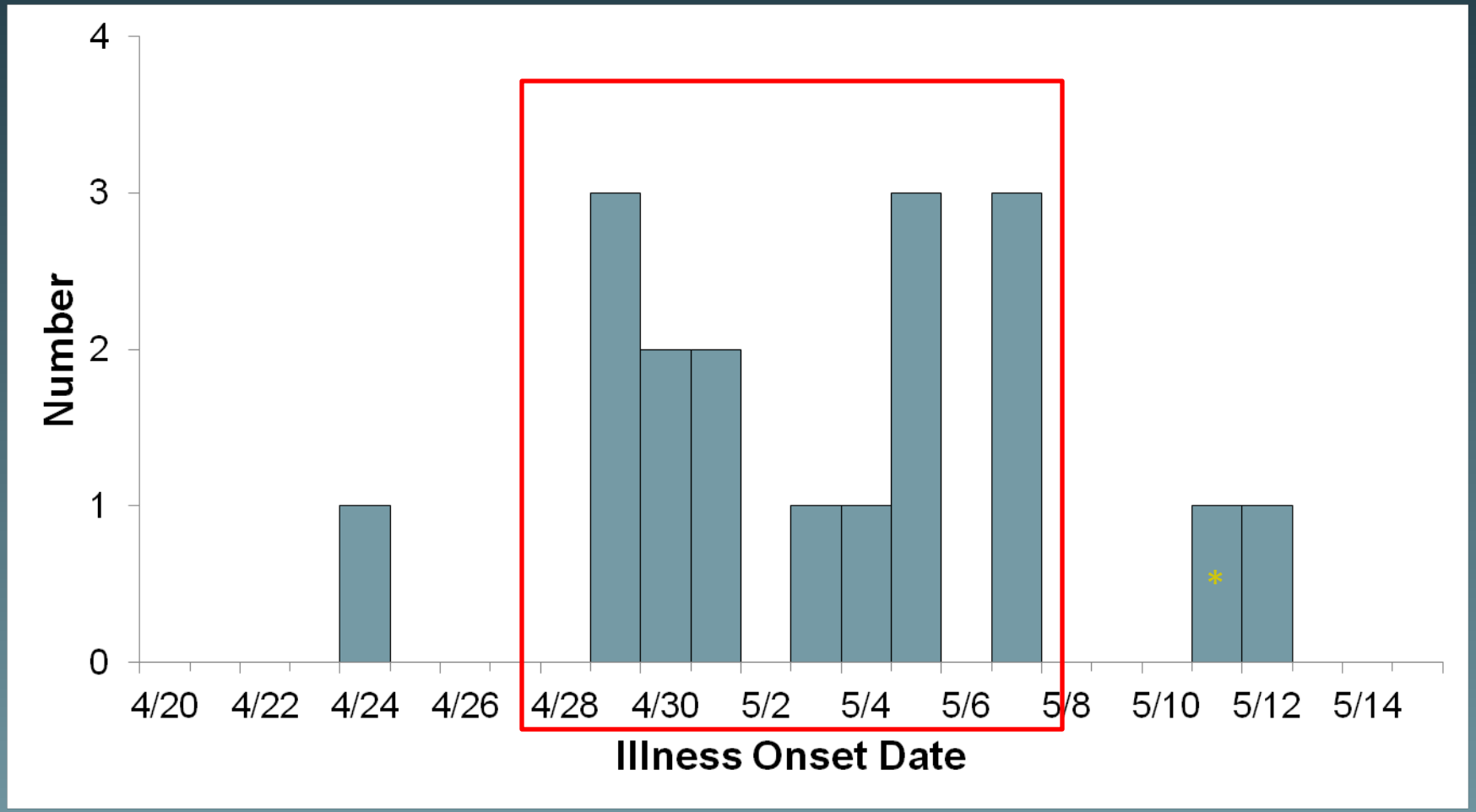
TN, GA, OH

OR, NY

Case Definition

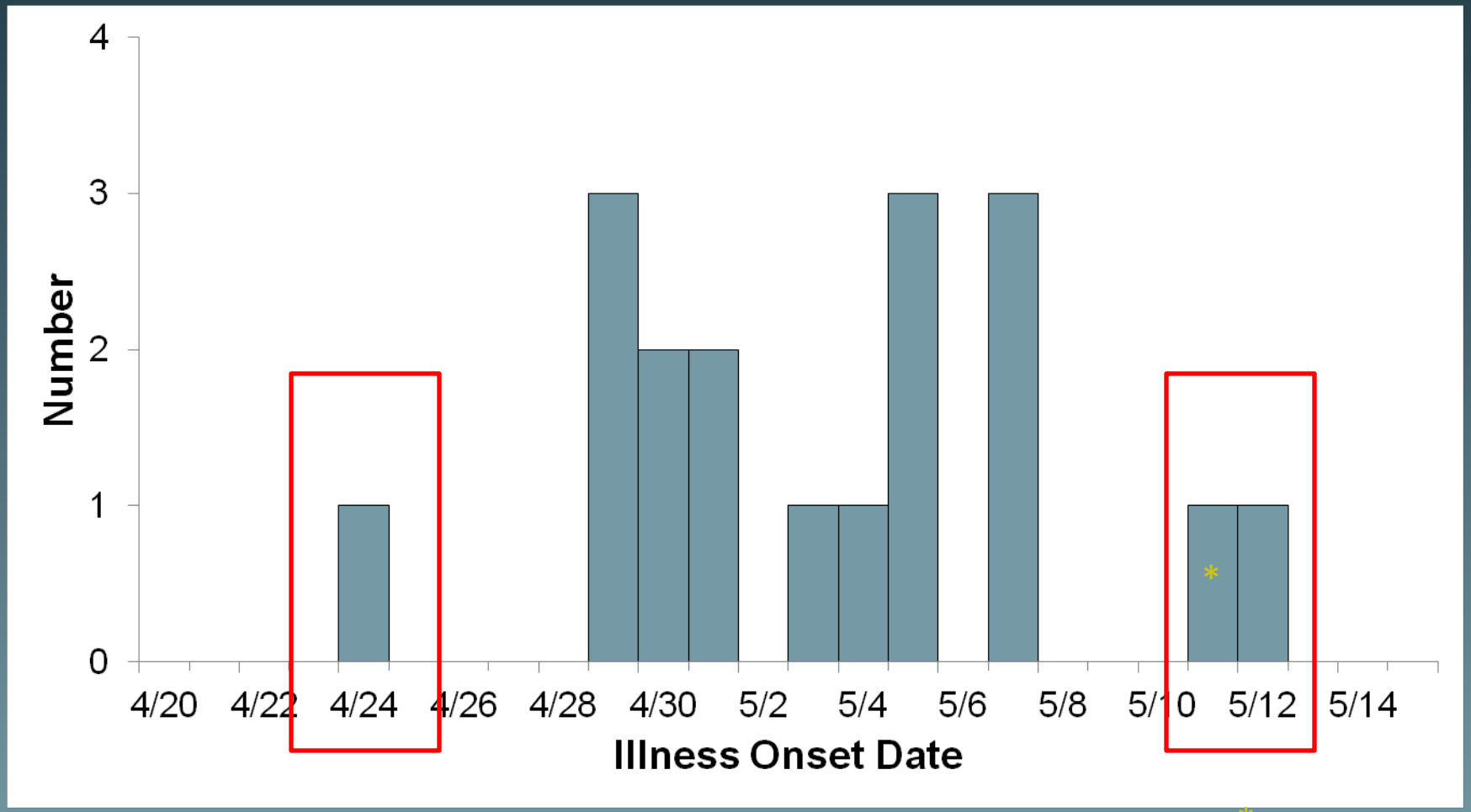
- Confirmed case definition
  - *E. coli* O157:H7
  - PFGE pattern “A”
  - Outbreak MLVA type
  - Illness onset on or after April 15
- Probable case definition
  - Clinically compatible illness
  - Epidemiologically linked to confirmed case

E. coli O157:H7 pattern “A” Infections by Illness Onset Date



* Probable case

E. coli O157:H7 pattern “A” Infections by Illness Onset Date

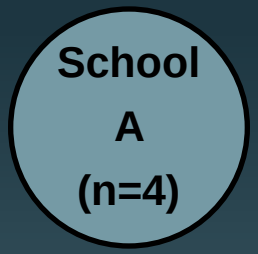


* Probable case

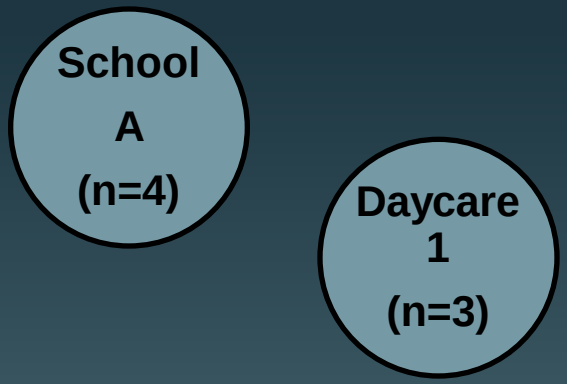
Descriptive Epidemiology

- 17 cases
  - TN: 14 (includes 1 probable case)
  - GA: 2
  - OH: 1
- Median age: 23 years (range: 3-88 yrs)
- Female: 76%
- Hospitalized: 35%, 2 deaths

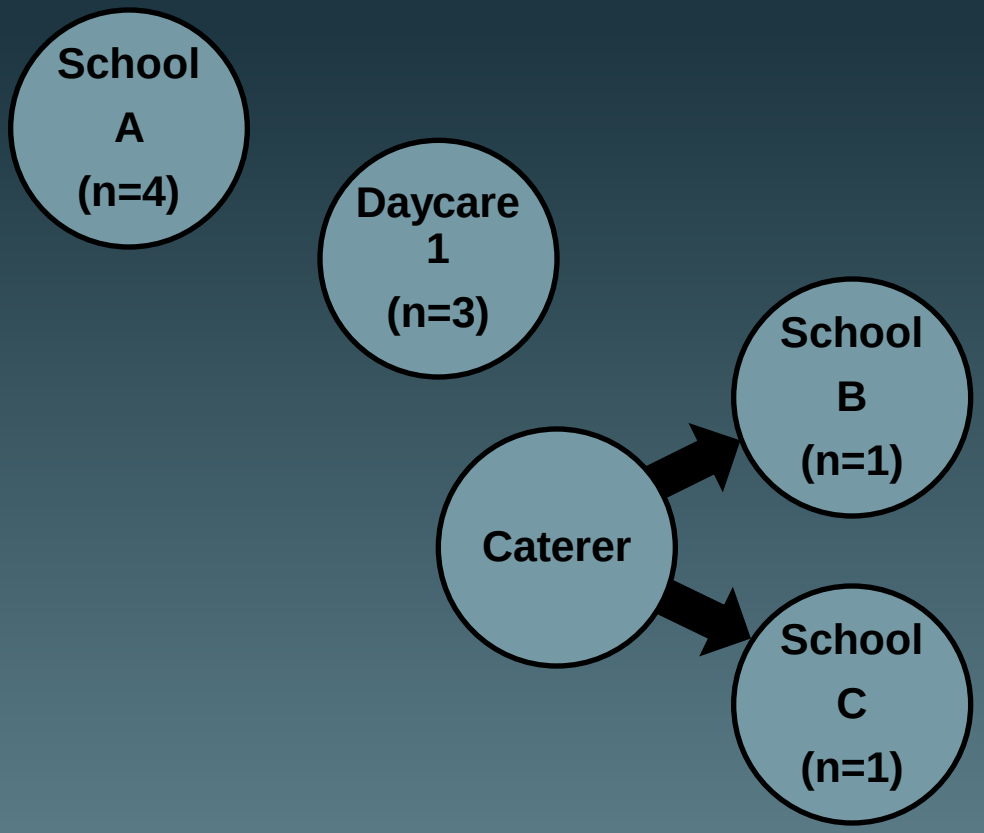
Subclusters



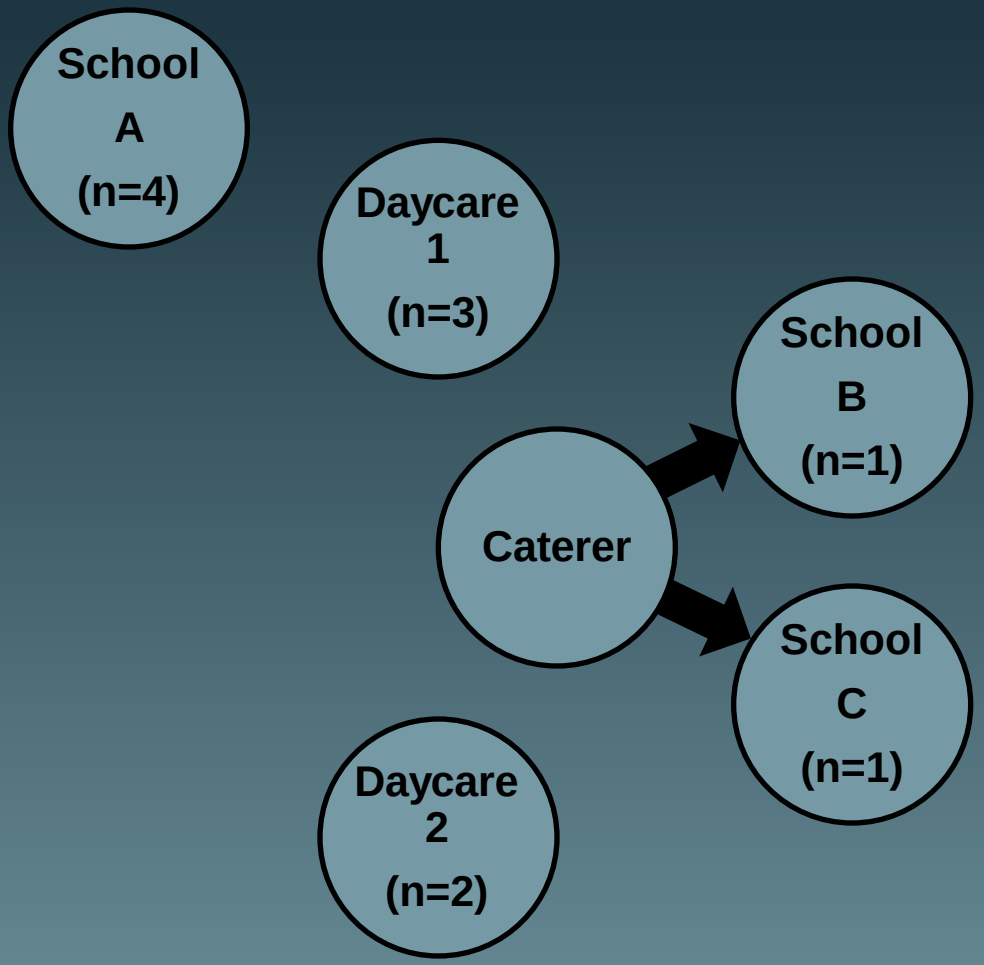
Subclusters



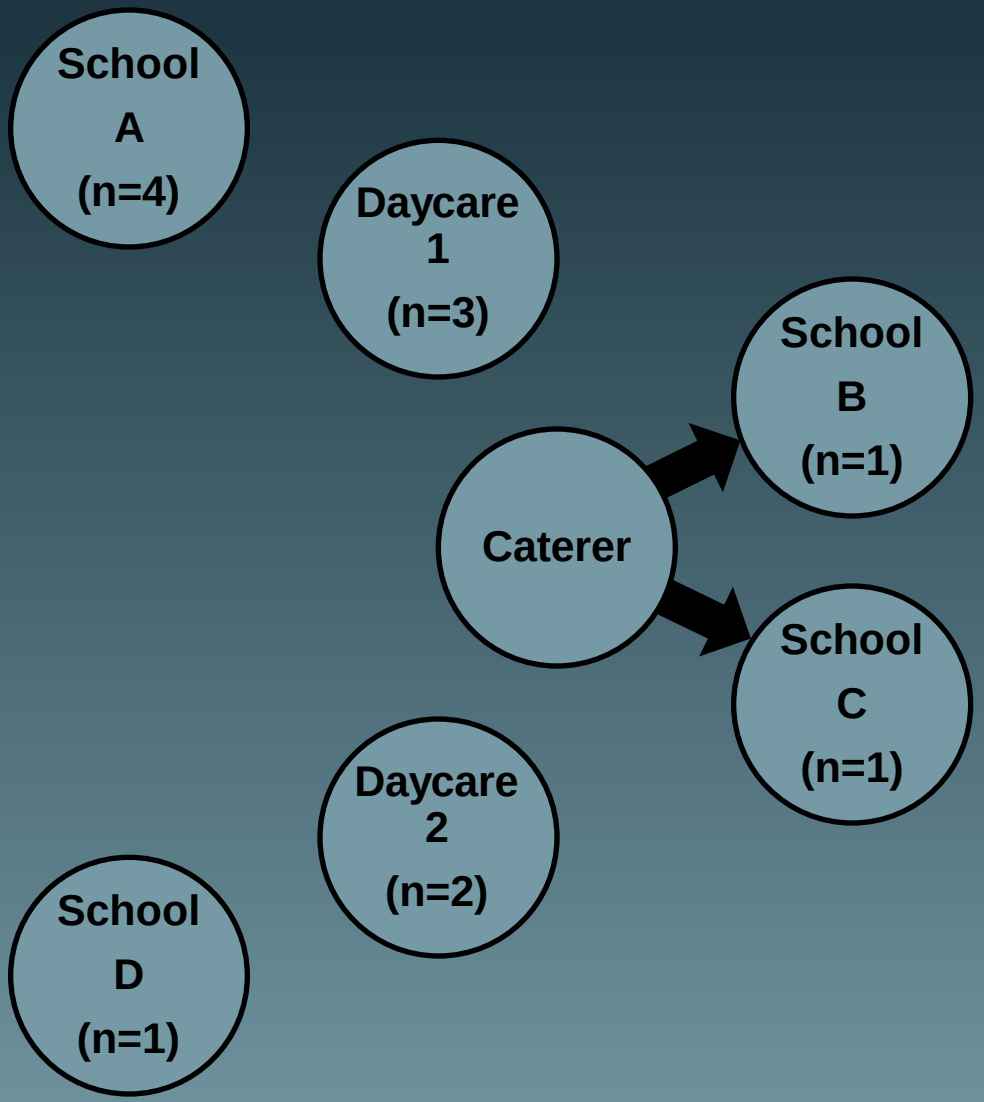
Subclusters



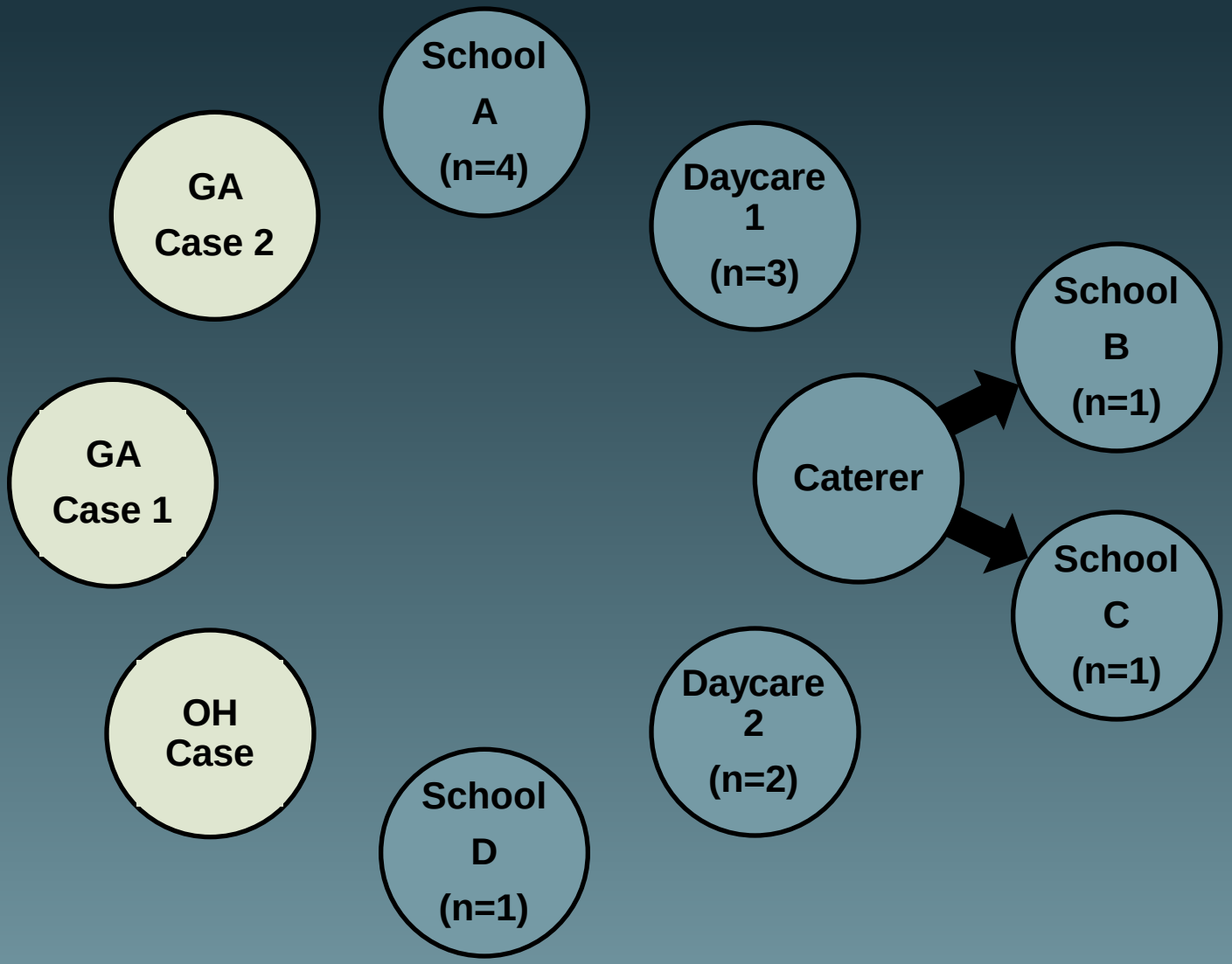
Subclusters



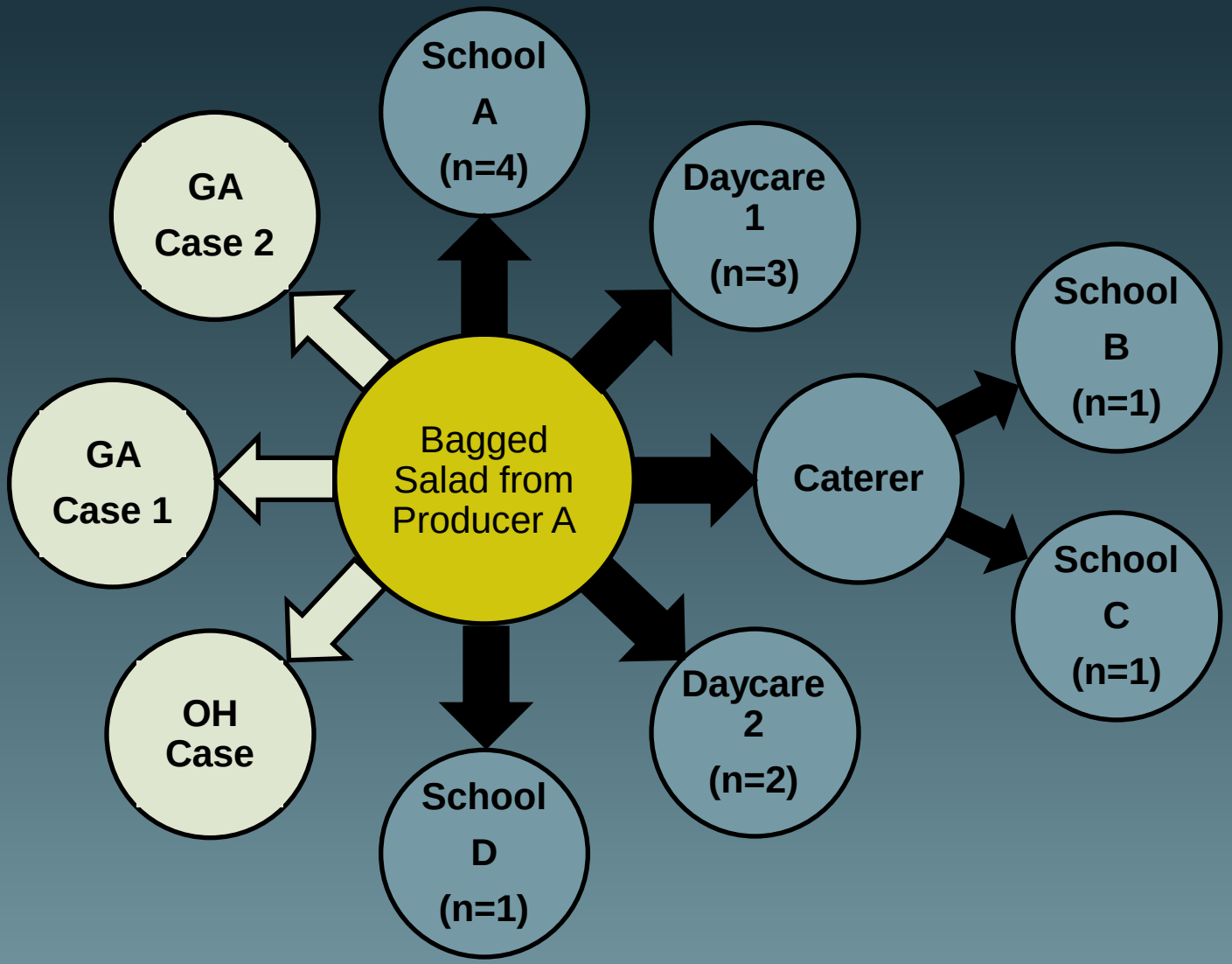
Subclusters



Subclusters

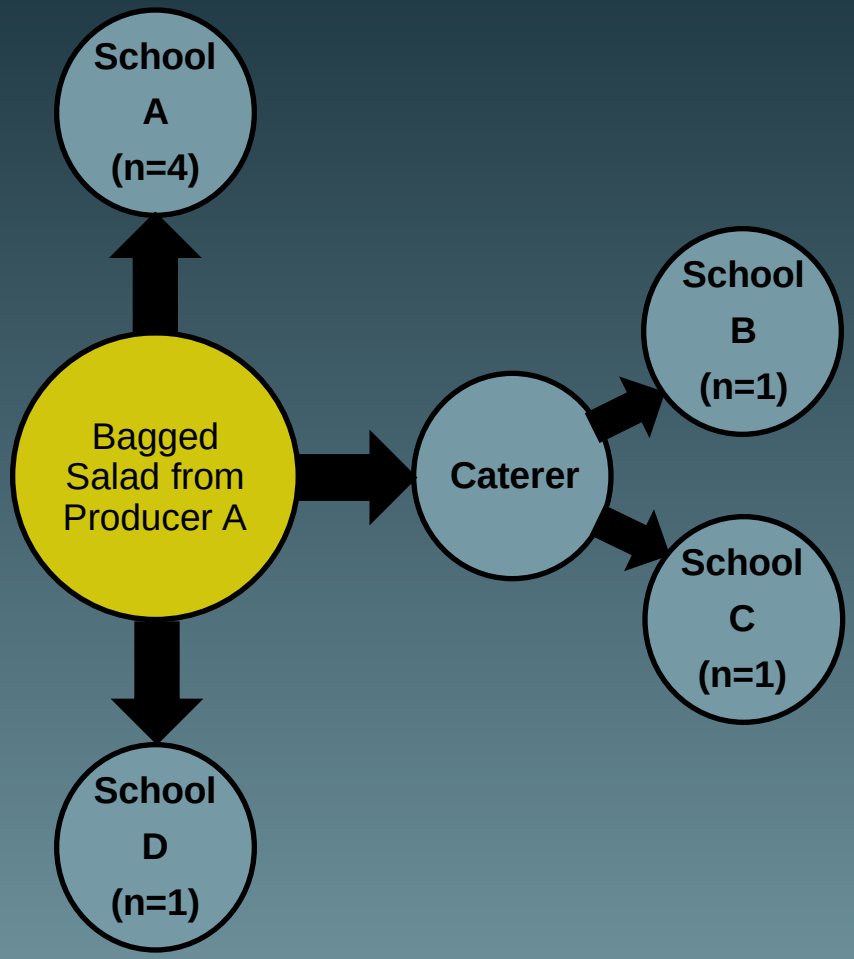


Subclusters and Epi Traceback



Matched Case-Control Study

- 7 cases included
- 3 controls:1 case, matched on school and grade
- Exposures common among ≥ 25% on initial questionnaire



Initial Interview Responses with ≥ 25% of Cases Exposed (n=8)

	No.	Percent
LEAD-IN QUESTIONS		
Worked/attended daycare or school	5	62.5
Ate food prepared by daycare or school	6	75.0
EATING AND SHOPPING VENUES		
Ate ay any restaurants	4	50.0
Ate at fast-food restaurants	2	25.0
Ate at cafeteria/dining room other than school	2	25.0
SOURCES OF FOOD AT HOME		
Ate from grocery store/supermarket	6	75.0
RESTAURANT GENRES		
Ate at a pizzeria	3	37.5
EGGS AND DAIRY		
Ate eggs	2	25.0
Ate eggs at home	2	25.0
Drank any pasteurized milk	4	50.0
Drank any pasteurized 2% milk	3	37.5
CHEESE		
Any pre-shredded cheese	4	50.0

	No.	Percent
FRESH AND FROZEN MEATS		
Any pre-packaged deli meats	2	25.0
Any bologna, corned beef, or other processed meats	2	25.0
Any fresh pork (not ham)	3	37.5
FRESH VEGETABLES		
Any “mini” carrots (peeled)	3	37.5
Any bell peppers (green, red, yellow or orange)	2	25.0
Any commercial fresh tomatoes eaten raw	3	37.5
Any bagged, pre-washed lettuce or salad mix	5	62.5
MISCELLANEOUS		
Any bottled water	2	25.0
SPECIFIC FOODS EATEN OUT		
Any other beef (steak, etc.) away from home	2	25.0
Anything from a salad bar	3	37.5
Any kind of salad made with lettuce or greens	3	37.5
Any pizza from a pizzeria or school	2	25.0
LIVE ANIMAL CONTACT, PETS, AND PET FOOD		
Any contact with dogs or puppies	3	37.5

Results Implicating Bagged Lettuce

- **Descriptive epi**
  - **75% female**
  - **Temporal distribution- produce shelf life**
- **Epi traceback- complex but compelling**
- **Matched subcluster case-control study**
  - **One unique exposure identified**
  - **“Ate lettuce provided by the school cafeteria?”, mOR=9.4, $p<0.05$**

Bagged Lettuce Producer A

- Epi traceback and FDA traceback converged
  - Single day of production implicated
  - Specific produce growing areas identified

Interventions

- Presented findings to Producer A:
  - No voluntary recall
  - Unsure of other industry actions
- FDA scheduled heightened inspections of produce growing areas

Conclusions

- Outbreak of *E. coli* O157:H7 associated with bagged salad from Producer A
- Outlier investigation can support or refute hypotheses
- Institution-level subcluster epidemiologic traceback and case-control study utilized
- Multiple epidemiologic approaches can be helpful during foodborne outbreak investigations

Thank You

Amanda Ingram

Katie Garman

John Dunn

FoodCORE Team