

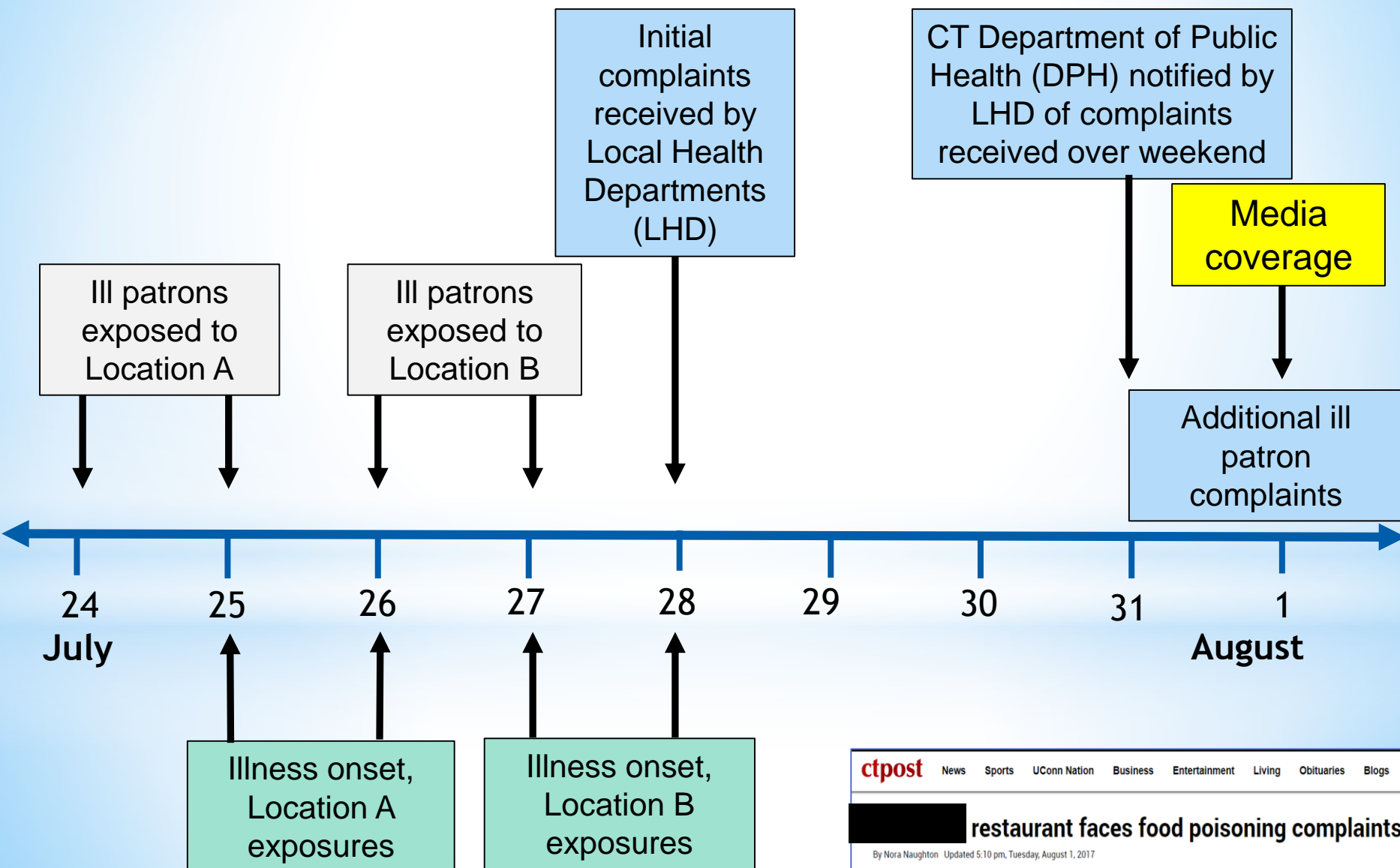
EPEC/EAEC - What the heck?

An Outbreak Investigation Using Culture-Independent Diagnostic Testing (CIDT), Connecticut, 2017

Christina Turner, MPH

Connecticut Department of Public Health
Epidemiology and Emerging Infections Program
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Background



Methods

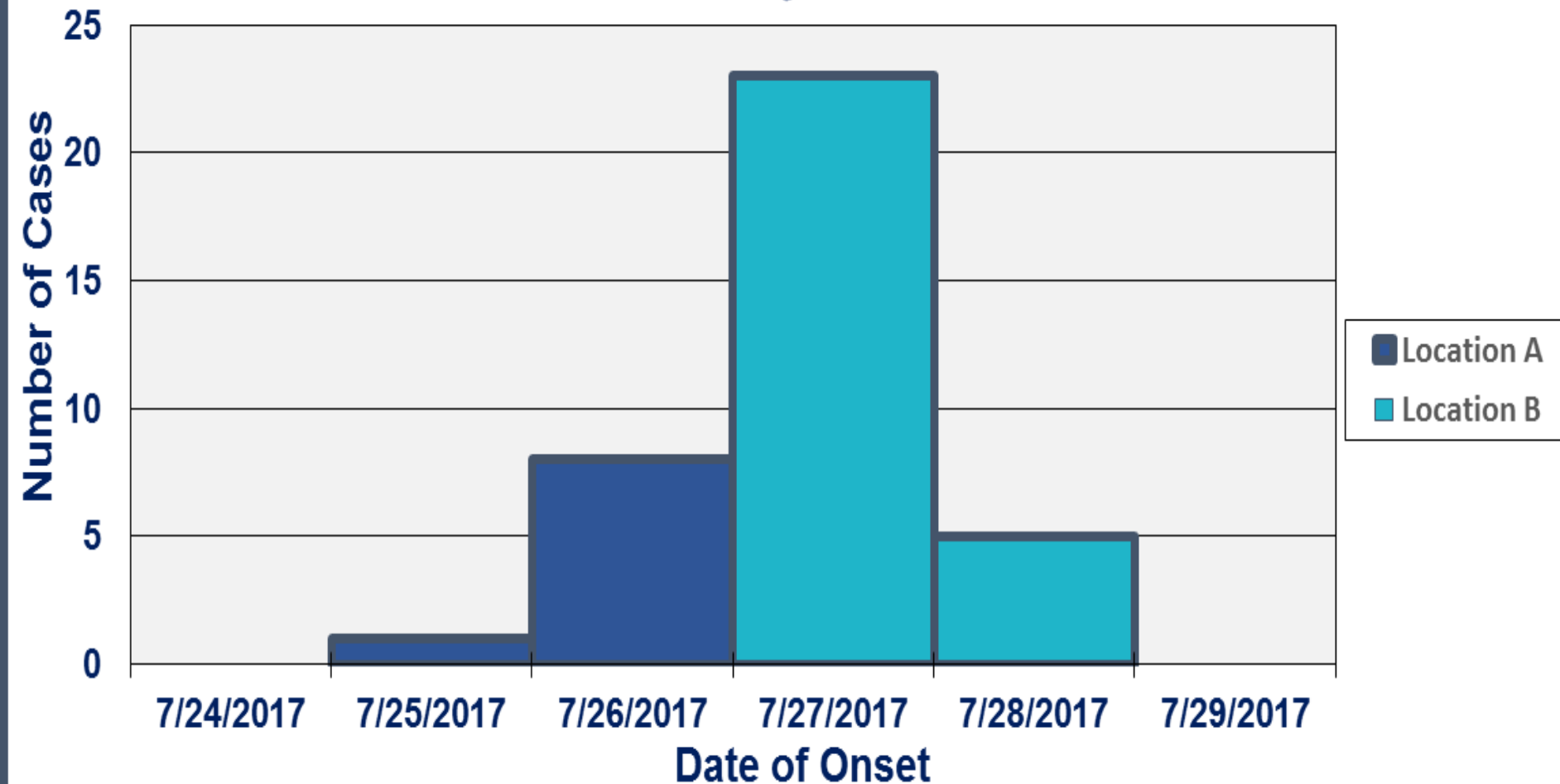
- Stool samples collected from ill patrons and food workers (FW) and tested at CT DPH Laboratory
 - All stools tested using multiplex polymerase chain reaction gastrointestinal screening panel (BioFire FilmArray)
- Positive patron and selected “interesting” FW samples forwarded to Minnesota Department of Health

Epidemiology Results

- Case definition: patron who developed vomiting and/or diarrhea (3 or more stools in a 24 hour period) within 24 hours after eating at either one of the two FSE locations
- 39 patrons were interviewed
 - 37 (95%) met the case definition
- Food items could not be statistically implicated due to a lack of controls for comparison

Epi Curve

**Number of Cases by Date of Onset, Fairfield County, CT,
July 2017**



Demographics and Clinical Features

Incubation: Median = 11 hours (range 4-24 hours)

Duration: Median = 3 days (range 1-7 days)

Symptom	% of Cases
Diarrhea	100%
Cramps	89%
Fever	27%
Vomiting	19%
Bloody stool	5%

CT Laboratory Results

Patrons

- 4/4 positive for Enteropathogenic E. coli (EPEC)
- 4/4 positive for Enteroaggregative E. coli (EAEC)

Food Workers

- 12/17 positive for EPEC
- **1/17 positive for EPEC & EAEC**
- 1/17 positive EPEC, Shigella/EIEC, Giardia
- 1/17 positive for Norovirus

Enteropathogenic *E.coli* and Enteroaggregative *E. coli*

EPEC

- Infection mainly among young children (<2 years)
- Disappeared as important cause of outbreaks of infant diarrhea in North America and Europe.
- “Typical EPEC” *eae* and *bfpA* gene (usually detected by PCR) and is known pathogen

EAEC

- Cause of epidemic and sporadic diarrhea
 - Role as enteric pathogen not fully understood
- Associated with persistent and acute child and adult diarrhea

MN Laboratory Results

Sample	Category	BioFire GI panel (CT)	Sweep PCR						Isolate PCR and characterization										
			STEC/EPEC PCR	STEC/EPEC Cq	Typical EPEC PCR	Typical EPEC Cq	EAEC PCR	EAEC PCR Cq	Typical EPEC Isolate	STEC/EPEC PCR	STEC/EPEC Cq	Typical EPEC PCR	Typical EPEC Cq	EAEC Isolate	EAEC PCR	EAEC PCR Cq	PFGE		
1	Food Worker 1	EPEC	eae+	32.1	bfp+	36	Negative												
									EP1	eae +	32.6	bfp+	36.5			Negative	EPEC13		
									EP2	eae +	34.4	bfp+	36.5			Negative	EPEC13		
									EP6	Neg		bfp+	34.8			Not tested	no PFGE		
2	Food Worker 2	Negative	Negative		Negative		Negative												
3	Food Worker 3	EPEC & EAEC	eae+	27.6	bfp+	30.6	Eagg+	27.6						Not found					
									EP2	eae +	33.1	bfp+	34.8			Negative	EPEC13		
									EP3	eae +	33.6	bfp+	38.5			Negative	EPEC13		
									EP5	eae +	35.2	bfp+	37.3			Negative	EPEC13		
4	Food Worker 4	EPEC	Negative		Negative		Negative												
5	Patron 1	EPEC & EAEC	Negative		Negative		Eagg+	27.6						Not found					
6	Patron 2	EPEC & EAEC	eae+	31.4	Negative		Eagg+	25.2											
									EP5-1	eae +	25	bfp+	23			Negative	EPEC13		
									22.96		Neg		NT			EA3.1M	Eagg+	23	EAEC134
									28.89		Neg		NT			EA3.1L	Eagg+	23	EAEC134
7	Patron 3	EPEC & EAEC	eae+	34.4	Negative		Eagg+	24.3	Not found										
									24.17		Neg		NT			EA2	Eagg+	24	EAEC134
8	Patron 4	EPEC & EAEC	eae+	39.9	Negative		Eagg+	24.3	Not found										
									25.07		Neg		NT			EA3.2	Eagg+	25	EAEC 134
									23.4		Neg		NT			EA3.8	Eagg+	23	EAEC 134
9	Food Worker 5	EPEC, Shigella/EIE, Giardia	eae+	29.2	Negative		Negative		Not found										

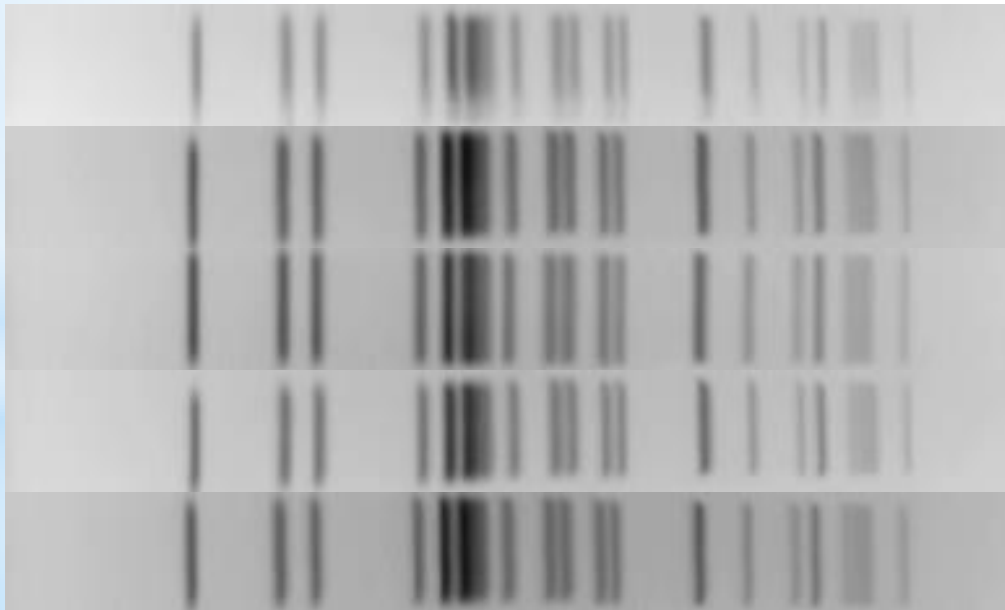
MN Laboratory Results

Sample	CT Results (BioFire FilmArray)	MN EPEC& EAEC Results Sweep PCR / Isolate PCR
Patrons		
Patron 1	EPEC & EAEC	EAEC / Isolates Not Found
Patron 2	EPEC & EAEC	EAEC / EAEC & tEPEC
Patron 3	EPEC & EAEC	EAEC / EAEC
Patron 4	EPEC & EAEC	EAEC / EAEC
Food Workers		
Food Worker 1	EPEC	tEPEC / tEPEC
Food Worker 2	Negative	Negative / Not Tested
Food Worker 3	EPEC & EAEC	tEPEC & EAEC / tEPEC
Food Worker 4	EPEC	Negative / Not Tested
Food Worker 5	EPEC, Shigella/EIEC, Giardia	EPEC / Not Found

MN Laboratory Results

EAEC Isolates

PFGE-XbaI



6-EA3-1L EAEC134* (**Patron 2**)

6-EA3-1M EAEC134 (**Patron 2**)

7-EA2 EAEC134 (**Patron 3**)

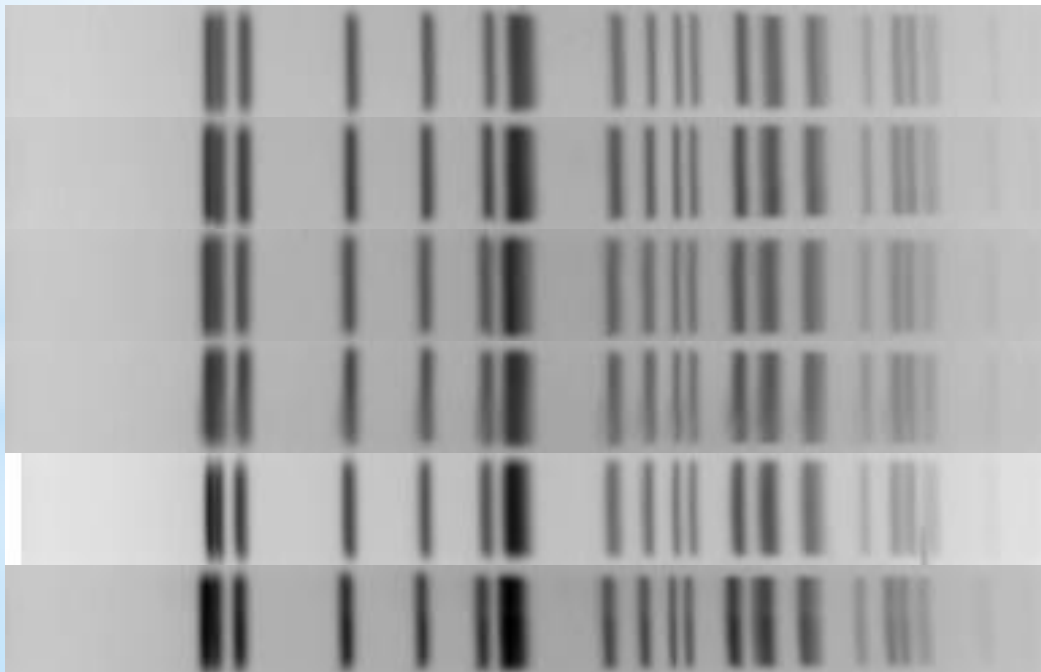
8-EA3-2 EAEC134 (**Patron 4**)

8-EA3-8 EAEC134 (**Patron 4**)

MN Laboratory Results

EPEC Isolates

PFGE-XbaI



1-EP1 EPEC13 (FW 1)

1-EP2 EPEC13 (FW 1)

3-EP3 EPEC13 (FW 3)

3-EP5 EPEC13 (FW 3)

6-EP5-1 EPEC13 (Patron 2)

3-EP2 EPEC13* (FW 1)

Conclusions

- An outbreak of GI illness due to both EPEC & EAEC occurred in CT in July 2017
- Use of CIDT (multiplex PCR panels) during outbreaks can identify pathogens not commonly tested for or linked to outbreaks
- Challenges in interpreting results and determining etiology especially when multiple pathogens detected
- Consider additional testing to determine etiology of outbreak
- Identifying, investigating, and documenting these outbreaks will improve understanding of these once 'novel or undetected' pathogens

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Christina Nishimura, CT DPH State Laboratory

Diane Noel, CT DPH State Laboratory

Jennifer Calder, Stamford Health Department

Norma Jarrett, Stamford Health Department

Tim Noia, Stamford Health Department

Terry Rabatsky-Ehr, CT DPH Epidemiology

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Thank You!