



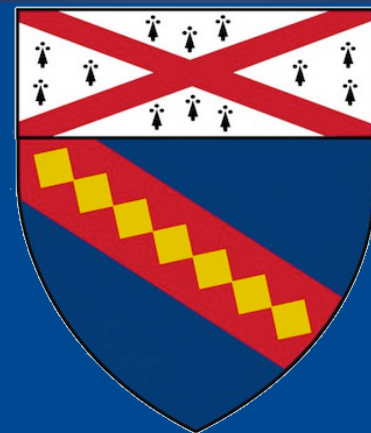
Increase in *Cyclospora cayentanensis* Infections, Connecticut, 2017

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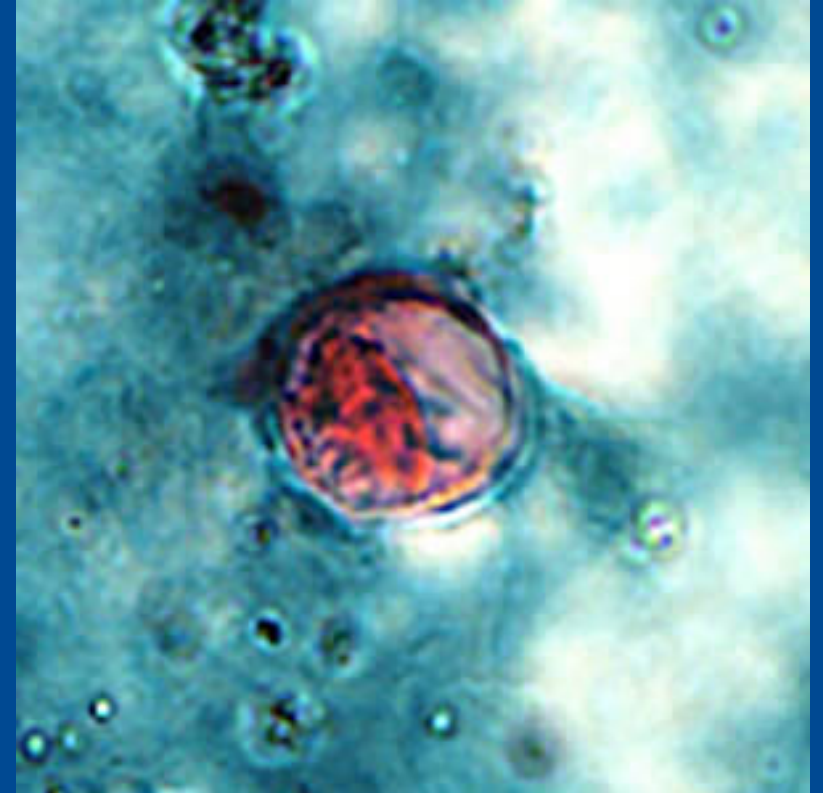
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Yale SCHOOL OF PUBLIC HEALTH



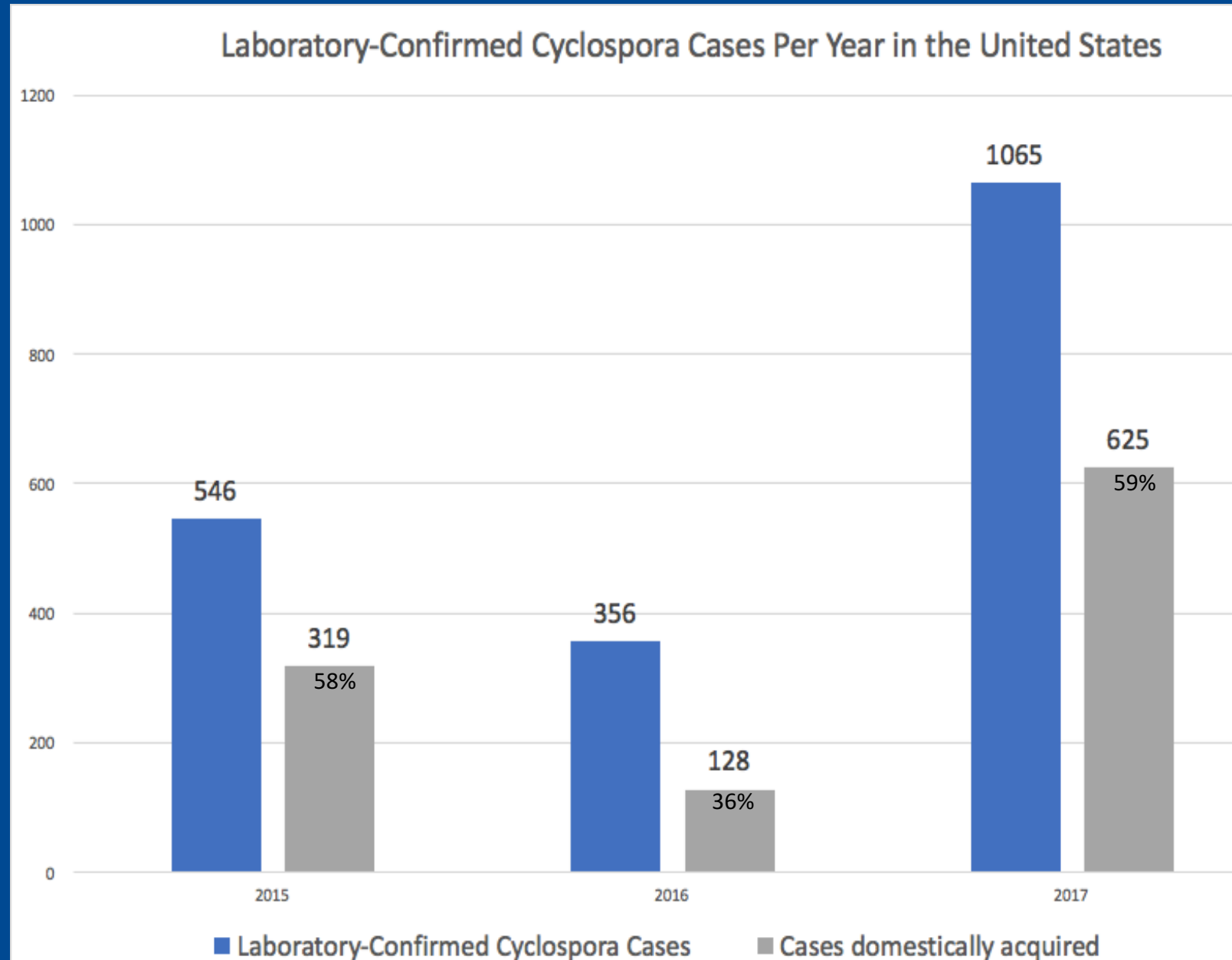
Background

- **Cyclosporiasis:**
 - Intestinal illness caused by parasite *Cyclospora cayetanensis*
 - Seen in travelers to endemic tropical/subtropical countries
 - Domestic outbreaks have been associated with imported produce such as cilantro, basil, and raspberries



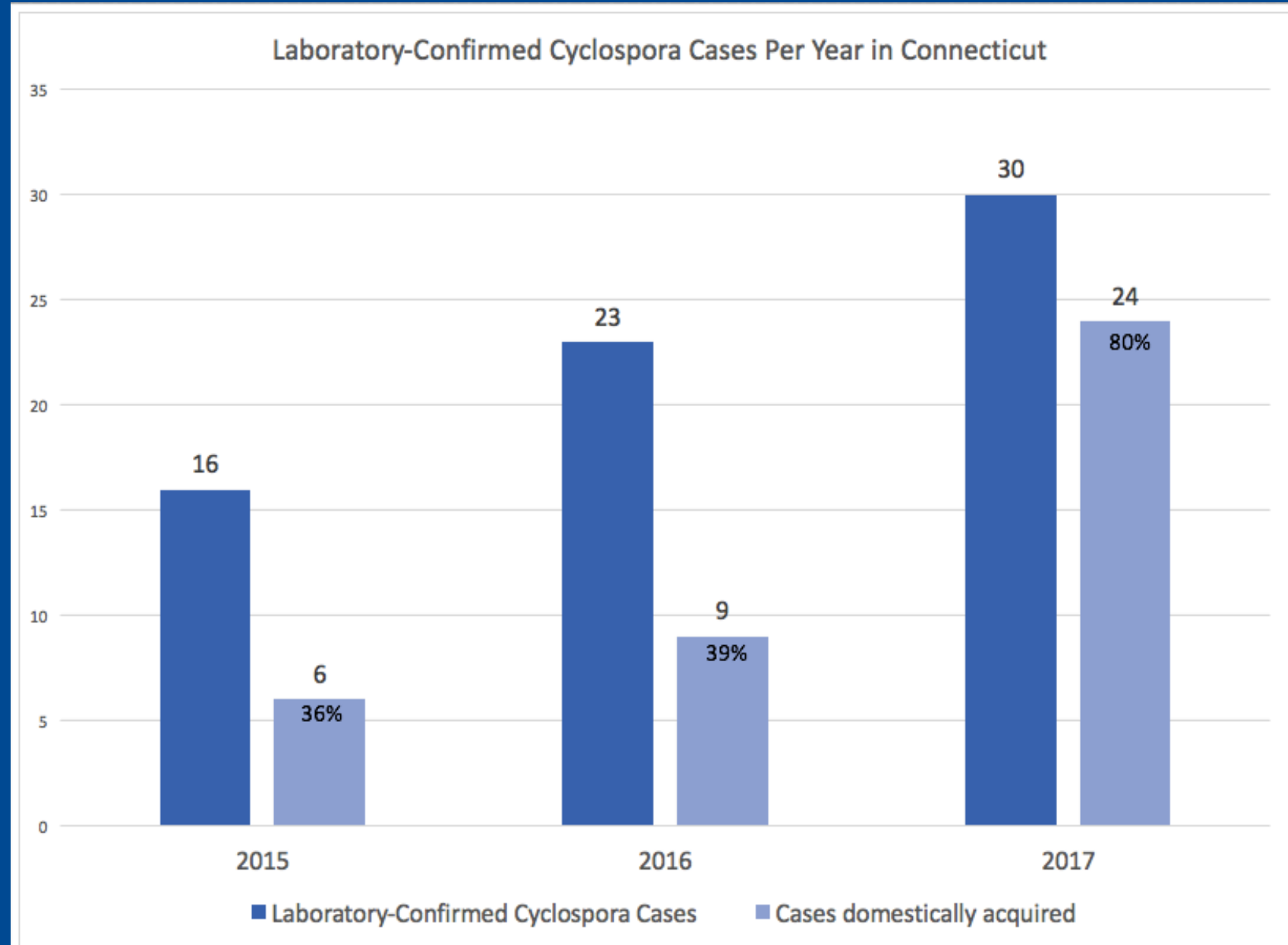
Background

- National increase in *Cyclospora* cases overall and in cases that are domestically-acquired
- **199%** increase comparing 2016 to 2017 case totals



Background

- FoodNet Active Surveillance in CT
- Increase in CT *Cyclospora* cases overall and in cases that are domestically-acquired



Cyclospora in Connecticut, 2017

From Jan. 1- Oct. 4, 2017, **30 cases** of cyclosporiasis have been reported to the CT DPH

- Interviewed using the CDC's Cyclosporiasis National Hypothesis-Generating Questionnaire
- **24 (80%)** case-patients reported **NO** international travel during their incubation period
- **19 (63%)** are female; median age is 45 years (range 19–66); and **18 (60%)** are from a single county

Yacht Club Outbreak: Background

Three laboratory-confirmed *Cyclospora* cases who attended the same dinner event in late June 2017

- Cocktail hour at a yacht club, followed by dinner/dessert at 10 different private homes (approximately 100 attendees in total)
- All 3 laboratory-confirmed cases associated with one private home (Home A)
- Foods provided at Home A came from 3 commercial establishments (the yacht club, a market/caterer, and a bakery)

Foods Served at Event

- Foods provided by yacht club
 - Appetizers (at club): *beef, sausage, burrata*
 - Entrées: *fish, beef*
 - Sides: *asparagus, roasted potatoes*
 - Dessert: *angel food cake, mixed berries*
- Foods provided by Home A dinner host
 - Quinoa salad from a caterer
 - Macarons from a bakery



Investigation Objectives

- 1) To evaluate the scope of the outbreak: to determine if other cases were associated with the Yacht Club Event, and to determine if other dinner groups were affected

- 2) To identify a possible food vehicle associated with Cyclosporiasis cases
 - Possible food vehicles include:
 - Quinoa salad: contaminated ingredient? Garnish?
 - Macarons
 - Drink garnish
 - A dish provided by yacht club, with contaminated batch just reaching 1 household

Methods

- Online questionnaire was emailed (by the yacht club) to all event participants:
 - 10 separate survey links for 10 separate home dinner parties
 - Asked about symptoms and onset
 - Asked about foods provided by yacht club catering
- Invoices and purchase records were collected for produce served at the event

Do you remember which specific items you ate?

Regardless of whether you became ill, please mark an answer for item listed. If you are not sure, please check "don't know".

8. Food items

	Yes	No	Don't know
Salmon with peppers, onions, and fennel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Beef filet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Asparagus with herbs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Roasted Fingerling Potatoes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Angel Food Cake	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mixed Berries	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. If you had berries, would you have had any of the following?

	Yes	No	Don't know
Strawberries	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Raspberries	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Blueberries	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Blackberries	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. If other food(s) served, please list food(s) and indicate whether you ate or did not eat.

11. Drinks and drink garnishes

Cyclosporiasis Case Definitions (2010)

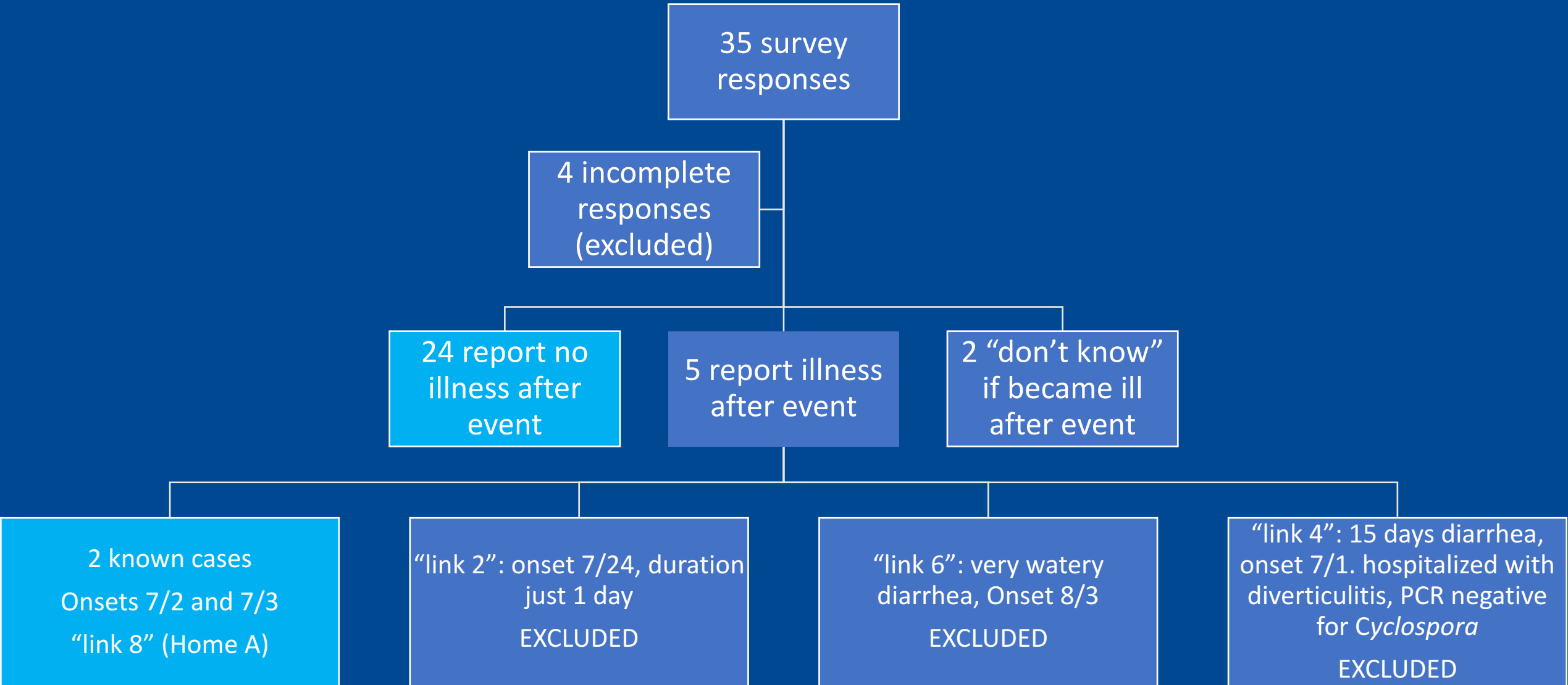
Clinical Description: Illness caused by parasite *Cyclospora cayetanesis*. Most common symptom watery diarrhea. Appetite loss, weight loss, abdominal cramps/bloating, nausea, body aches and fatigue also common.

Laboratory Criteria for Diagnosis: Detection of *Cyclospora* organisms or DNA in stool, intestinal fluid/aspirate, or intestinal biopsy specimens

Case Classification

- **Probable:** meets clinical description and is epidemiologically linked to a confirmed case
- **Confirmed:** meets clinical description and at least one of criteria for laboratory confirmation

Survey Responses



Cocktail Party Analysis

Food	Ill/ate	Ill/not ate	Well/ate	Well/not ate	RR (95% CI)	P-value
Beef	1	0	10	8	undefined	1
Burrata	0	1	7	8	0	1
Sausage roll	0	2	9	7	0	0.471
Beer	0	2	3	9	0	1
Wine	0	2	13	4	0	0.088
Liquor	0	2	7	8	0	0.485
Ice	1	1	10	5	0.55 (0.04-7.25)	1
Orange slice	0	1	1	10	0	1
Lime slice	0	1	4	8	0	1
Lemon slice	0	1	3	9	0	1
Water	2	0	6	7	undefined	0.467

Dinner Analysis

Food	Ill/ate	Ill/not ate	Well/ate	Well/not ate	RR (95% CI)	P-value
Salmon	2	0	14	6	Undefined	1
Beef	2	0	22	1	Undefined	1
Asparagus	2	0	23	0	Undefined	1
Potatoes	1	1	20	1	0.10 (0.01-1.01)	0.170
Cake	1	1	17	5	0.33 (0.02-4.55)	0.446
Berries	2	0	17	4	Undefined	1
Strawberries	2	0	12	4	Undefined	1
Raspberries	2	0	12	4	Undefined	1
Blueberries	2	0	12	4	Undefined	1
Blackberries	2	0	10	6	Undefined	0.529

Challenges

- Gathering list of attendees
- Communicating with Home A host
- Collaborating with yacht club
- 31% reply rate to survey
- Recall bias
- Small numbers for analysis



Texas *Cyclospora* Investigation

Ingredient level unmatched case control study:
24 cases and 70 controls at Restaurant A in Houston, TX

Ingredient	Case			Control			OR	Lower 95% CI	Upper 95% CI
	Ate	Did not eat	% exposed	Ate	Did not eat	% exposed			
Mint	20	4	83.30%	39	31	55.71%	3.9	1.15	17.42
Green peppers	19	5	79.17%	37	33	52.86%	3.3	1.05	12.78
Tomatoes	21	3	87.50%	43	27	61.43%	4.3	1.13	24.86
Red onion	14	10	58.33%	17	53	24.29%	4.3	1.5	13.06
Green onion	20	4	83.30%	23	47	32.86%	9.9	2.9	44.71
Cabbage	9	15	37.50%	8	62	11.43%	4.6	1.32	16.24

Data are preliminary, until trace-back investigations are completed

Connecticut *Cyclospora* Investigation (revisited)

Quinoa salad:

- *Quinoa, cabbage, carrots, hearts of palm, edamame, sunflower seeds, lemon juice, olive oil, garlic, salt and pepper*

“The only garnishments they used were scallions and sunflower seeds”

We are sold subject to the Agricultural Marketing Agreement Act of 1937, and all commodities listed herein are subject to the provisions of that Act and any orders thereunder.

Invoice **13063482**
 Entered By: **OMAR**
 Time: **15:26:15**
 Route: **CT1**

Late charges will accrue at the rate of 2% per month. These late charges and all attorneys' fees necessary to collect any balance due hereunder shall be considered owing in connection with this transaction covered by the PACA trust.

Bill To: [Redacted] Ship To: [Redacted]

Delivery Window: * M-S 7- 10

Customer	Ship Via	F.O.B.	Terms	Store Name/Number
[Redacted]			Net 30	[Redacted]
Purchase Order Number		Salesperson	Order Date	Our Order Number
		OMAR	06/17/17	9882459

Ordered	Shipped	B.O.	U/M	Item	Item Description	Origin	Unit Price	Extended Price
2.00	2.00	0.00	CTN	SQ94	SQUASH ACORN 35#	MEX	29.00	58.00
1.00	1.00	0.00	CTN	BEE3	RED BEETS 25lb MED-LARGE	USA	16.50	16.50
1.00	1.00	0.00	CTN	BR2AA	BROCCOLI CROWNS 20 LB	USA	22.00	22.00
1.00	1.00	0.00	CTN	CAB	CABBAGE GREEN CASE	USA	14.00	14.00
1.00	1.00	0.00	CTN	CI2	CILANTRO CRATE	USAL	16.00	16.00
1.00	1.00	0.00	CTN	PE8A	PEPPERS JALAPENOS CASE	MEX	12.00	12.00
1.00	1.00	0.00	CTN	KA1	GREEN KALE	USAL	14.00	14.00
1.00	1.00	0.00	CTN	PI6	PINEAPPLE GOLDEN 5 CT	CRI	13.50	13.50
1.00	1.00	0.00	CTN	SC2A	SCALLIONS 48ct ICELESS	MEX	17.00	17.00
2.00	2.00	0.00	CTN	TO	TOMATO PLUM RED RIPE PLUM	USA	29.50	59.00
1.00	1.00	0.00	EACH	ME2AA	YELLOW WATER MELON PIECE	USA	9.50	9.50
3.00	3.00	0.00	CTN	SQ2	SQUASH YELLOW MEDIUM	USAL	28.00	84.00
3.00	3.00	0.00	CTN	SQ	SQUASH GREEN MEDIUM	USAL	10.00	30.00
1.00	1.00	0.00	CTN	BA1	BANANAS READY TO GO No6	ECU	21.00	21.00
1.00	1.00	0.00	CTN	MI2	MINT KILO BOX MINT KILO	COL	12.00	12.00

*** IMPORTANT ***
 [Redacted] A 24 HOUR RETURN POLICY ON ALL ITEMS EXCEPT MEATS, CHEESES AND FRESH TRUFFLES THESE ITEMS MUST BE RETURNED AT TIME OF DELIVERY PLEASE INSPECT ALL ITEMS AT TIME OF DELIVERY

Nontaxable Subtotal	398.50
Taxable Subtotal	0.00
Tax	0.00
Total Invoice	398.50

Received by: _____

Customer Original Page 1

Conclusions

- The observed increase in domestically-acquired cases in CT parallels the increase seen nationally
- Outbreak investigation did not implicate a specific vehicle for infection
 - Reflects the challenge of identifying the source of illness on both a national and state level
- Value of trace-back of ingredients traditionally high-risk for *Cyclospora*
 - Gathering invoices and determining distributor and supplier

Acknowledgements

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