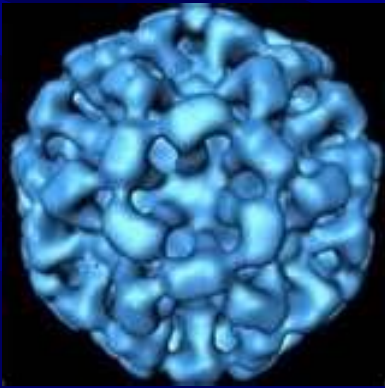


Norovirus Outbreaks Associated with Consumption of Raw Oysters



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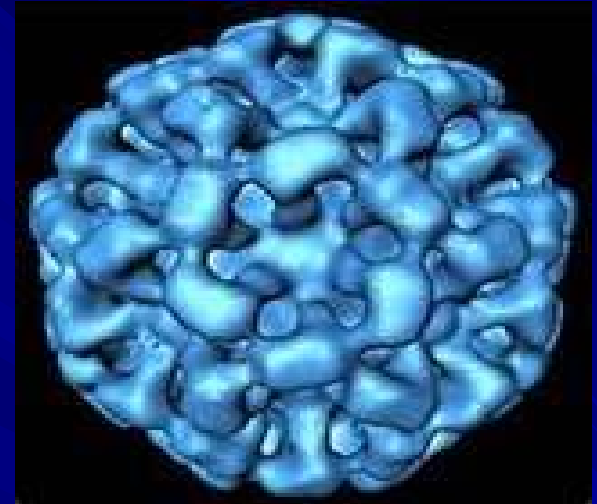
Infectious Disease Epidemiology Section

Louisiana Office of Public Health

Gulf & South Atlantic States
Shellfish Conference

Norovirus

- Small round structured virus
- Single stranded RNA
- *Caliciviridae* virus family
 - *Vesivirus*-animal
 - *Lagovirus*-animal
 - ***Norovirus*-human**
 - *Sapovirus*-human
- *Norovirus*-
 - Five genogroups GI-GV
- Very stable in the environment



Norovirus

- Symptoms: nausea, vomiting, diarrhea & abdominal pain
- Incubation period: 12-48 hours (up to 72 hrs)
- Illness is self limiting
- Treatment: Oral fluid and electrolyte replacement

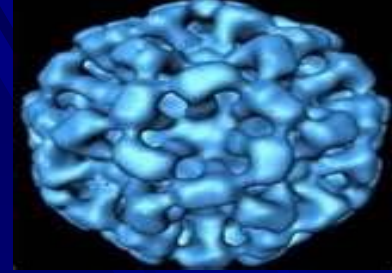


Norovirus



- Norovirus is not a reportable disease
- Outbreaks are reportable
- ID Epi follows up on all reported outbreaks
- Numerous person-to-person Norovirus outbreaks January-March 2010

Norovirus



- CDC estimates >21 million cases of acute gastroenteritis each year are due to norovirus
- 1997-2000- 232 norovirus outbreaks reported to CDC:
 - 57% foodborne
 - 16% person-to-person
 - 3% waterborne
 - 23% unknown

Norovirus



- 2006-54% of all reported foodborne disease outbreaks with a confirmed etiology were caused by norovirus.*
- Most common settings: restaurants, catered meals, nursing homes, schools, vacation settings, and cruises

Foodborne Norovirus

- Cold foods, salads, sandwiches, bakery products, liquid items



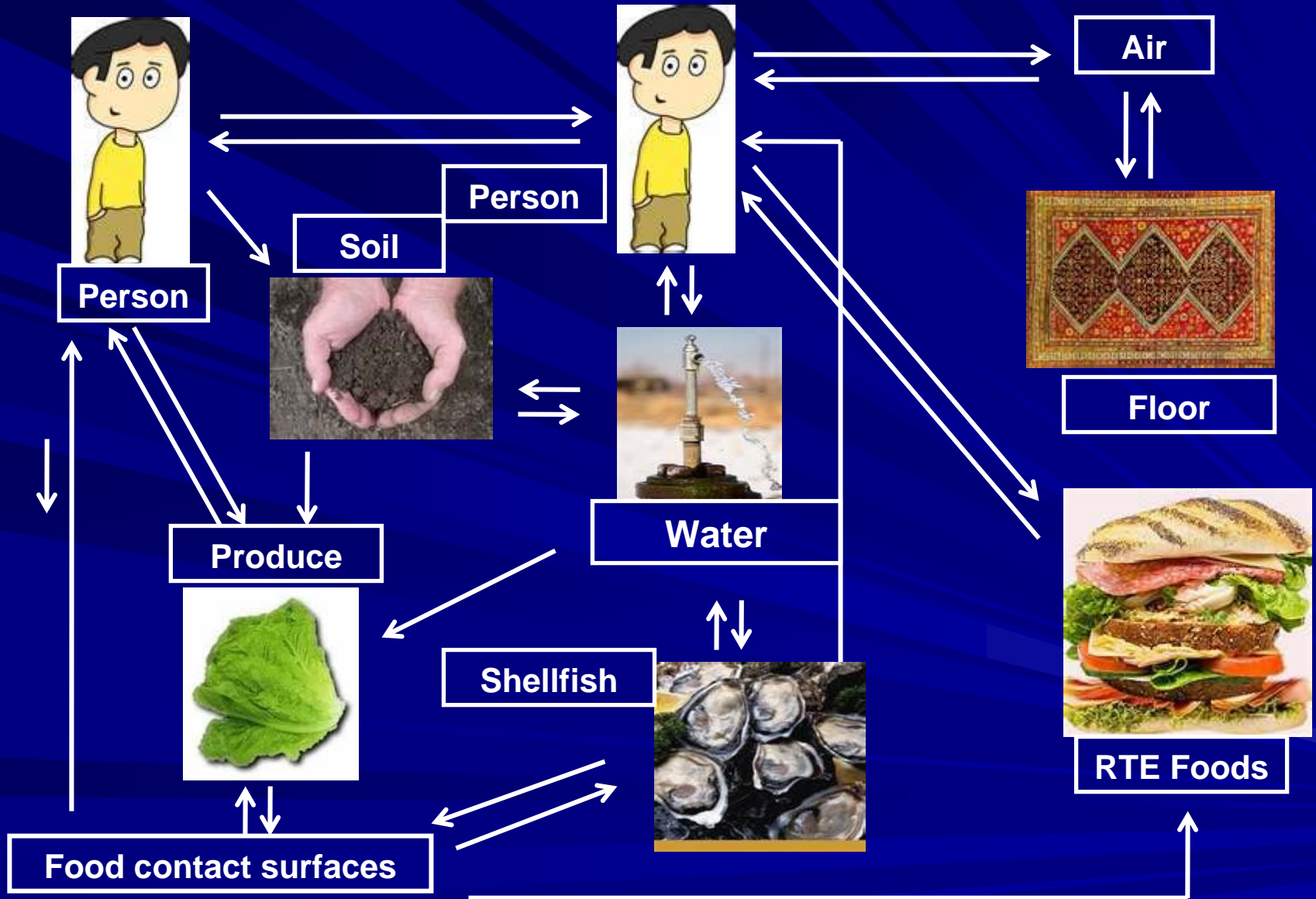
- Fruits/vegetables irrigated with contaminated water



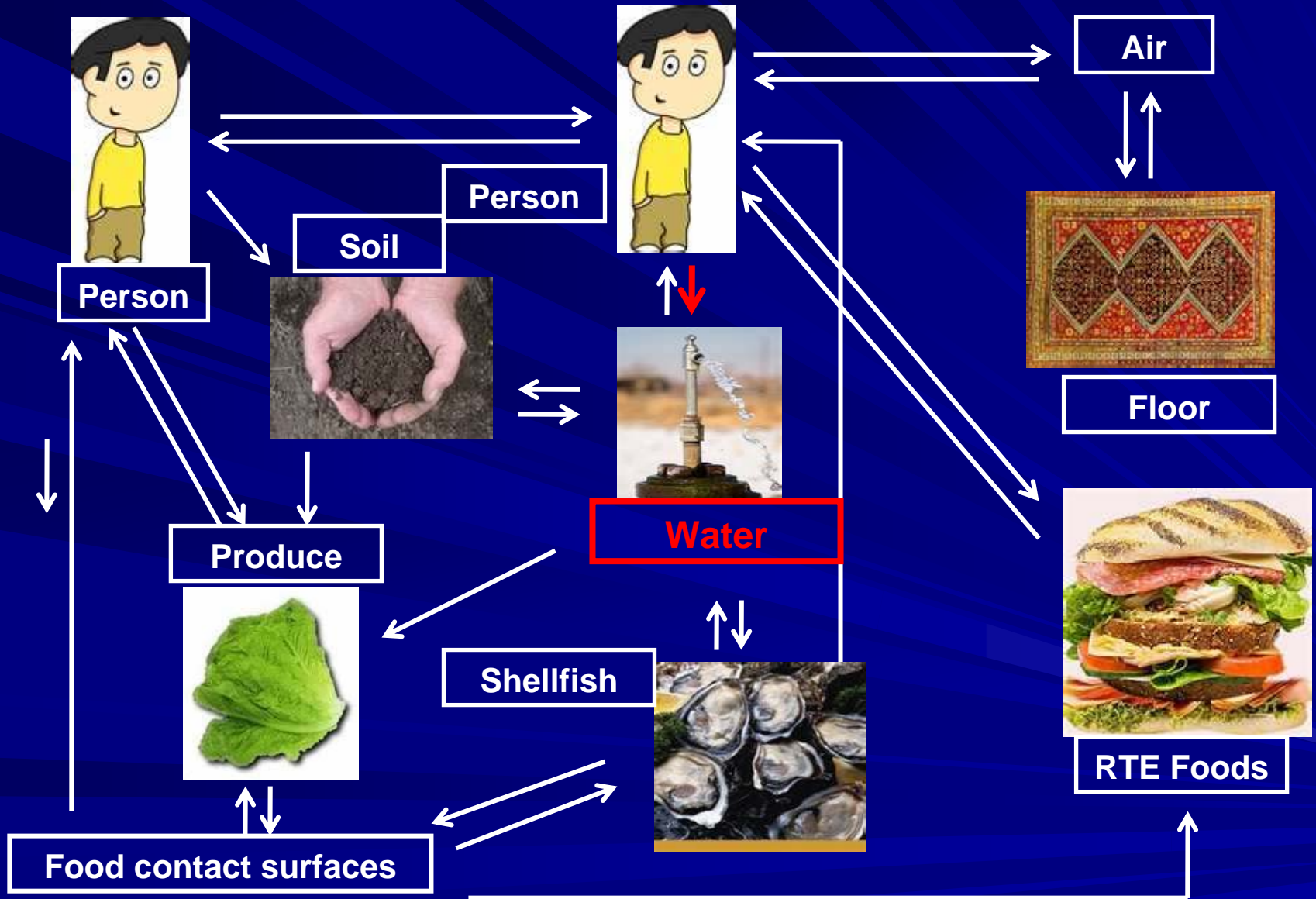
- **Oysters from contaminated waters**



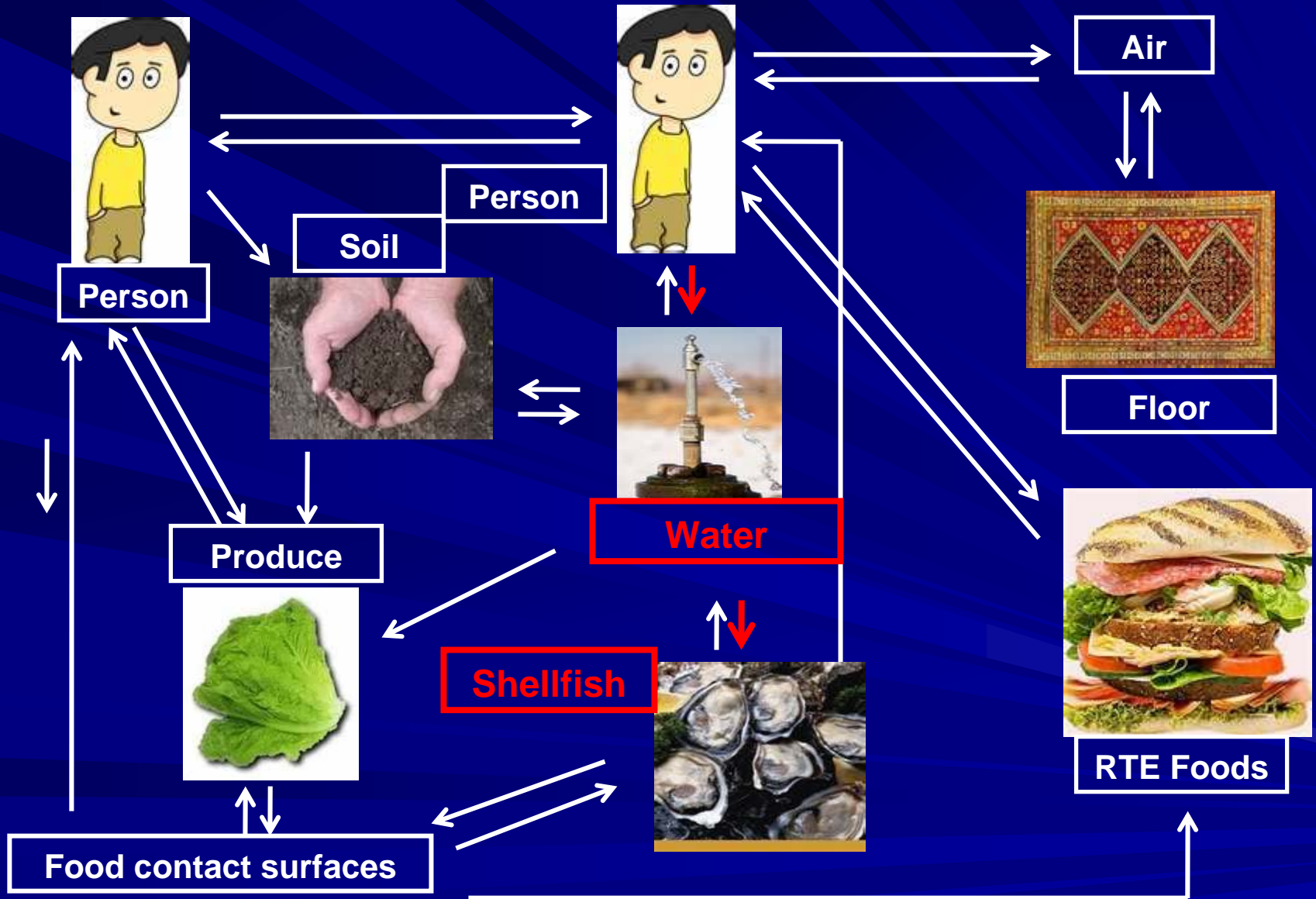
Norovirus



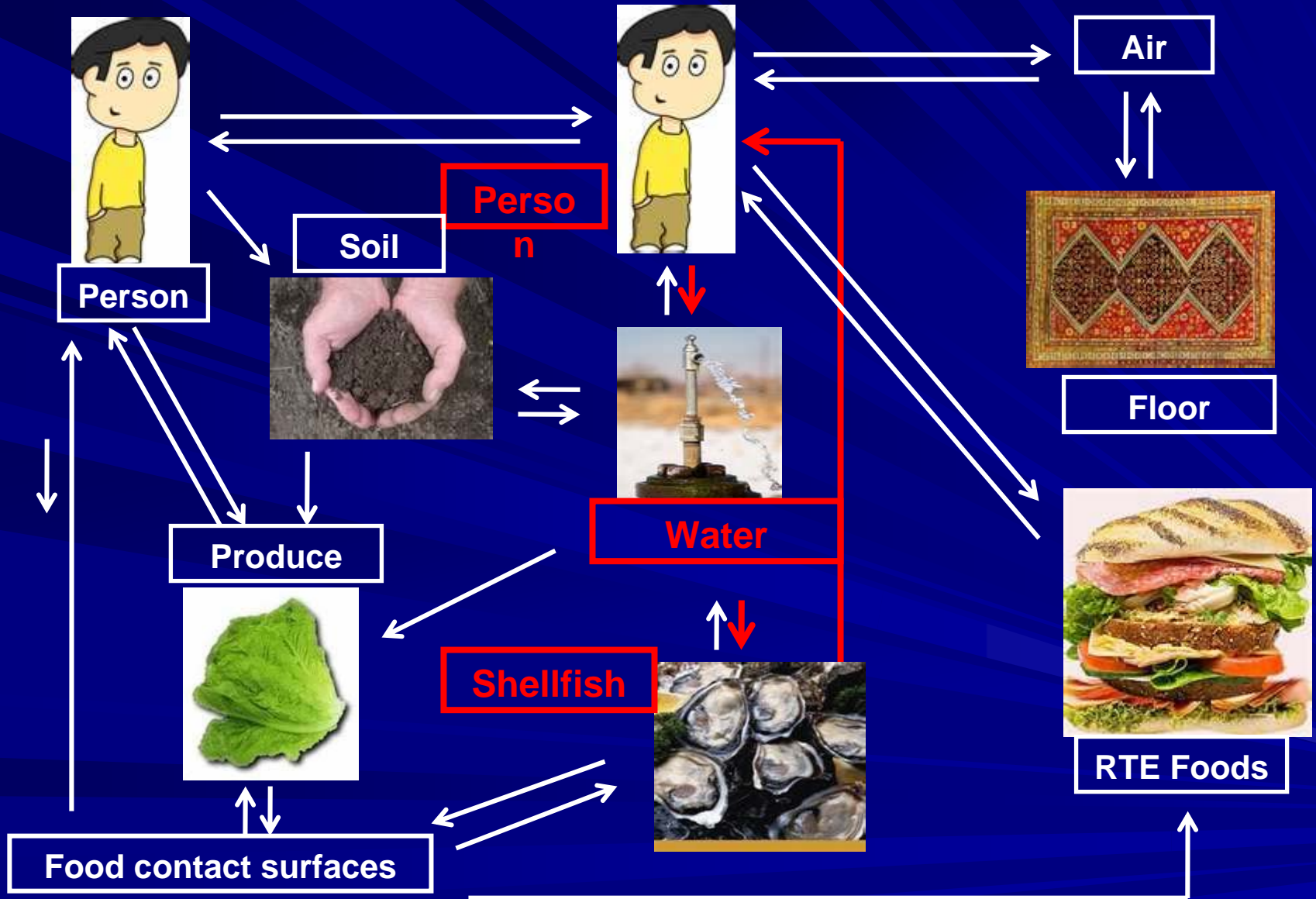
Norovirus



Norovirus



Norovirus



Norovirus 2010

Mississippi outbreak with La oysters

- GI outbreak among Conference attendees in Mississippi March 8-12, 2010

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	1	2	3	4	5	6
7	8	9	10	11	12	13
	Mississippi conference		Raw oyster dinner	Mississippi conference		
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

Norovirus 2010

Mississippi outbreak with La oysters

- ~ 60 people attended from 19 states and 1 U.S. territory
- **Illness onset:** Thursday March 11
- **Symptoms:** nausea, vomiting, diarrhea, abdominal cramps.
- Menus, attendee lists were obtained by MS DOH
- Questionnaires were completed on 49 of the 60 attendees.
- Oyster samples + tags collected
- Stool samples collected

Norovirus 2010

Mississippi outbreak with La oysters-

Results:

- OR raw oysters (dinner Wednesday, March 10) was **20.31 (2.21-469.46)**
- The incubation period was **22-33.9 hours** with a **mean of 28 hours.**
- 2 stool samples were positive for **Norovirus GII.**
- Oysters were from Louisiana harvest **Area 7**

Norovirus 2010

Mississippi outbreak with La oysters

- Oyster meat was tested at the Gulf Coast Seafood lab:
 - Subsample A tested negative for norovirus GI and GII
- Harvest **area 7** was closed on **March 24th** and oysters were recalled.
 - Subsample B tested **positive for norovirus GII**

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	1	2	3	4	5	6
7	8 Mississippi conference	9	10 Raw oyster dinner	11 Mississippi conference	12	13
14	15	16	17	18	19	20
21	22	23	24 LA Area 7 Closed	25	26	27
28	29	30	31			

Norovirus 2010

La. Restaurant Outbreak with La. Oysters

- March 23, 2010 the IDES was notified that restaurant patrons were getting sick after eating oysters on March 21st and 22nd.



SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	1	2	3	4	5	6
7	8 Mississippi conference	9	10 Raw oyster dinner	11 Mississippi conference	12	13
14	15	16	17	18	19	20
21 LA Restaurant Raw Oysters Consumed	22	23	24 LA Area 7 Closed	25	26	27
28	29	30	31			

Norovirus 2010

La. Restaurant Outbreak with La. Oysters

- Restaurant was contacted
- Names and numbers of the patrons who reported getting sick provided by restaurant
- The diners were called immediately.



Norovirus 2010

La. Restaurant Outbreak with La. Oysters

- Food history questionnaire and details of their symptoms were collected

Patient No. _____ Interviewer's Initials: _____

FOODBORNE CASE HISTORY FORM

Name _____ DOB: ___/___/___ Sex: M F
Address _____ City _____ Zip _____
Phone () _____ Occupation _____

When were you in New Orleans? Date: ___/___/___ to Date: ___/___/___

Date/time of meal? Date: ___/___/___ Time: ___:___ a.m./p.m.

What food/drinks did you consume at the restaurant?

Did you have any of the following symptoms beginning on or after day of the meal?

	Yes	No	Unknown	
Diarrhea	___	___	___	# Stools/day _____; duration of diarrhea ___ days
Blood/stools	___	___	___	
Fever	___	___	___	(If recorded: _____ °F)
Cramps	___	___	___	
Nausea	___	___	___	
Vomiting	___	___	___	Comments: _____
Headache	___	___	___	_____
Other	___	___	___	_____

When did your symptoms start? Date ___/___/___ Time ___:___ a.m./p.m.

How long did your symptoms last? ___ hours OR ___ days

Did you consult a physician? ___ Yes ___ No Name: _____

Were you hospitalized? ___ Yes ___ No Hospital: _____

Was a stool specimen submitted? ___ Yes ___ No Date: _____ Result: _____

Any complications? ___ Yes ___ No What? _____

Comments: _____

Do you know anyone else who was sick? Y N
Names/phone numbers: _____

Norovirus 2010

La. Restaurant Outbreak with La. Oysters

- Diners were asked to provide names and numbers of other diners-ill/not ill.
- Patrons were asked to provide a stool sample.
- Sanitarians did an inspection and obtained oyster tags.

Norovirus 2010

La. Restaurant Outbreak with La. Oysters

- The molluscan shellfish program was notified of the possible illnesses associated with oysters.
- FDA was notified of the potential problem.
- The Oyster Task Force was contacted and informed about the spread of norovirus throughout the state.

Norovirus 2010

La. Restaurant Outbreak with La. Oysters

Cases: those who ate at the restaurant on March 21st or 22nd and experienced vomiting and/or diarrhea 12 to 72 hours after eating there. **N=14**

Controls: those who ate at the restaurant on March 21st or 22nd and did not experience vomiting and/or diarrhea 12 to 72 hours afterwards. **N=1**

Norovirus 2010

La. Restaurant Outbreak with La. Oysters

Symptoms:

Vomiting: 93%

Diarrhea: 100%

Cramps: 93%

Nausea: 100%

Symptom Onset: 3/22/2010 - 3/23/2010

Incubation period: mean 25 hours (19-34)

Symptom duration: mean 17 hours (5 to 60)

0 hospitalizations.

Norovirus 2010

La. Restaurant Outbreak with La. Oysters

Results:

- 14 cases reported eating raw oysters
 - 6/14 ate only raw oysters
 - 8/14 cases ate raw oysters + other food items but there were no other common food items



Norovirus 2010

La. Restaurant Outbreak with La. Oysters

Results:

- 1/1 stool sample + Norovirus GII -to CDC further testing.
- FDA did not test the oysters
- On **March 25th**, there was a precautionary closure of Louisiana Growing Area 3

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	1	2	3	4	5	6
7	8 Mississippi conference	9	10 Raw oyster dinner	11 Mississippi conference	12	13
14	15	16	17	18	19	20
21 LA Restaurant Raw Oysters Consumed	22	23	24 LA Area 7 Closed	25 LA Area 3 Closed	26	27
28	29	30	31			

Norovirus 2010

La. Restaurant Outbreak with La. Oysters

- **Conclusion:** Confirmed norovirus outbreak associated with the consumption of raw oysters at a restaurant harvested from Area 3.

Norovirus 2010

La. Outbreak Wedding #1 - La. Oysters

- Monday, March 29th IDES was notified of a possible GI outbreak associated with a wedding held on the night of March 27th.



SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	1	2	3	4	5	6
7	8 Mississippi conference	9	10 Raw oyster dinner	11 Mississippi conference	12	13
14	15	16	17	18	19	20
21 LA Restaurant Raw Oysters Consumed	22	23	24 LA Area 7 Closed	25 LA Area 3 Closed	26	27 Wedding #1
28	29	30	31			

Norovirus 2010

La. Outbreak Wedding #1 - La. Oysters

- Raw oysters were served at the reception.
- The catering company was contacted, menu was obtained.
- A sanitarian inspected catering company, collected the oyster tags.
- IDES was given a list of names and phone numbers of people who attended the wedding reception.

Norovirus 2010

La. Outbreak Wedding #1 - La. Oysters

- Food history questionnaire was completed on the guests
- Guests were asked to provide names and numbers of other people who attended the reception.
- Food history questionnaires were completed on 47 people who attended the reception, 6 of these people were part of the catering staff.
- Guests were also asked to provide a stool sample.

Norovirus 2010

La. Outbreak Wedding #1 - La. Oysters

Cases: those who ate food served at the wedding reception and experienced vomiting and/or diarrhea 12-72 hours after eating at the reception. **N=19**

Controls: those who ate food served at the wedding reception and did not experience vomiting and/or diarrhea 12-72 hours afterwards. **N=28**

Norovirus 2010

La. Outbreak with La. Oysters Wedding #1

Symptoms:

Vomiting: 74%

Diarrhea: 84%

Cramps: 74%

Nausea: 84%

Headache: 74%

Onset: 3/28 -3/29.

Incubation period: mean 30 hours (12 to 41)

Symptom duration: mean 18 hours (4-48)

3 ER/physician visits

0 hospitalizations.

Norovirus 2010

La. Outbreak Wedding #1 - La. Oysters

Results:

- Significant association between becoming sick and eating raw oysters P-value: 0.0000012
- 3/3 stool samples Norovirus GII + to CDC for further testing.
- Oysters were not tested at FDA.
- On **March 30th** Louisiana Harvest Area 13 was closed.

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	1	2	3	4	5	6
7	8 Mississippi conference	9	10 Raw oyster dinner	11 Mississippi conference	12	13
14	15	16	17	18	19	20
21 LA Restaurant Raw Oysters Consumed	22	23	24 LA Area 7 Closed	25 LA Area 3 Closed	26	27 Wedding #1
28	29	30 LA Area 13 Closed	31			

Norovirus 2010

La. Outbreak Wedding #1 - La. Oysters

- **Conclusion:** Confirmed norovirus outbreak associated with the consumption of raw oysters harvested from Area 13 at a wedding reception.

Norovirus 2010

La. Outbreak Wedding #2 - La. Oysters

- Thursday, April 1st, IDES was notified by a sanitarian about a possible GI outbreak associated with a wedding and reception that was held at a Hotel on March 20th.

- Late reporting makes follow up difficult!



SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	1	2	3	4	5	6
7	8 Mississippi conference	9 Mississippi conference	10 Raw oyster dinner	11 Mississippi conference	12 Mississippi conference	13
14	15	16	17	18	19	20 Wedding #2
21 LA Restaurant Raw Oysters Consumed	22	23	24 LA Area 7 Closed	25 LA Area 3 Closed	26	27 Wedding #1
28	29	30 LA Area 13 Closed	31	ID Epi notified of Wedding #2		

Norovirus 2010

La. Outbreak Wedding #2 - La. Oysters

- A chef in the restaurant was contacted that evening - he could not provide details about the outbreak.
- On Friday, April 2nd, the catering staff, the executive chef and the director of operations were contacted- more details about the outbreak were obtained.

Norovirus 2010

La. Outbreak Wedding #2 - La. Oysters


- The wedding took place at the hotel on **March 20th** and the reception was catered for and took place at the hotel.
- Oysters were served at the reception.



Norovirus 2010

La. Outbreak Wedding #2 - La. Oysters

- The Restaurant and Beverage department had received complaints from some of the wedding/reception attendees after it was aired on the news that some oyster beds had been closed due to illnesses related to oyster consumption.

A television screen with a white border and a black bezel. The screen displays the text "Oyster Beds closed due to illnesses." in yellow font on a blue background.

Oyster Beds
closed due to
illnesses.

Norovirus 2010

La. Outbreak Wedding #2 - La. Oysters

- Oysters were from **Area 7** which was later closed (on 3/24 and recalled) due to the norovirus outbreak in Mississippi.
- Currently serving TX oysters until the La. beds were safe again.
- Menu, contact information for the wedding was obtained.

Norovirus 2010

La. Outbreak Wedding #2 - La. Oysters

- Monday, April 5th, the contact person was called, IDES obtained a list of wedding attendees to contact.
- A food history questionnaire was administered to the guests (13 were collected).
- Due to the late report of this outbreak, guests were not asked to submit stool samples.

Norovirus 2010

La. Outbreak with La. Oysters Wedding #2

Cases: attended the wedding reception and experienced vomiting and/or diarrhea 12-72 hours after eating at the reception. **N=9**

Controls: attended the wedding reception and did not experience vomiting and/or diarrhea 12-72 hours afterwards. **N=4**

Norovirus 2010

La. Outbreak Wedding #2 - La. Oysters

Symptoms:

Vomiting: 67%

Diarrhea: 100%

Cramps: 100%

Nausea: 67%

Headache : 67%

Onset: 3/21-3/22.

Incubation period: mean 27 hours (14 to 40)

Symptom duration: mean 57 hours (15 hrs to 6 dys)

1 ER/physician visit

0 hospitalizations.

Norovirus 2010

La. Outbreak Wedding #2 - La. Oysters

Results:

- 9 cases - all 9 ate raw oysters.
- 4 controls - all 4 did not eat oysters.
- Due to the late reporting of this outbreak, no stool samples were collected.
- **Conclusion:** Based on incubation period, signs and symptoms, duration of illness:
Suspect norovirus outbreak associated with the consumption of raw oysters.

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	1	2	3	4	5	6
7	8 Mississippi conference	9	10 Raw oyster dinner	11 Mississippi conference	12	13
14	15	16	17	18	19	20 Wedding #2 Area 7 Oysters
21 LA Restaurant Raw Oysters Consumed	22	23	24 LA Area 7 Closed	25 LA Area 3 Closed	26	27 Wedding #1
28	29	30 LA Area 13 Closed	31	ID Epi notified of Wedding #2		

Norovirus 2010



- DHH press releases
- Media coverage of Harvest Area closures due to illnesses
- Numerous complaints from people who consumed raw oysters at restaurants and became ill.
- Small parties (1 or 2 people) at a single restaurant
- Complaints to Molluscan Shellfish Program & Sanitarians
- ID Epi worked with Molluscan Shellfish Program & Sanitarians to follow up on all complaints.

Questions?



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