Descriptive Epidemiology

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Acute & Communicable Disease Prevention Program

Polling questions

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Descriptive Epidemiology

- Characterizes the amount and distribution of disease within a population
- Permits evaluation of trends and comparisons among groups
- Provides a basis for planning and evaluation of services
- Identifies problems to be studied further with analytic methods & comparison group

2

Describing the Data

- Data= What: injuries, cancer, hepatitis
- Person- Who
- Place- Where
- Time- When
- Why & How are part of Analytic Epidemiology

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Person

- Demographics: age, ethnicity, gender, SES
- Risk factors
  - Activities - work, leisure, use of medications/drugs/tobacco/alcohol
  - Behaviors – sex, drugs, food

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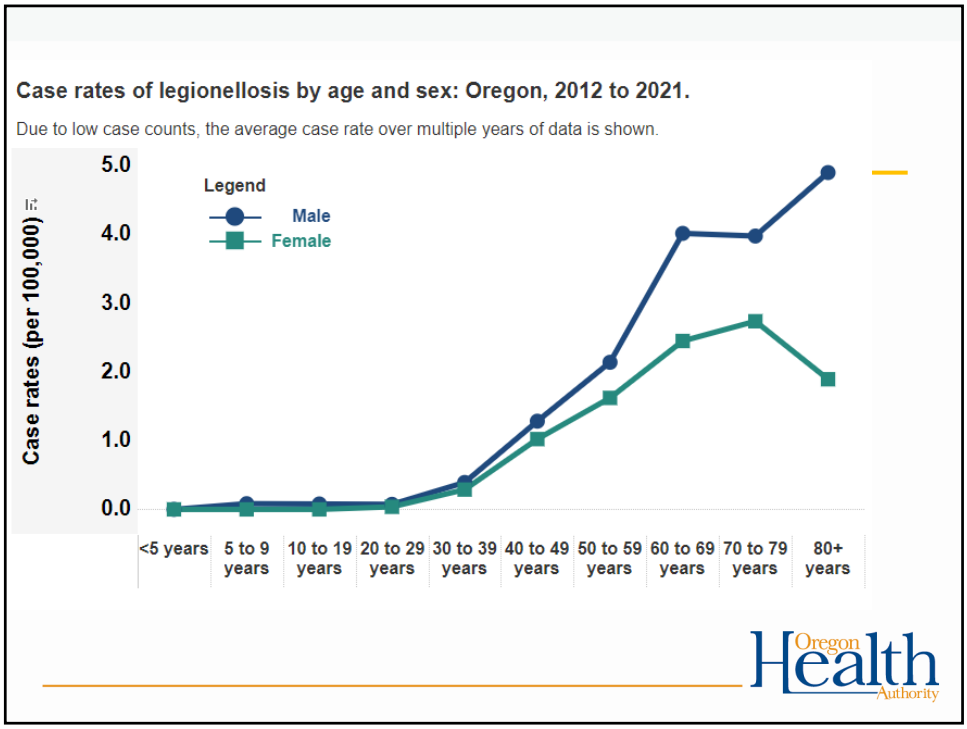
Case rates of legionellosis by age and sex: Oregon, 2012 to 2021.
Due to low case counts, the average case rate over multiple years of data is shown.
Case rates (per 100,000)
5.0
4.0
3.0
2.0
1.0
0.0
Legend
Male
Female
<5 years
5 to 9 years
10 to 19 years
20 to 29 years
30 to 39 years
40 to 49 years
50 to 59 years
60 to 69 years
70 to 79 years
80+ years
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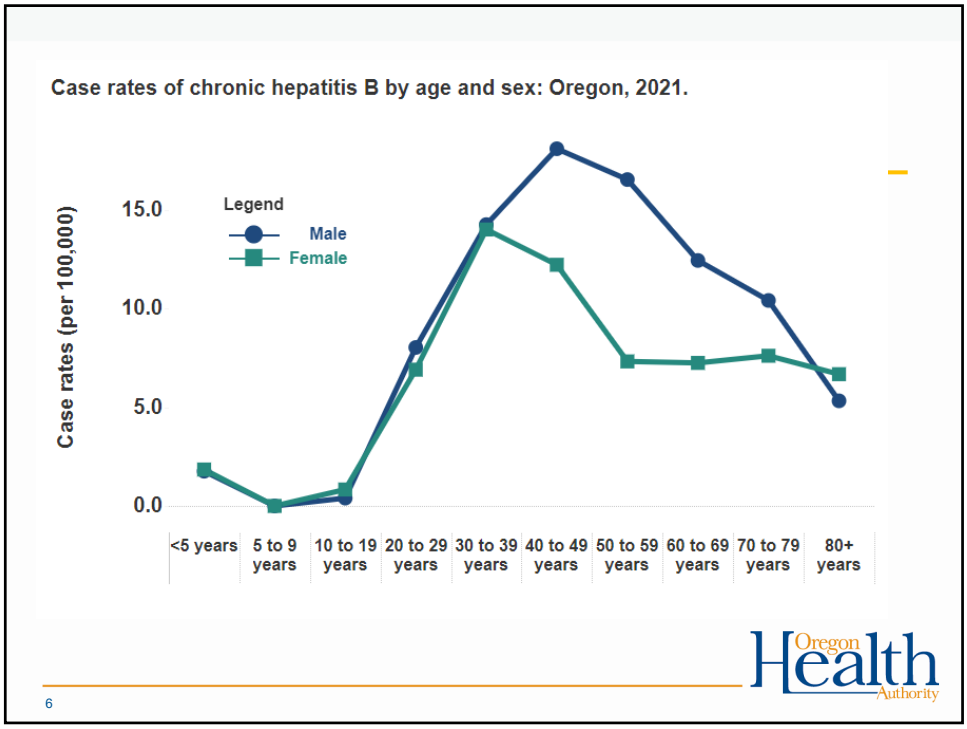
Case rates of chronic hepatitis B by age and sex: Oregon, 2021.
Case rates (per 100,000)
15.0
10.0
5.0
0.0
Legend
Male
Female
<5 years
5 to 9 years
10 to 19 years
20 to 29 years
30 to 39 years
40 to 49 years
50 to 59 years
60 to 69 years
70 to 79 years
80+ years
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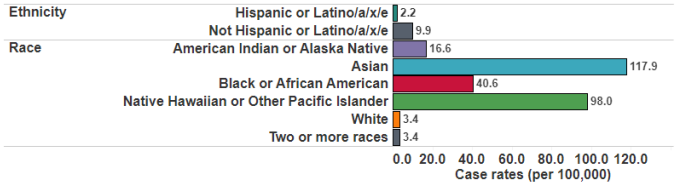
Case rates of chronic hepatitis B by reported race and ethnicity: Oregon, 2012 to 2021.

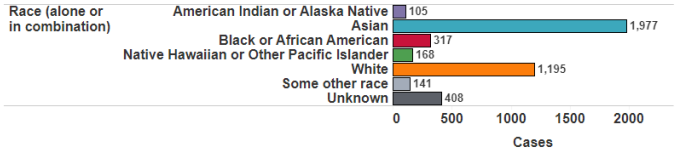
Race and Ethnicity are groupings determined by the Office of Management and Budget. Due to low case counts, the average case rate over multiple years of data is shown.



†Note: Rates based on small case counts (<5 cases) might be unstable.

Case counts of chronic hepatitis B by reported race and ethnicity: Oregon, 2012 to 2021.

Race alone or in combination means cases may be counted in all races that apply.



Rates calculated using NCHS population estimates

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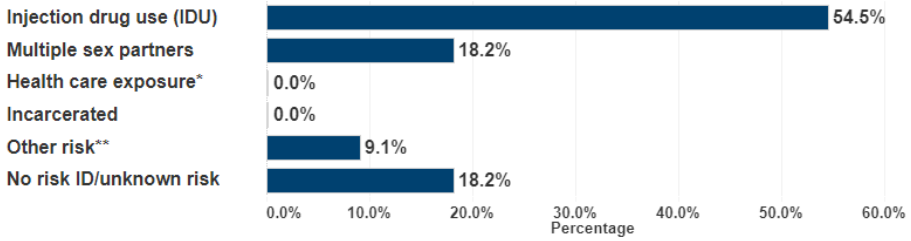
Risk factors for acute hepatitis C among interviewed cases: Oregon, 2021.

Risk factors are mutually exclusive.



*Health care exposures include transfusions. infusions, dialysis, surgery.
**Other risks include street drugs, needlestick, tattoo, piercings, other blood exposure.
***MSM stands for men who have sex with men.

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Place

- Where a person lives, works, plays
- Patterns of activity
  - Seating arrangements
- Maps are a useful tool to understand what might be happening
- Field study or site visit also are helpful to see things that people might not have noticed or remember

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Chat question

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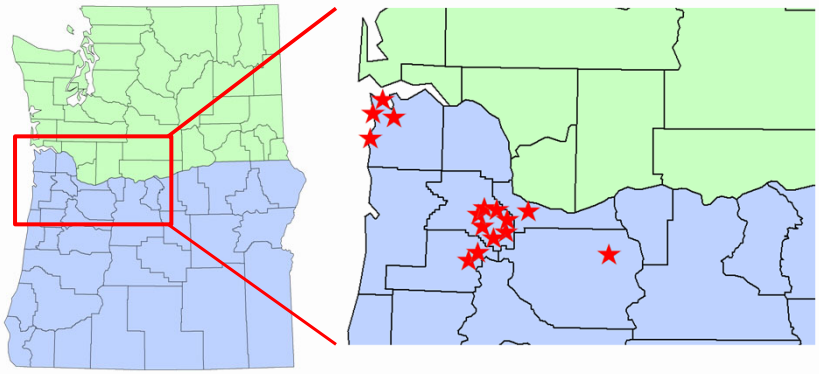
Residences of Cases



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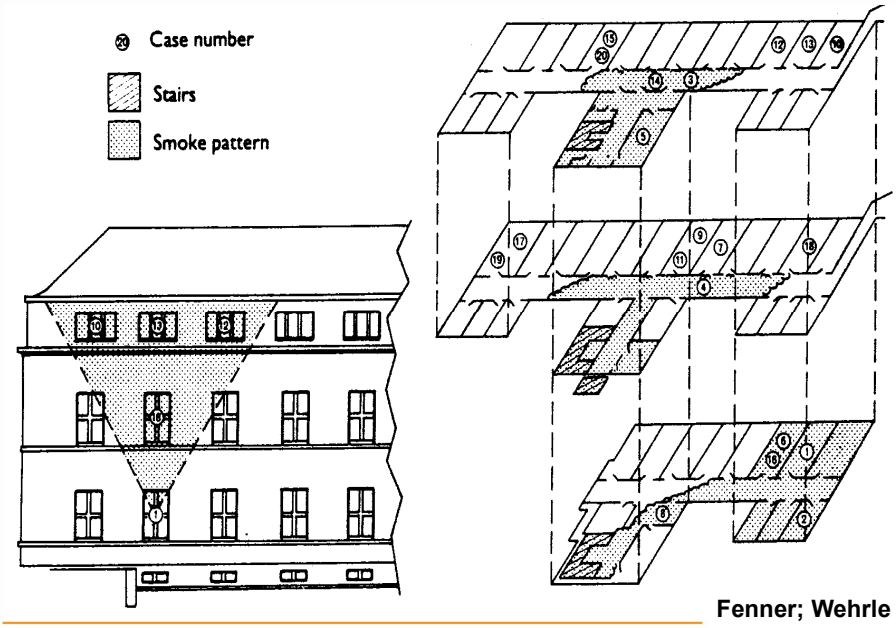

Fenner; Wehrle et al, 1970

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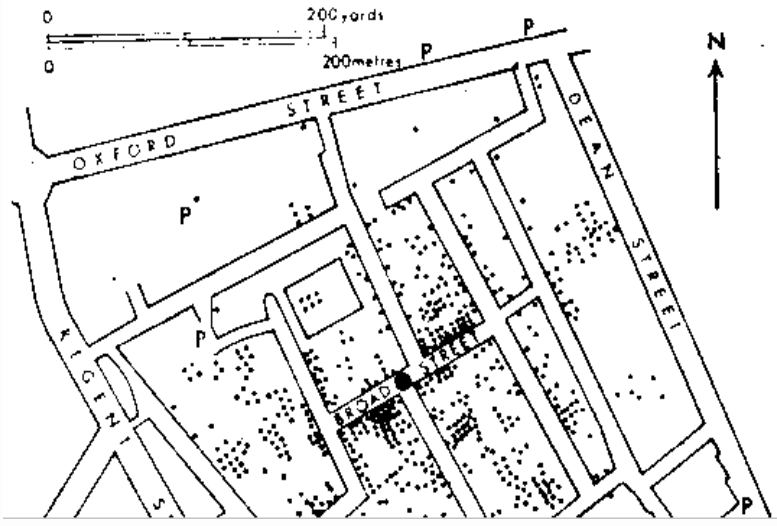

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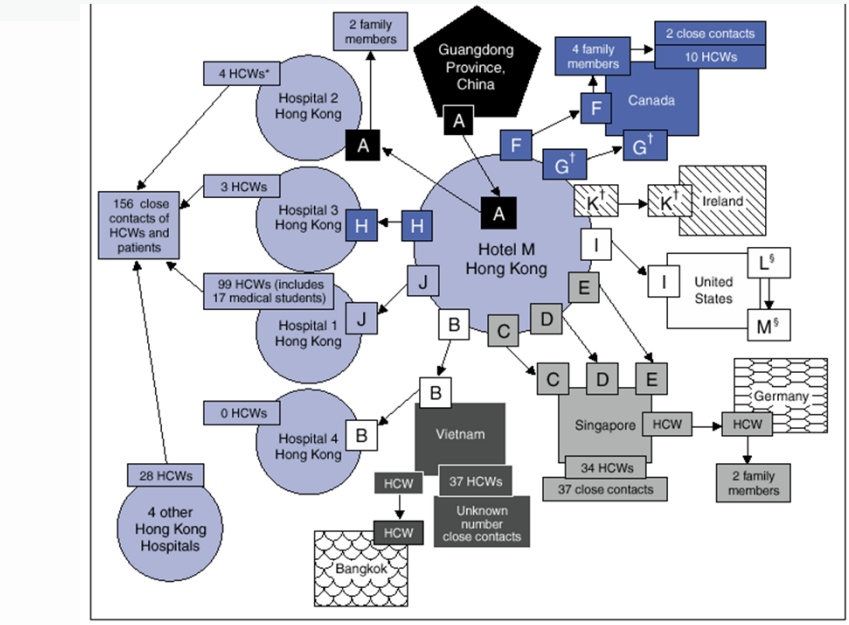

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Time

- Trends over years
- Seasonal variations
- Onset: day, time

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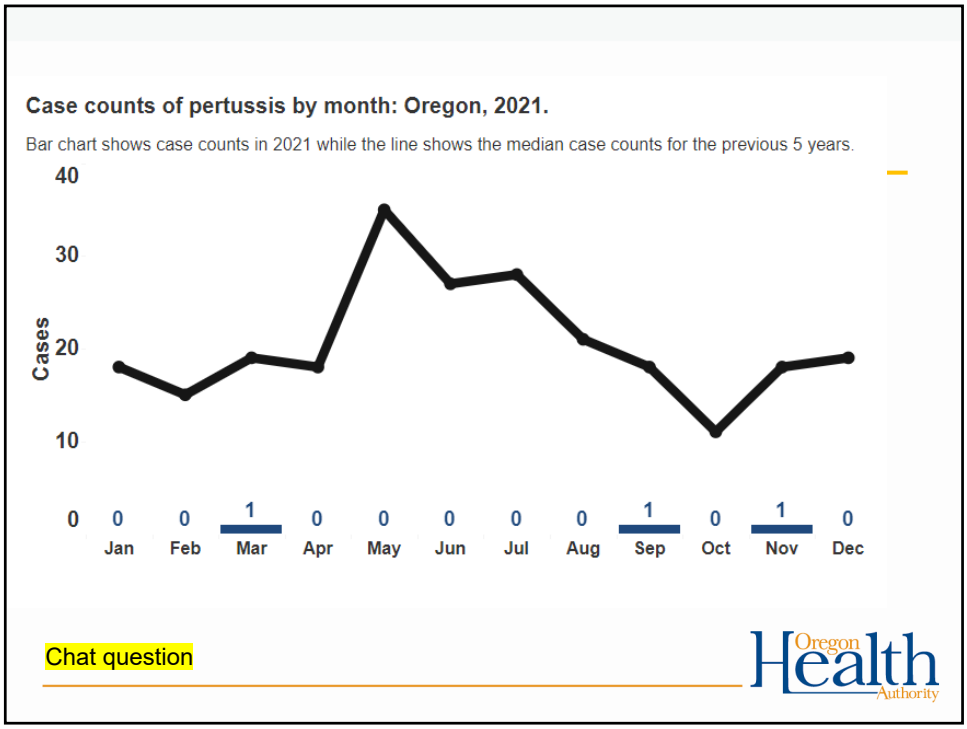
Case counts of pertussis by month: Oregon, 2021.
Bar chart shows case counts in 2021 while the line shows the median case counts for the previous 5 years.
Cases
40
30
20
10
0
0 Jan
0 Feb
1 Mar
0 Apr
0 May
0 Jun
0 Jul
0 Aug
1 Sep
0 Oct
1 Nov
0 Dec
Chat question
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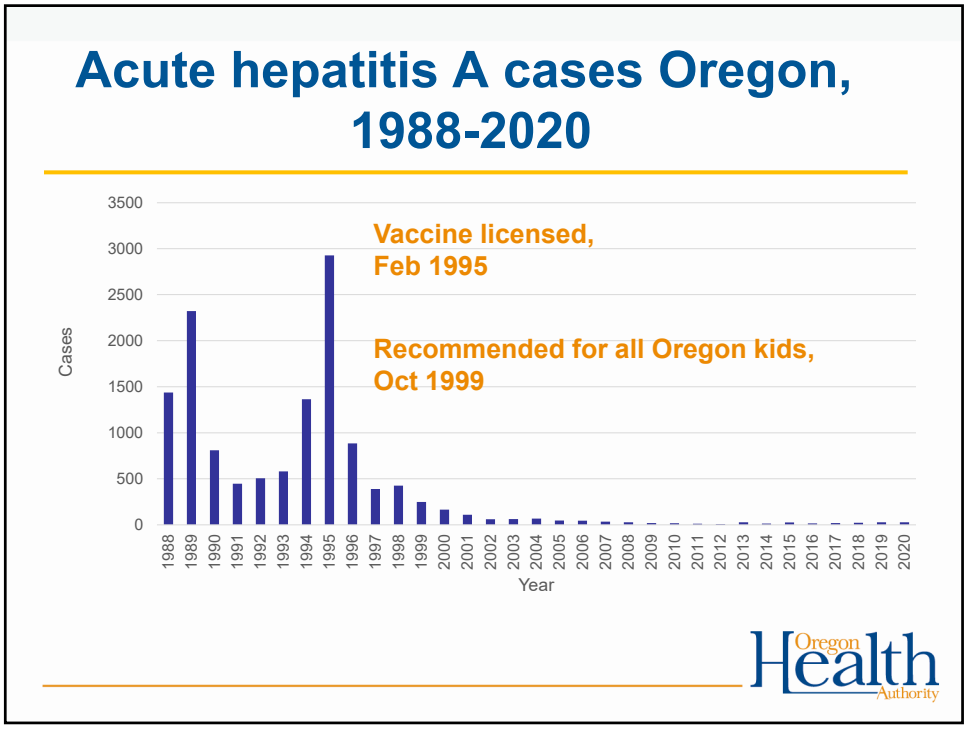
Acute hepatitis A cases Oregon, 1988-2020
Cases
3500
3000
2500
2000
1500
1000
500
0
Vaccine licensed, Feb 1995
Recommended for all Oregon kids, Oct 1999
1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
Year
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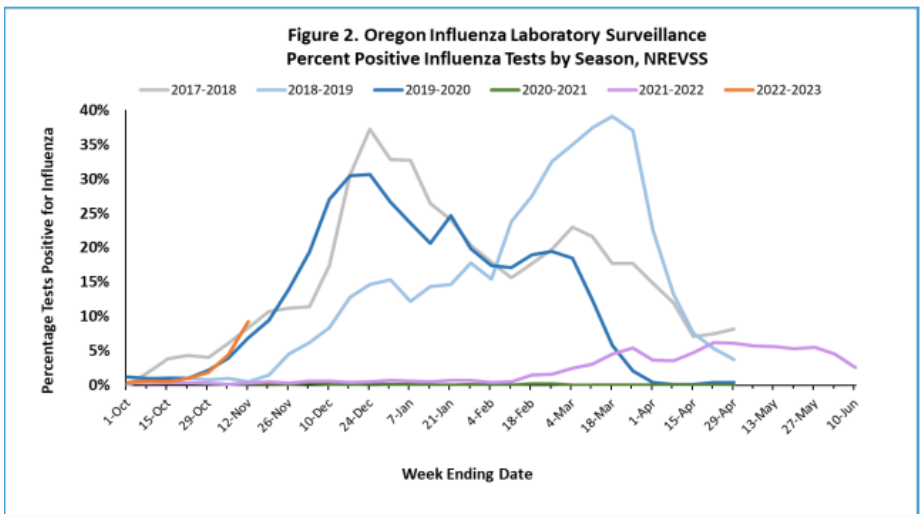

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Case Definition

- Person
- Place
- Time
- Clinical and laboratory information

Constructing line list is helpful to understanding the data and can assist in developing the definition of a case. The case definition is a standard set of criteria for deciding if the person is a case or not

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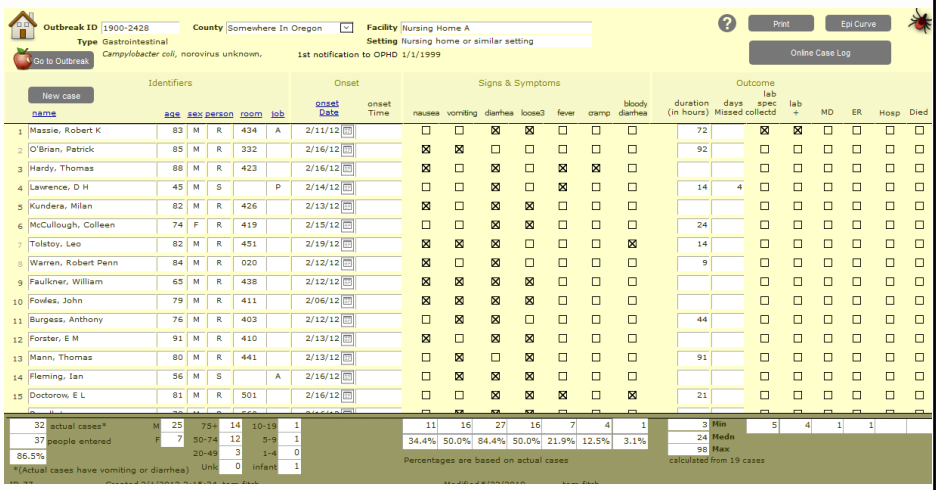

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Types of Case Definitions

- Confirmed – identification of the agent via laboratory
- Probable/Presumptive – either linked to a confirmed case OR other lab tests suggestive of exposure
- Suspect – someone who might be ill but has no link or laboratory data

Strawberry outbreak - O157 Case Definition

- **Confirmed case**
  - Culture-positive, outbreak PFGE pattern, symptom onset July–August 2011
- **Presumptive case**
  - Coincident diarrheal illness in household member of confirmed case
- **Compatible case**
  - Culture-positive, PFGE result pending, symptom onset July–August 2011

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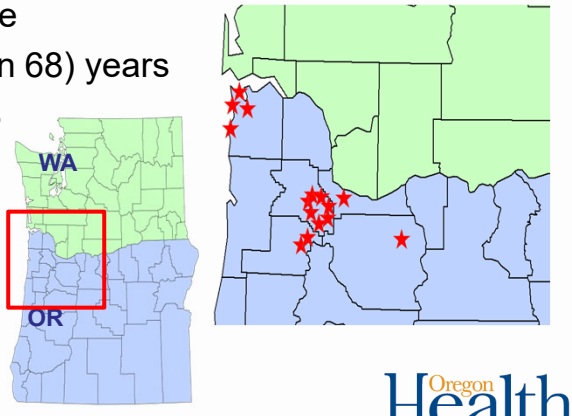
Case Characteristics

- 15 cases (8 confirmed, 1 presumptive, 6 compatible)
- 11 female, 4 male
- Age 4–85 (median 68) years
- Onset July 10–28



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Descriptive Epi exercise

The Oregon County Health Department assumed lead responsibility for the investigation. The State Office of Acute and Communicable Disease Prevention was asked to assist.

Over the next several days, more and more cases of diarrhea and bloody diarrhea were reported. While the earliest case was a child, cases occurred among all age groups.

The case-patients did not appear to have any consumption of food or water in common. However, they all had attended the Oregon County Fair. The investigators therefore felt comfortable focusing on the fair as the source of the outbreak.

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Descriptive Epi exercise

Question 1
What might you use as a case definition?

Question 2
How are you going to look for additional cases?

Question 3
What information do you want to obtain in your questionnaire?

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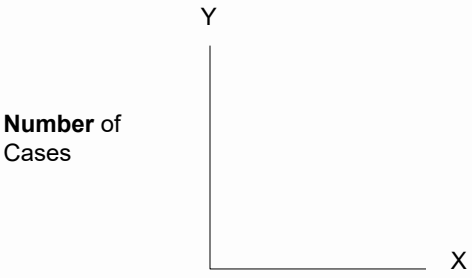
Epidemic Curve

- Visual graph
- Cases over time



Time – of onset or of meal

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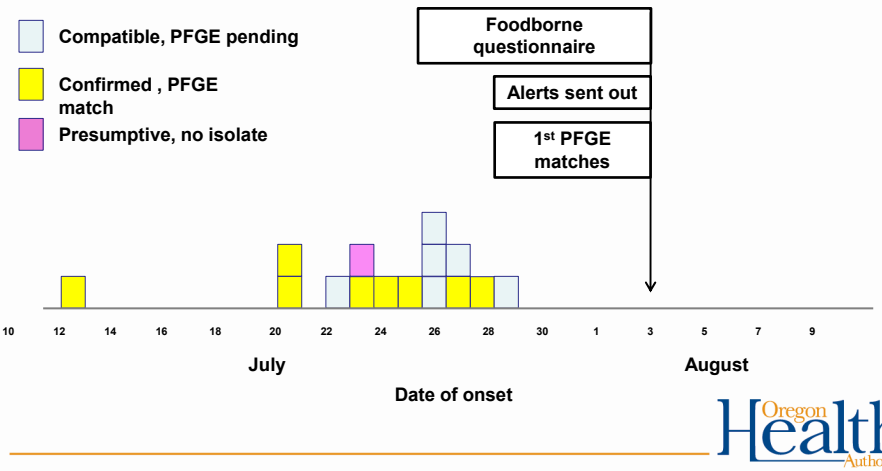
Epidemic Curve — August 5



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Different Patterns on Epi Curve

- Common source
  - Point source
  - Intermittent or continuous exposure
- Propagated (person-to-person)
- Mixed
- Other

Need to consider the incubation period of the pathogen

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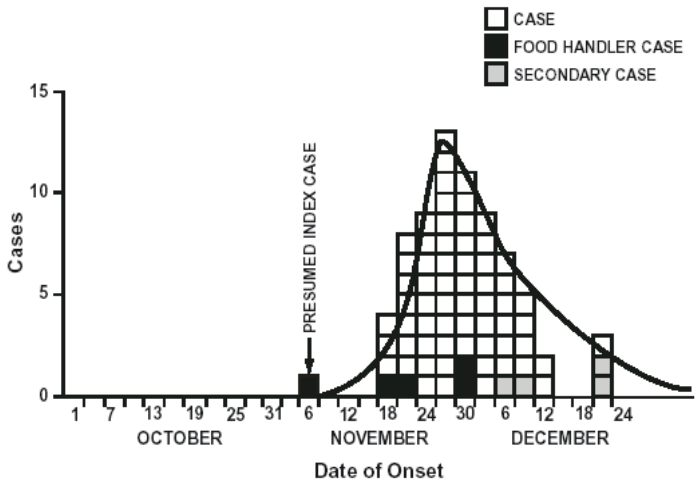
Common source outbreak with point source exposure: hepatitis A cases by onset date



Source: CDC, unpublished data, 1979

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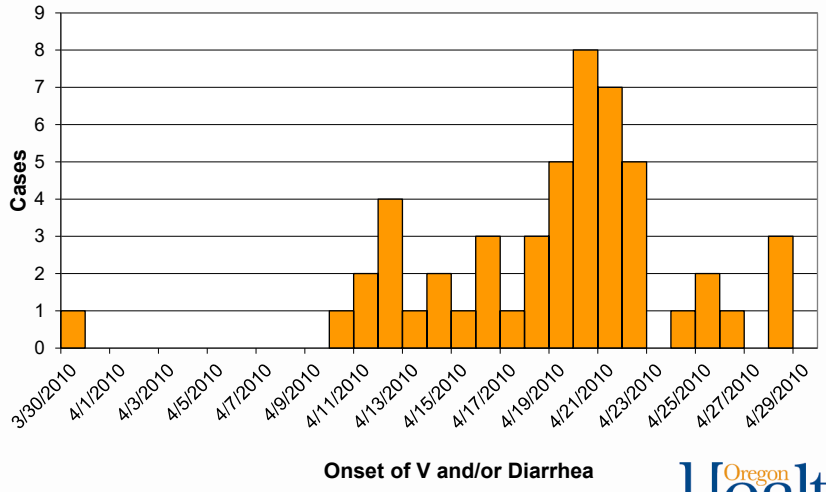
Common source outbreak, continuous exposure



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Common source outbreak with continuous exposure, by meal date

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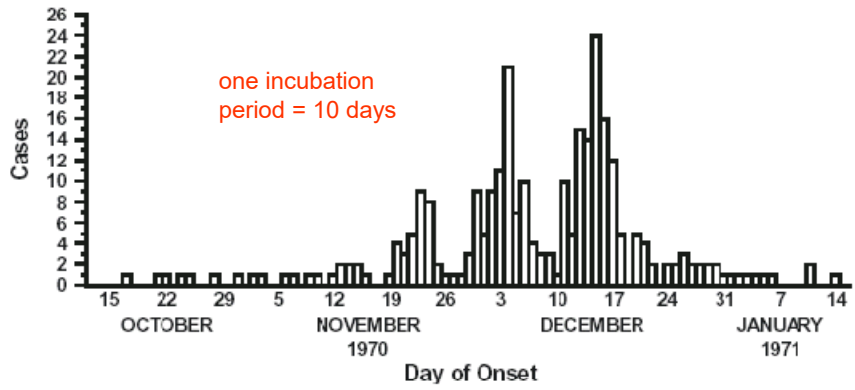
Propagated outbreak:
Measles cases by date of onset



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Who, What, Where, When, Why, How?

- Using descriptive epidemiology helps guide:
  - ➢what questions to ask
  - ➢who to interview
  - ➢what data is important to collect
  - ➢which lab tests should I order
  - ➢where to target prevention efforts

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What do these case details suggest?

- Who is getting ill?
- What are their symptoms?
- What else would we want to know?

Polling questions

Sex Distribution
Male: 4 (22%) Female: 14 (78%)

Age Distribution (N = 18 cases)

infants	0	(0%)
1–4	0	(0%)
5–9	0	(0%)
10–19	0	(0%)
20–49	14	(78%)
50–74	4	(22%)
75+	0	(0%)
unknown	0	(0%)

Signs and Symptoms (N = 18 cases)

any diarrhea	18	(100%)
3+ diarrhea	18	(100%)
vomiting	12	(67%)
bloody D	1	(6%)
cramps	17	(94%)
fever	12	(67%)
headache	13	(72%)
myalgia	10	(56%)
chills	13	(72%)
fatigue	18	(100%)
nausea	17	(94%)

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What do these case details suggest?

- Who is getting ill?
- What are their symptoms?
- What else would we want to know?

Sex Distribution
Male: 4 (22%) **Female: 14 (78%)** ←

Age Distribution (N = 18 cases)

	infants	0	(0%)
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	5–9	0	(0%)
	10–19	0	(0%)
→	**20–49**	**14**	**(78%)**
	50–74	4	(22%)
	75+	0	(0%)
	unknown	0	(0%)

Signs and Symptoms (N = 18 cases)

any diarrhea	18	(100%) ←
3+ diarrhea	18	(100%) ←
vomiting	12	(67%)
bloody D	1	(6%)
cramps	17	(94%)
fever	12	(67%)
headache	13	(72%)
myalgia	10	(56%)
chills	13	(72%)
fatigue	18	(100%)
nausea	17	(94%)

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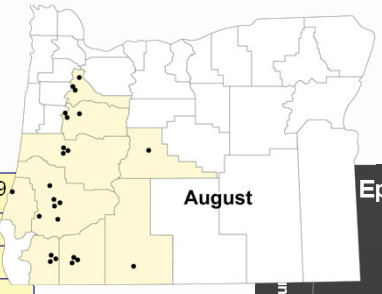
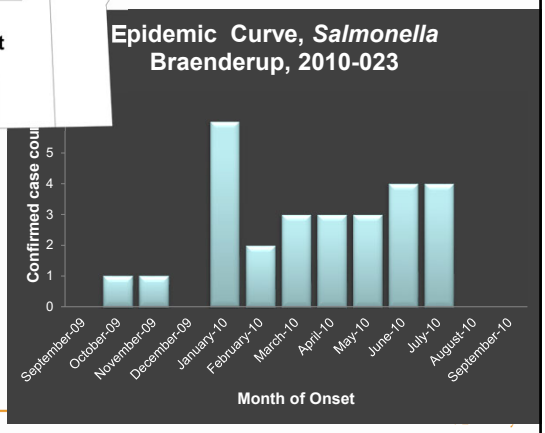
Orient data by person, place, and time



15	F	10/21/09
81	F	11/5/09
4	M	1/16/10
26	M	1/12/10
1	M	1/17/10
2	M	1/18/10
17	M	1/10/10
22	F	1/31/10
16	F	2/13/10
10	F	2/13/10
85	M	Unknown
5	F	3/8/10



Polling questions

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Is this an outbreak or something else?

- Use your surveillance data:
  - Reportable diseases data (state/local/national)
  - Hospital discharge data
  - Mortality statistics
  - Registries
  - Surveys
- Is this more than what is expected?
- Is there a single common exposure among cases?
- Could another event confound the situation?

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Use the tools on our website

OREGON HEALTH SERVICES COMPENDIUM OF ACUTE FOOD-BORNE DISEASES [1] Page 1

Agent	Usual Incubation Period (Range) [2]	Symptom Profile	Duration of Illness [3]	Period of Communicability	Characteristic Foods [4]	Criteria for confirmation Type and amount of specimens; handling requirements for shipping to OSPHL*
I. Agents typified by nausea and vomiting, *without fever*, within 8 hours of eating						
Bacillus cereus ("emetic" variety)	2-4 hours (1-6 hours)	Vomiting, with nausea and diarrhea (abrupt onset)	24 hours	Not communicable (preformed enterotoxin)	Fried rice, meats, vegetables	Isolation of 10^5 organisms per gram from stool of two or more ill persons OR isolation of 10^5 organisms per gram from epidemiologically implicated food Collect at least 2 grams of fresh stool (pea size) within three days of illness and refrigerate prior to shipment. DO NOT FREEZE. DO NOT send in transport medium. Ship in a cold pack to OSPHL* with OSPHL Form 60, Request for Bacteriology/ Parasitology (available at *http://oregon.gov/DHS/ph/phlabs/75.pdf*); must be ordered, not part of OSPHL routine enteric screening Collect 50-150 grams (about 2-6 oz.) of food

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Oregon Outbreak Tools

www.healthoregon.org/fomes

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Foodborne and Gastroenteritis Outbreaks

Oregon Public Health Division

Public Health Division › Diseases and Conditions › Communicable Disease › Outbreak Investigation › Foodborne and Gastroenteritis Outbreaks › Foodborne Outbreak Investigation Tools

Foodborne Outbreak Investigation Tools

Foodborne and Gastroenteritis Outbreaks

Gastroenteritis Outbreaks in Long-term Care Facilities and Hospitals

Foodborne Outbreak Investigation Tools

Contact Us

For the consolidated tools of all five Centers of Excellence, please visit http://coefoodsafetytools.org.

To view a brief summary about the tools on this page, view the Oregon Outbreak Investigation Tools (PDF). For more information, contact the FOMES staff.

On this page:

- Shotgun Hypothesis-generating Questionnaire
- Binomial Probability Worksheet
- Event Outbreak Questionnaire
- The Gopher-Beaver Form
- CIFOR Foodborne Outbreak Guidelines
- Courses for CD Nurses
- It-Kit™ Stool Sample Collection Kit
- Interviewer Training Resources
- Remembering Dr. Bill Keene

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Continued Case Study

The Oregon County Health Department assumed lead responsibility for the investigation. The State Office of Disease Prevention and Epidemiology was asked to assist.

Over the next several days, more and more cases of diarrhea and bloody diarrhea were reported. While the earliest case was a child, cases occurred among all age groups. The case-patients did not appear to have any consumption of food or water in common. However, they all had attended the Oregon County Fair. The investigators therefore felt comfortable focusing on the fair as the source of the outbreak.

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Preliminary data showed that there were 60 cases of lab confirmed O157 infections. 46 were primary cases and 14 were secondary cases. 46/60 (77%) were < 6 years of age and 48/60 (80%) were <19 years of age. Among these culture confirmed cases, 21 were hospitalized and 11 had hemolytic uremic syndrome (HUS).

See table in handout and draw epi curve

Question 4
What is an epidemic curve? What is the value of an epidemic curve?

Question 6
Based on curve and known incubation period estimate when peak exposure likely occurred.

Question 7
What can you conclude from the epidemic curve?

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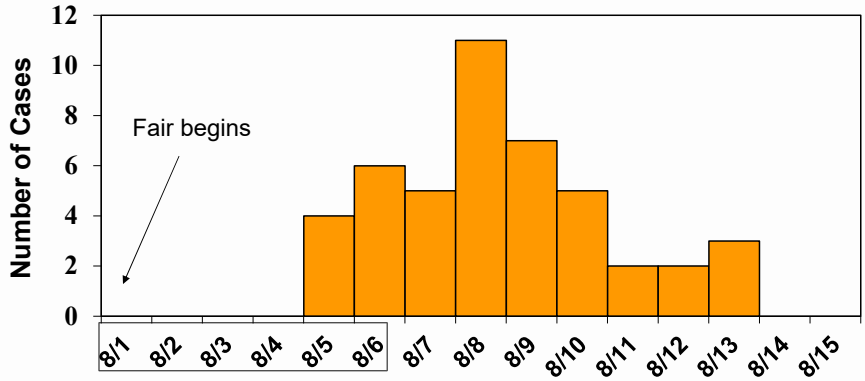
Onset of Diarrhea among Oregon County Fair Attendees, August 2012



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Outbreak Source Prediction Tool

Total Cases
*required
0

Month of first illness onset
*required
Choose one

Geography of exposures
*required
- Multi County
- Multi State
- Single County

Infectious Agent
*required
- STEC
- Salmonella

Salmonella Serotype
*required for Salmonella
Choose STEC or Salmonella First

Male 0
Female 0
Under 1 Year 0
1 yr to 4 yrs 0
5 yrs to 19 yrs 0
20 yrs to 49 yrs 0
50 yrs or older 0

Submit

Developed by the Colorado Integrated Food Safety Center of Excellence, the Outbreak Source Prediction Tool is a resource for public health professionals to help with hypothesis generation during an enteric disease outbreak investigation. The tool was developed using statistical prediction methods (code can be found here) and historical Salmonella and shiga toxin-producing E.coli(STEC) outbreak data from the CDC's National Outbreak Reporting System.
The tool is intended to be used, along with other resources, as a guide during hypothesis generation. This and other hypothesis generation resources should not be used in place of an epidemiological study or other outbreak investigation

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