

Steps of an Outbreak Investigation: Back to Basics

Communicable Disease Branch
North Carolina Division of Public Health

Example Agenda

9:30 am	Welcome and Introduction
9:35 am	Pre Test and Learning Objectives
9:40 am	Steps 1 – 3; Activity 1
10:15 am	Break
10:25 am	Steps 4 – 5; Activity 2 & 3
11:15 am	Lunch
12:15 pm	Steps 6-8
1:00 pm	Steps 9-10
1:15 pm	Post Test
1:20 pm	Break
1:30 pm	Activity 4: Outbreak Exercise
2:50 pm	Evaluation and Conclusion of Training

Pre Test

- Close all training materials!
- Using the colored cards
 - At the top, write the name of the person sitting directly across from you
 - In order, list the 10 steps of an outbreak investigation
- Turn in cards

Training Credit

Continuing education credit (4 hours) has been applied for through

- Public Health Nursing & Professional Development, &
- NC Board of Environmental Health Specialist Examiners

Course Materials (on-line)

- Steps of an Outbreak Investigation
- List of Terms
- Outbreak Report Form
- Evaluation Form
- Activity 1: Resource Table
- Activity 3: Surveillance
- Activity 4: Case Study & Compendium

Target Audience

- Local health department
 - Communicable Disease nurses
 - Environmental Health staff
- Force multipliers
 - anyone who may be called to assist

Learning Objectives

- Describe public health importance of outbreak investigations
- List components of a case definition
- Define elements included on a line list
- Describe potential control measures
- List and describe the steps of an outbreak investigation

What are the reasons for investigating an outbreak?

Reasons to Investigate an Outbreak

- Identify, describe the source
- Describe new diseases, learn more about known diseases
- Identify populations at risk
- Evaluate existing prevention strategies
 - E.g., immunization requirement
- Opportunity to educate public about disease prevention
- Address public concern
- Develop strategies to prevent future outbreaks
- Fulfillment of legal obligations and duty of care for the public
- Terminate the outbreak!

What factors should you consider when deciding to investigate?

When to Investigate

- Consider the following factors:
 - Severity of illness
 - Transmissibility
 - Unanswered questions
 - Ongoing illness / exposure
 - Public concern
 - Prevention potential

Principles of Outbreak Investigations

- Be systematic
 - Follow the same steps for every type of outbreak
 - Write down case definitions
 - Ask the same questions of everybody
- Stop often to re-assess what you know
 - Line list and epidemic curve provide valuable information; many investigations never go past this point
 - Consider control measures to be applied
- Coordinate with partners (e.g., environmental)

10 Steps of an Outbreak Investigation

1. Identify investigation team and resources
2. Establish existence of an outbreak
3. Verify the diagnosis
4. Construct case definition
5. Case finding: Find cases systematically / develop line list
6. Perform descriptive epidemiology / develop hypotheses
7. Evaluate hypotheses / perform additional studies (as necessary)
8. Implement control measures
9. Communicate findings
10. Maintain surveillance

Steps of an Outbreak Investigation

- These steps may occur simultaneously or be repeated as new information is received

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10 Steps of an Outbreak Investigation

1. Identify investigation team and resources
 - a. Local and state resources
 - b. Outbreak investigation team, team lead
 - c. Research disease, review scientific literature
 - d. Determine if immediate control measures needed
 - e. Prepare for field work

Local and State Resources

- Local
 - CD nurse(s)
 - Environmental health
 - Preparedness coordinators
 - EpiTeam
 - LHD director
- State
 - CD Branch epidemiologists (epi on call)
 - CD Branch subject matter experts
 - TATP Nurse Consultants
 - PHPR Team

Other Resources

- Local / State
 - Disease Intervention Specialists (DIS)
 - Local PIO
 - State Laboratory of Public Health
 - Hospital-based Public Health Epidemiologist (PHE)
- Other resources
 - CDC
 - NC EDSS
 - NC DETECT
 - Media

Activity 1 – Resource Team

- Who is on your resource team?
- Why those individuals?
- Could you reach them after hours?

****Routinely update this information****

Investigation Team

- Members from your resource table
- Consider establishment of ICS
- Identify 'Lead'

Research Disease, Review Literature

- NC DPH Communicable Disease Manual (on-line)
- MMWR & other CDC published information
- Control of Communicable Disease Manual (19th edition)
- Manual for the Surveillance of Vaccine-Preventable Diseases (5th edition, 2011)
- Epidemiology and Prevention of Vaccine-Preventable Diseases (12th edition, May 2012) (e.g., ‘the Pink Book’)

Control Measures

- When should control measures be implemented immediately?
 - Source is identified
 - Continued risk of either exposing others or being exposed
 - E.g., food handler
- Control measures are applied as soon as possible, may change at any point during investigation

Prepare for Field Work

- Identification of team
- Gather resources, supplies, equipment
 - Computer, questionnaires, specimen collection kits
- Make necessary administrative, personal arrangements for travel
 - Determine role in the investigation
 - Identify points of contact (field and office)
- What do you need to do to prepare?

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2. Establish Existence of an Outbreak

- What is an outbreak?
 - Increase in cases above what is expected in that population in that area
 - Occurrence of 2 or more 'epi-linked' cases

2. Establish Existence of an Outbreak

- How do you know?
 - For notifiable diseases
 - Reported to local, state health departments (**NC EDSS!**)
 - Compare number of current cases / rate with previous weeks
 - Compare number of current cases / rate with same time period or season in previous years

2. Establish Existence of an Outbreak

Number of probable and confirmed communicable disease cases in North Carolina by disease for: 1) the current month, 2) the year to date, 3) the average cases for the year to date, 4) the total cases during 2011, 5) and the average (with 95% confidence intervals) of the previous five years.

DISEASE	Cases in July, 2012	Cases During January and July, 2012	Average Cases During January and July, 2007 - 2011	Cases in 2011	Average cases (95% confidence interval) per year 2006 to 2010
Botulism ¹	0	0	1	2	1 (0 – 4)
Campylobacter Infection*	122	557 	309	909	693 (361 – 1,026)
Chlamydia ²	4,035	27,689	16,345	54,891 	39,161 (29,695 – 48,641)
Cryptosporidiosis	15	58	34	115	114 (22 – 206)
E. coli O157:H7/ STEC Infection*	7	52	51	155	126 (57 – 194)
Ehrlichiosis ³	26	40	23	107	67 (40 – 174)
Gonorrhea	1,108	8,102	7,083	17,487	15,336 (8,779 – 21,892)
Group A Strep Infection, Invasive	13	87	99	181	143 (81 – 205)
Haemophilus Influenzae	8	56	50	84	86 (7 – 179)
Hepatitis A	0	12	27	31	60 (11 – 109)
Hepatitis B (acute)	4	36	56	124	128 (66 – 190)
Hepatitis B (perinatal)	0	0	0	1	2 (0 – 5)
Hepatitis B (chronic) ⁴	52	498	522	1,309 	873 (662 – 1,085)
Hepatitis C (acute)	13	39	19	61	29 (6 – 64)
Influenza Death, Adult ⁵	0	7	8	26	50 (0 – 117)
Influenza Death, Pediatric	0	2	2	10	3 (0 – 14)
LaCrosse Encephalitis	3	6	3	24	15 (1 – 31)
Legionellosis	4	25	24	86	52 (15 – 86)
Listeriosis	1	5	9	21	25 (8 – 42)
Lyme Disease	6	25	30	91	66 (23 – 155)

2. Establish Existence of an Outbreak

- For non-notifiable conditions:
 - National estimates
 - Hospital discharge records
 - Mortality data
 - Other available records
 - Use data from neighboring areas
 - Call local health care providers
 - Call community members

Potential Pitfalls: is it a true increase?

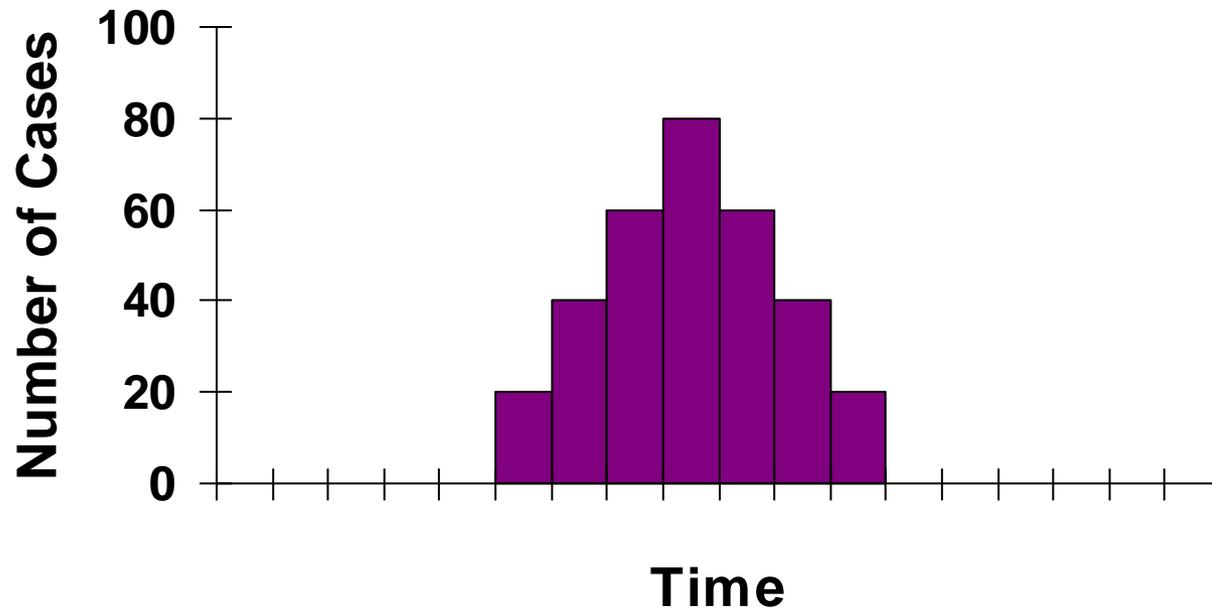
- Reasons why the observed cases may exceed the expected numbers:
 - Increased awareness or public interest
 - Changes:
 - Reporting procedures
 - Case definition
 - Diagnostic procedures
 - Clinician or clinician practices
 - Population
 - Actual outbreak

Example: Outbreak or Not

- Single case of acute Hepatitis A in foodhandler?
- Four cases of 'respiratory illness' among residents of a nursing home in January?
- Seven cases of pertussis in a community in December?
- One case of acute GI illness in individual after eating at Diner A?
- Thirty cases of acute GI illness after eating at church picnic?
- One case of smallpox?
- Three cases of active pulmonary TB at Hospital B?

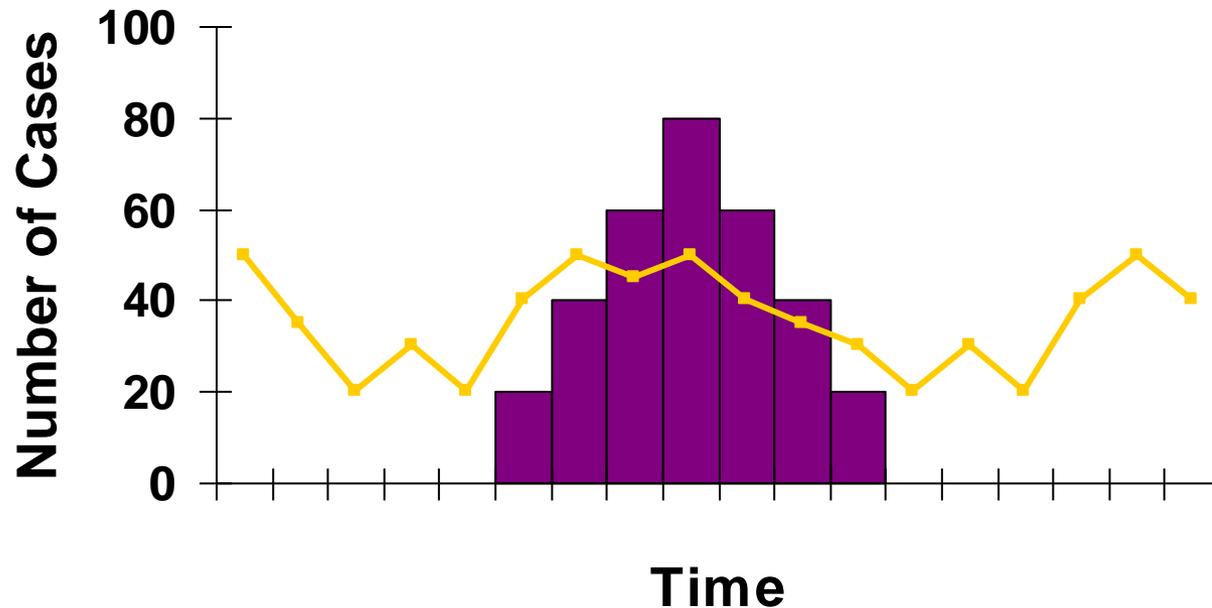
Example: Establish Existence of an Outbreak

An Outbreak...To Be or Not To Be



Example: Establish Existence of an Outbreak

An Outbreak...To Be or Not To Be



10 Steps of an Outbreak Investigation

1. Identify investigation team and resources
2. Establish existence of an outbreak
3. **Verify the diagnosis**
4. Construct case definition
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3. Verify the Diagnosis

- What does that mean?
- Confirm:
 - Clinical signs
 - Clinical symptoms
 - Test results
- Reduce diagnostic error
 - Confirm appropriate lab tests were performed
 - Confirm symptoms were reported accurately
 - For rare conditions, educate clinicians

3. Verify the Diagnosis

- Obtain medical records, laboratory reports
- Talk with patients
- If needed,
 - Conduct clinical testing
 - Collect specimens
 - Hold specimens
- Consult with DPH CDB, SLPH
- In conjunction with CDB, request SLPH to perform bacteriologic, virologic, other testing

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4. Construct Case Definition

- A case definition
 - Allows a simple, uniform way to identify cases
 - “Standardizes” the investigation
 - Is unique to outbreak but is based on objective criteria

4. Construct Case Definition

- 3 components:
 - Person..... Type of illness, characteristics (e.g., “a person with...”)
 - Place..... Location of suspected exposure
 - Time..... Based on incubation period* (if known)

4. Construct Case Definition

- Can emphasize sensitivity (broad) or specificity (narrow) in case definition
 - Sensitive early in investigation
 - Specific as more information is obtained

Example: Case Definition – Broad

- An individual reporting 2 or more of the following symptoms: diarrhea (3 or more loose stools within a 24 hour period), abdominal pain, nausea, or fever with illness onset on or after February 28th and resided in or traveled to County B during the 10 days prior to illness onset.

Example: Case Definition – Specific

- Laboratory confirmation of Salmonella paratyphi B with PFGE pattern missing or pending in a person who experienced illness onset on or after February 28th and resided in or traveled to County B during the 7 days prior to illness onset.

Example: Case Definition – Very Specific

- Laboratory confirmation of Salmonella paratyphi B with PFGE pattern .1228

Activity 2 – Case Definition

Activity 2 – Case Definition

- 12 ill persons
 - One infant with post-tussive vomiting
- Cough lasting ≥ 2 weeks
- Onset of illness 12/5/11 – Present
- Resident of Community A

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5. Case Finding

- ‘Enhanced surveillance’
 - Look for additional cases
 - Use the case definition

- Two methods: Active and Passive
 - Active
 - Visits, phone calls
 - Ask cases if they know of other ill people
 - Passive
 - HAN, blast fax, press release
 - People self-report illness

Activity 3 – Surveillance

5. Develop Line List

- Method to systematically record information
- Simple to review, update, summarize
- Paper or electronic
- NC DPH encourages use of Outbreak Workbook Tool
 - Automatically populates descriptive epidemiology
 - Easily imports cases into NC EDSS
 - Easily attaches to a case associated with an outbreak in NC EDSS

5. Develop Line List

- Identifying information
 - Name, address, phone number, unique identifier
- Demographic information
 - DOB, gender, race, occupation
- Clinical information
 - Date(s) of report and onset of illness, symptoms
 - Laboratory specimen submitted, results
- Exposure / risk factor information
 - Food, water, activities

5. Develop Line List

Identifying Information



1	First-Name	Last-Name	Street1	City	State	Zip-Code	County	Home-Phone
2								
3	Ally	Alligator	100 Swamp Lane	Cedar Park	NC	27514	Escambia	111-111-1111
4	Benjamin	Bear	506 Forest Road	Cedar Park	NC	27514	Escambia	222-222-2222
5	Carie	Cat	52 House Circle	Cedar Park	NC	27514	Escambia	333-333-3333
6	Donald	Duck	200 Disney Way	Cedar Park	NC	27514	Escambia	444-444-4444
7	Emily	Elephant	64 Safari Ave	Cedar Park	NC	27514	Escambia	555-555-5555
8	Farrah	Fox	182 Tree Farm Road	Cedar Park	NC	27514	Escambia	666-666-6666
9	Gary	Gorrilla	70 Jungle Drive	Cedar Park	NC	27514	Escambia	777-777-7777
10	Henry	Horse	300 Farm Court	Cedar Park	NC	27514	Escambia	888-888-8888

5. Develop Line List

Demographic Information



1	Gender	DOB	Age at Onset	Foodhandler	HCW	Childcare Worker
2	0=F, 1=M					
3	0	1/2/1986	26	1	0	0
4	1	12/1/1988	23	0	0	1
5	0	5/7/1992	19	0	0	1
6	1	4/4/1973	38	1	0	0
7	0	6/18/1979	32	0	0	0
8	0	8/24/1982	30	0	1	0
9	1	11/25/1981	30	0	0	1
10	1	9/11/2001	10	0	0	1

5. Develop Line List

Clinical Information

	Date of Report	Date of Onset	Died	Hospitalized	ER Visit	Provider Visit	Vomiting	Diarrhea	Bloody Stools	Fever	Abdominal Cramps
1											
2											
3	4/14/2012	4/9/2012	0	0	1	0	1	1	1	1	1
4	4/17/2012	4/11/2012	0	0	1	0	1	1	1	unknown	1
5	4/23/2012	4/14/2012	0	0	1	0	1	1	1	1	1
6	4/18/2012	4/7/2012	0	0	0	1	1	1	unknown	1	1
7	4/27/2012	4/10/2012	0	0	0	1	0	1	0	1	1
8	4/23/2012	4/14/2012	0	0	0	1	unknown	1	unknown	1	1
9	4/20/2012	4/13/2012	0	0	0	1	0	1	1	1	1
10	4/24/2012	4/19/2012	0	1	1	0	1	1	0	unknown	1

5. Develop Line List

Laboratory & Case Classification Information

1	Salmonella species	Serotype	Enteriditis	PFGE .0246	Confirmed	Probable /	Suspect	Why Status?
2	1=Yes, 0=No				Epi-Linked			
3	1		1	1	1			PFGE match
4	1		1	1	1			PFGE match
5	1		1	1	1			PFGE match
6	1		1	1	1			PFGE match
7	1		1	1	1			PFGE match
8	1		1	1	1			PFGE match
9	1		1				1	PFGE pending
10	1		1				1	PFGE pending

5. Develop Line List

Exposure Information

1	Travel to Escambia County	Ate at Restaurant A	Swam in River B	Attends Day Camp C	Other Exposures
2					
3	1	0	1	0	lifeguard at River B
4	1	1	1	0	works at Day Camp C
5	1	1	0	1	
6	1	unknown	0	1	works at Restaurant A
7	1	0	1	0	
8	1	1	1	0	ate at McDonalds
9	1	0	unknown	1	shops at Wal-Mart
10	1	0	unknown	1	

Example – Outbreak Workbook Tool

Line Number	First-Name	Middle-Name	Last-Name	Date of Birth	Gender	SSN	Street1	Street2	City	State	Zip-Code	County	Country	Home Phone
1	Ally		Alligator	1/2/1986	Female		100 Swamp Lane		Cedar Park	NC	27514	Escambia		302-591
2	Benjamin		Bear	12/1/1988	Male		506 Forest Road		Cedar Park	NC	27514	Escambia		336-28
3	Carie		Cat	5/7/1992	Female		52 House Circle		Cedar Park	NC	27514	Escambia		678-98
4	Donald		Duck	4/4/1973	Male		200 Disney Way		Cedar Park	NC	27514	Escambia		301-66
5	Emily		Elephant	6/18/1979	Female		64 Safari Ave		Cedar Park	NC	27514	Escambia		838-65
6	Farah		Fox	8/24/1982	Female		182 Tree Farm Road		Cedar Park	NC	27514	Escambia		276-96
7	Gary		Gorilla	11/25/1981	Male		70 Jungle Drive		Cedar Park	NC	27514	Escambia		704-33
8	Henry		Horse	9/11/2001	Male		300 Farm Court		Cedar Park	NC	27514	Escambia		225-92
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6. Perform Descriptive Epidemiology

- What and why
 - Provides systematic method
 - Characterize, or describe what has occurred
 - Person, place, time

 - Components
 - Line list
 - Epi curve
 - Others, but we will focus on line list and epi-curve
- } useful for developing hypotheses

6. Perform Descriptive Epidemiology

- Person
 - Place
- } Line List
-
- Time
- } Epidemic curve ('Epi curve')

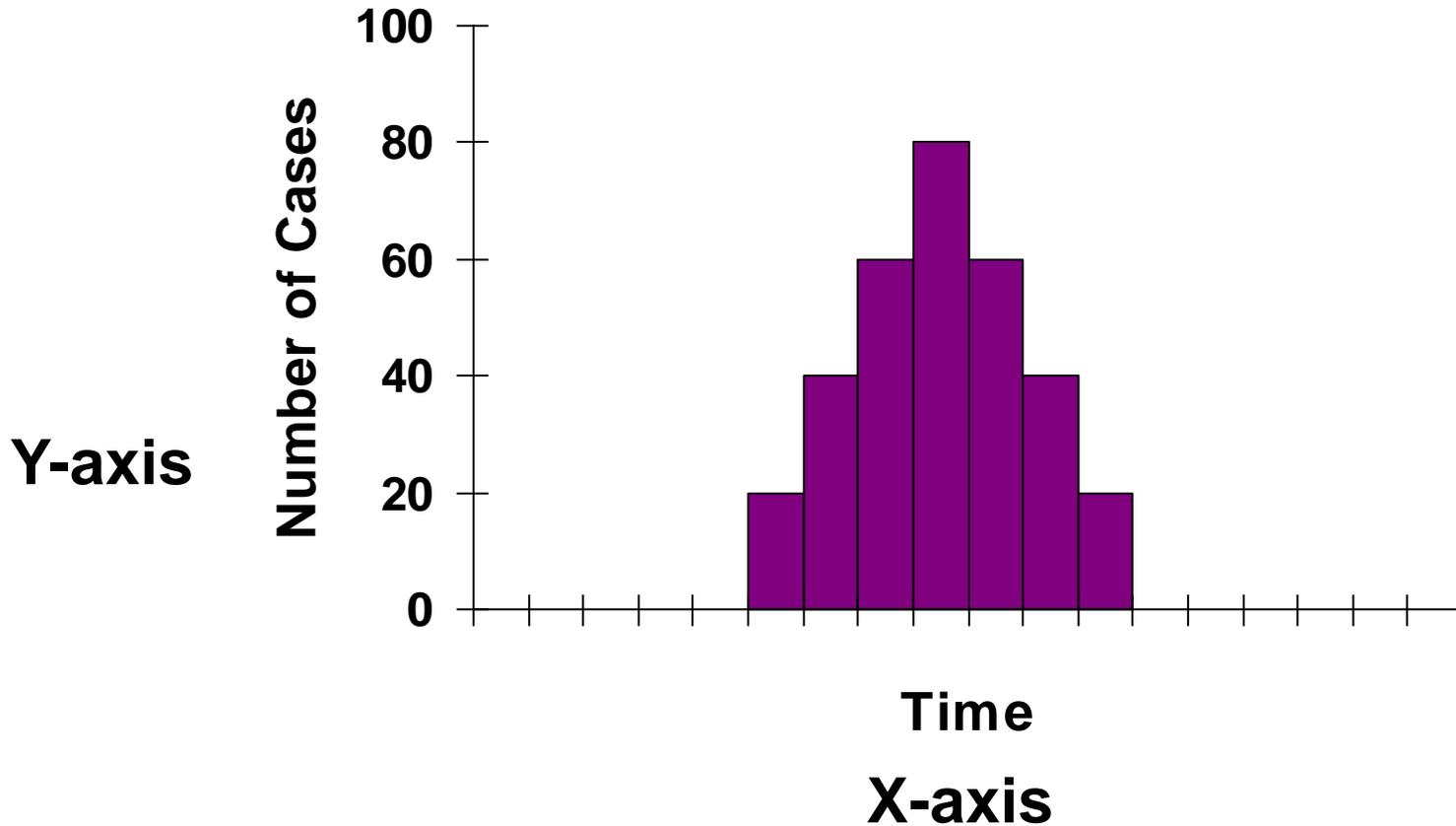
6. Perform Descriptive Epidemiology

- Epi curve: visual representation of
 - Ill persons (cases) over time
 - Magnitude of outbreak
 - Type of outbreak
 - Point source
 - Propagated (person-to-person)
 - Exposure period / Time of exposure (if agent known)
 - Incubation period
 - Possible agents (if time of exposure known)

6. Perform Descriptive Epidemiology

- How do I make an epi curve?
 - Number of cases on the vertical (y) axis
 - Time period (or date of illness onset) on the horizontal (x) axis

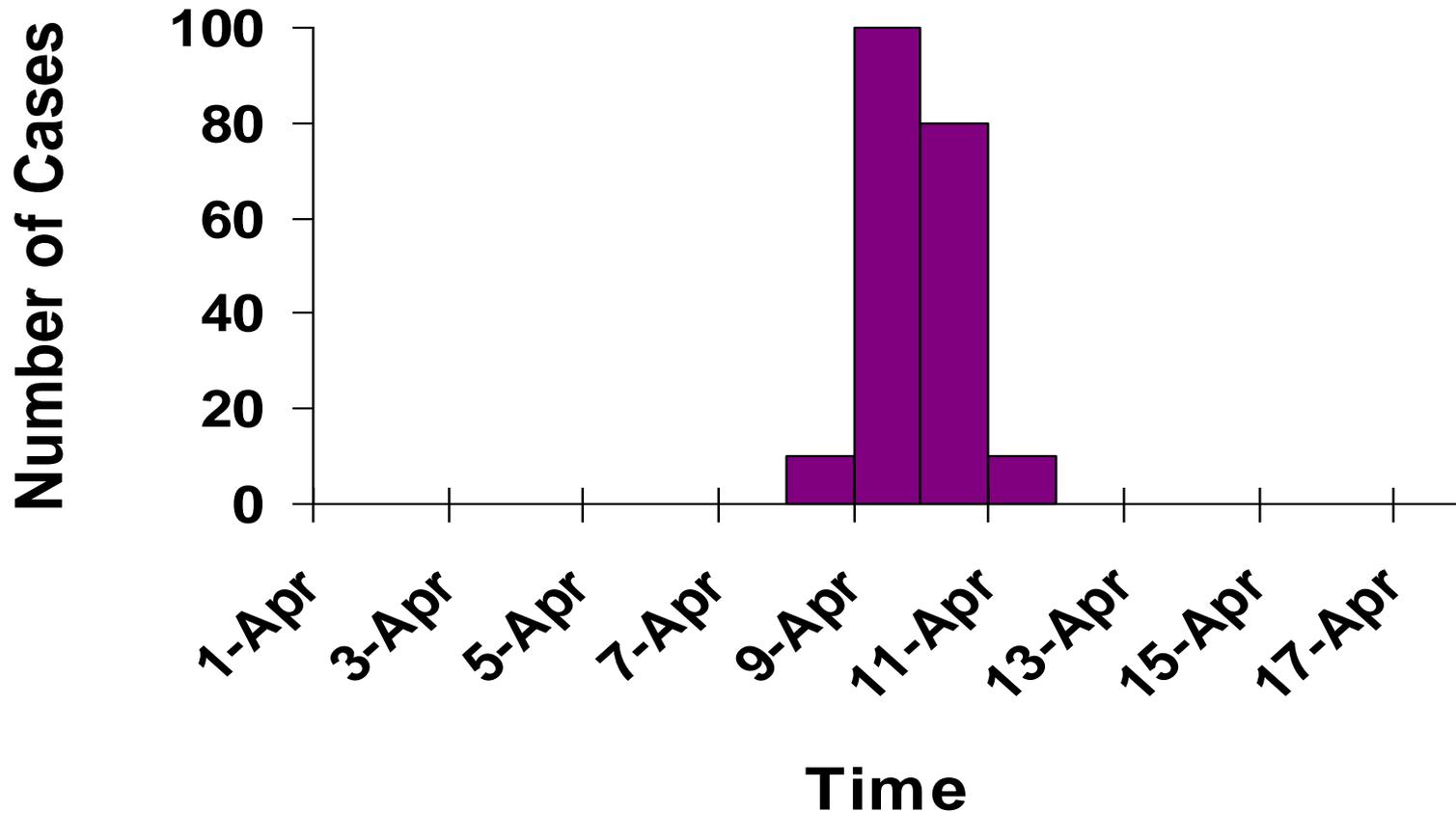
Example – X and Y axis



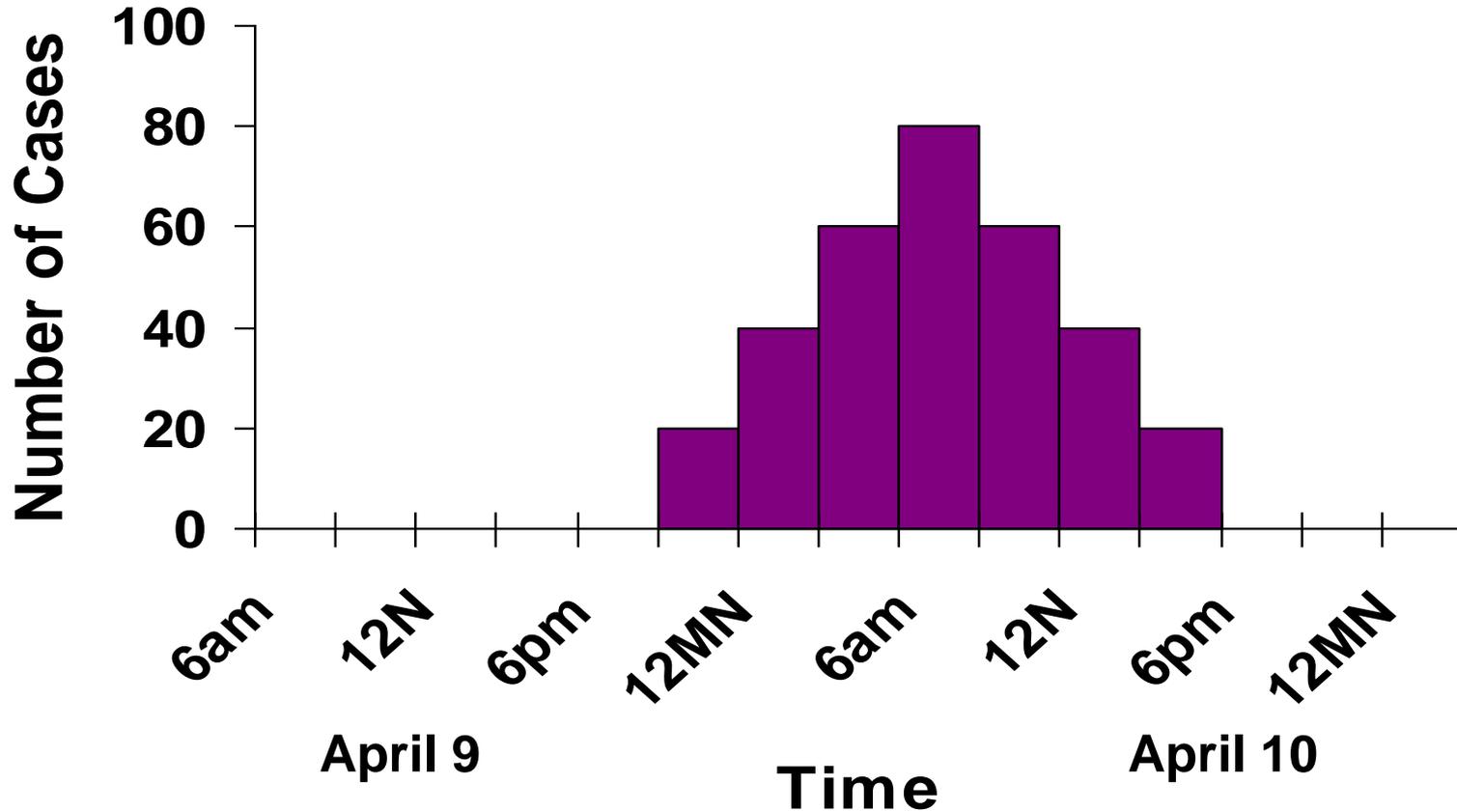
6. Perform Descriptive Epidemiology

- How do I choose the correct unit of time?
 - Depends upon the incubation period
 - If incubation period is not known, graph several epi-curves with different time units

Example Epi Curve – Time Unit (Day)



Example Epi Curve – Time Unit (Hours)



6. Perform Descriptive Epidemiology

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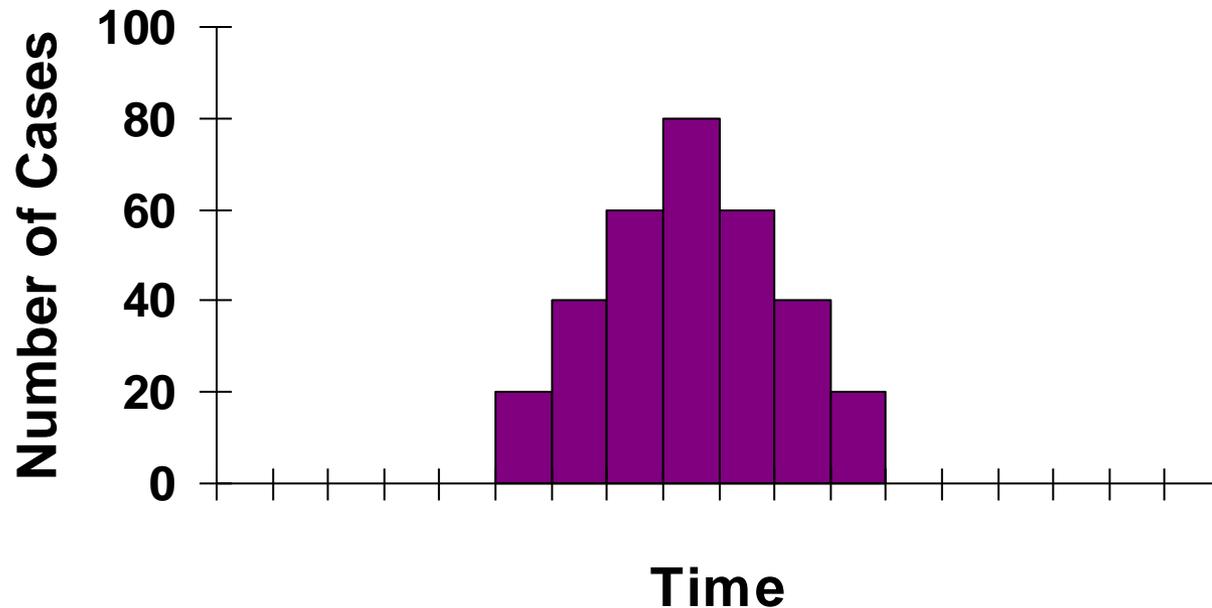
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6. Perform Descriptive Epidemiology

- Point source
 - Usually demonstrated by sharp upward slope and a gradual downward slope
 - Common source outbreak
 - Period of exposure is brief
 - Cases occur within one incubation period

Example Epi Curve – Point Source

An Outbreak...Point Source

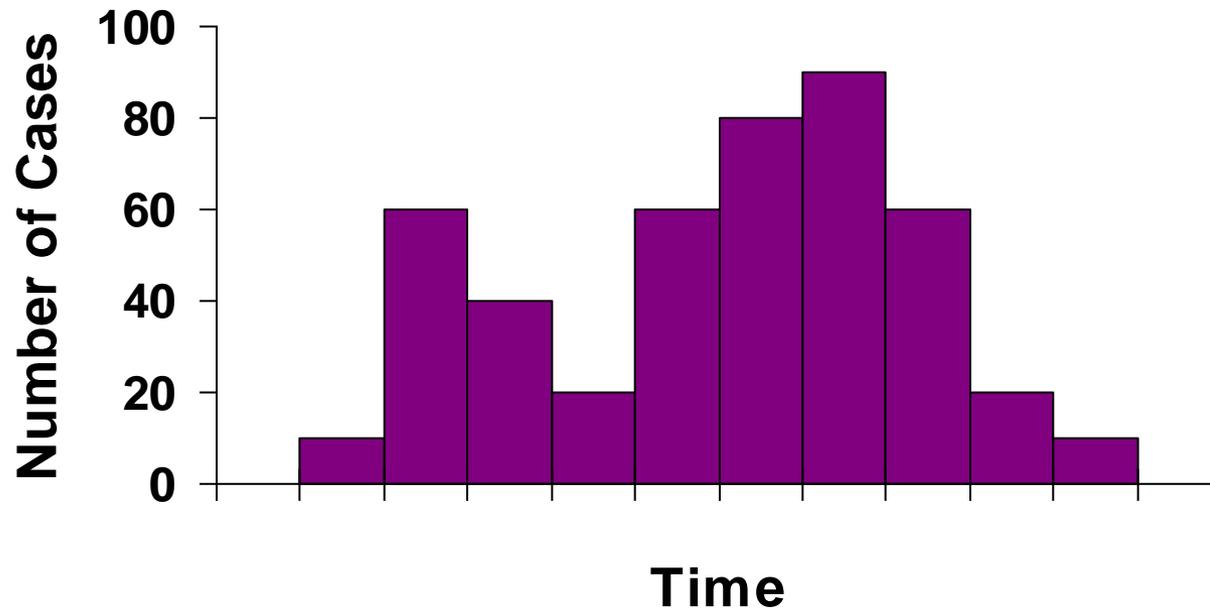


6. Perform Descriptive Epidemiology

- Propagated (person-to-person)
 - Progressively taller peaks, an incubation period apart
 - Person to person transmission
 - May last a long time
 - May have multiple waves

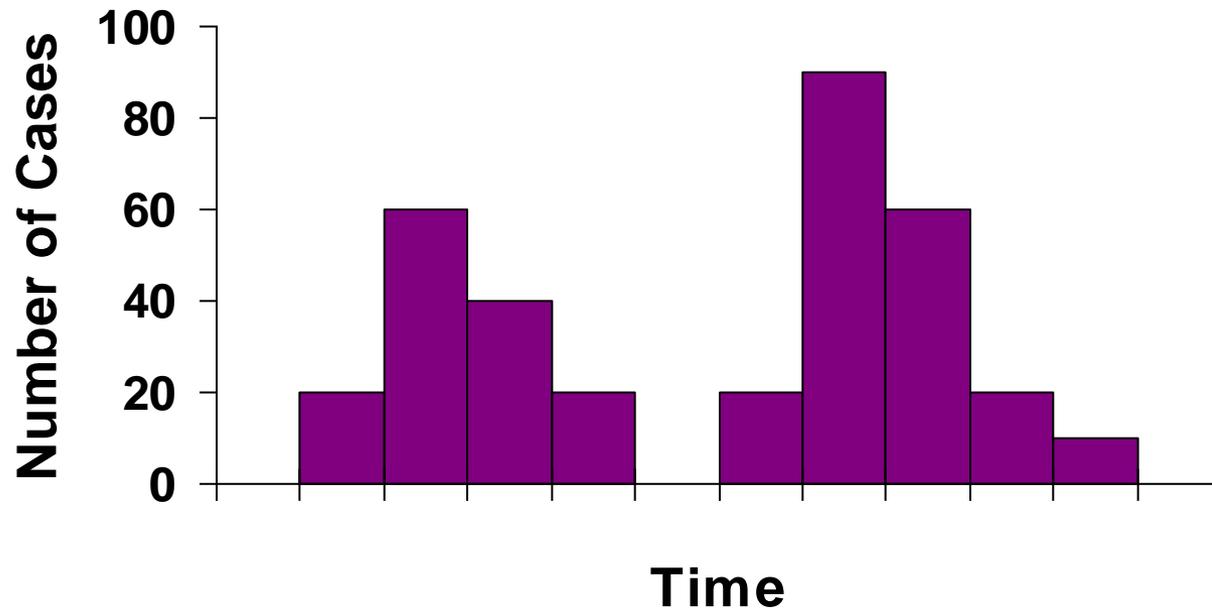
Example Epi Curve – Person to person (Propagated)

Epi Curve...Person to Person



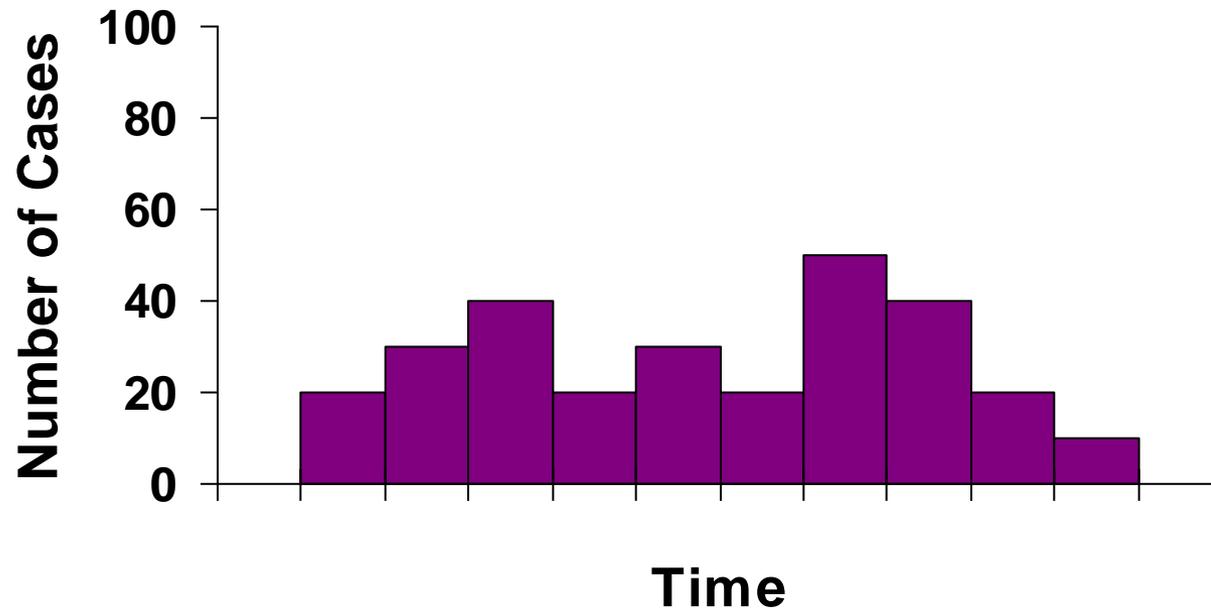
Example Epi Curve – Person to person (Propagated)

Epi Curve...Person to Person



Example Epi Curve – Person to person (Propagated)

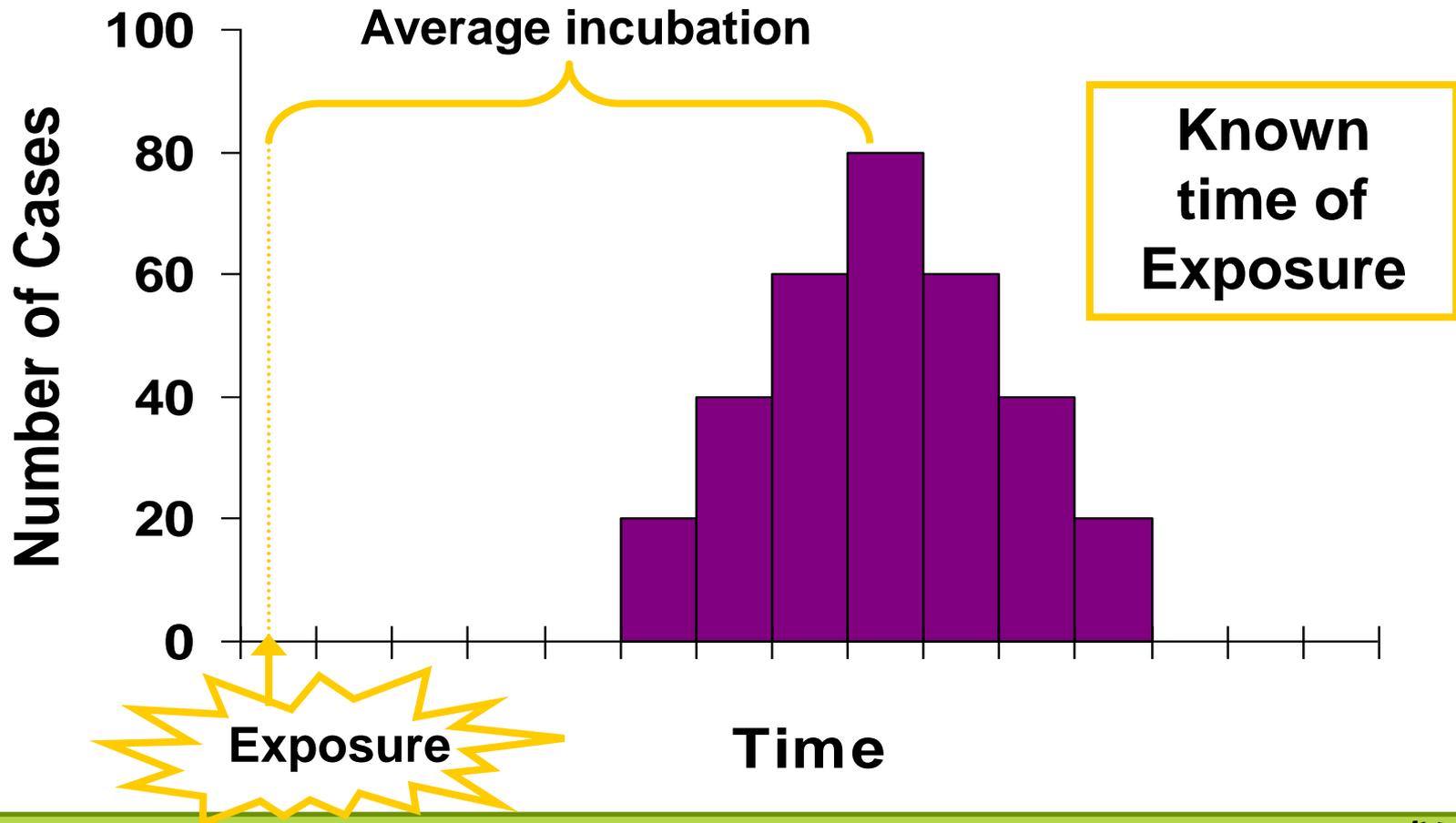
Epi Curve...Person to Person



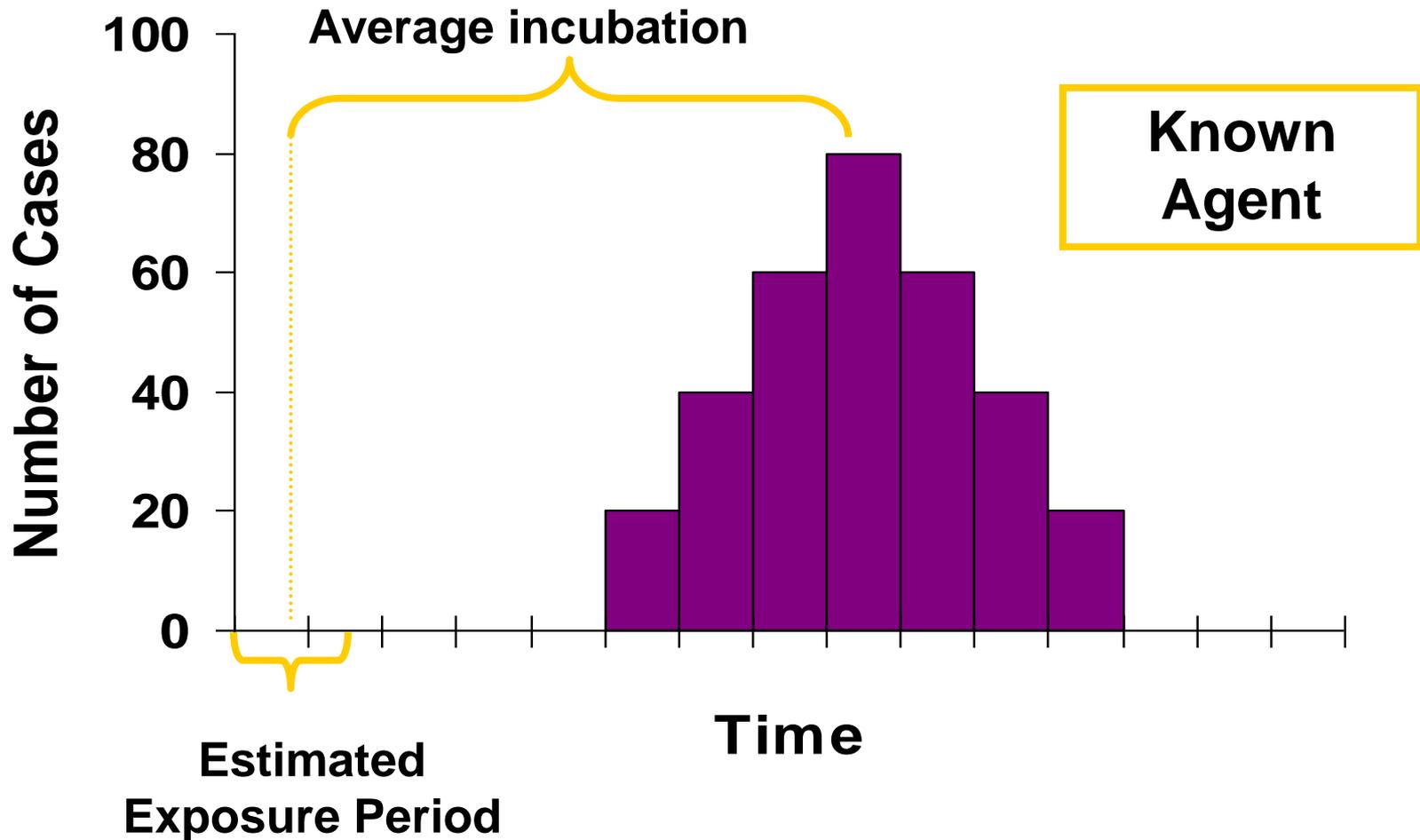
6. Perform Descriptive Epidemiology

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 - Incubation period
 - Possible agents (if time of exposure known)

Example – Exposure Period



Example – Exposure Period



6. Develop Hypotheses

- What are hypotheses?
 - Statements which help us describe why and how the outbreak occurred
- How do you generate hypotheses?
 - Examine descriptive epidemiology:
line list, epi-curve
 - Administer open-ended questionnaire to cases
 - Review the existing body of knowledge

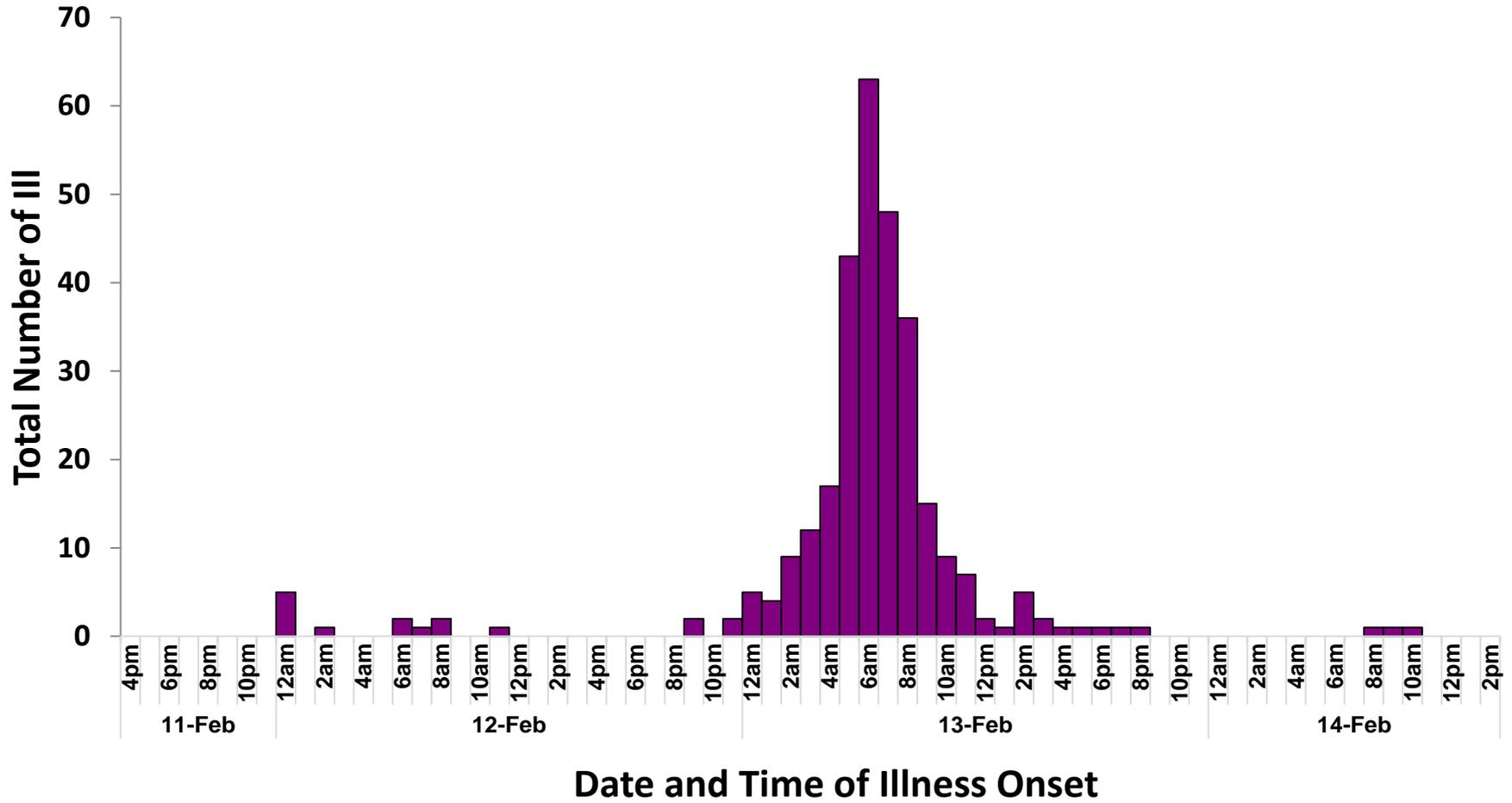
6. Develop Hypotheses

- Questions to ask yourself:
 - What is the agent's usual reservoir
 - How is the agent usually transmitted
 - What vehicles are commonly implicated
 - What are the known risk factors
 - In discussions with ill persons, what possible exposures were in common

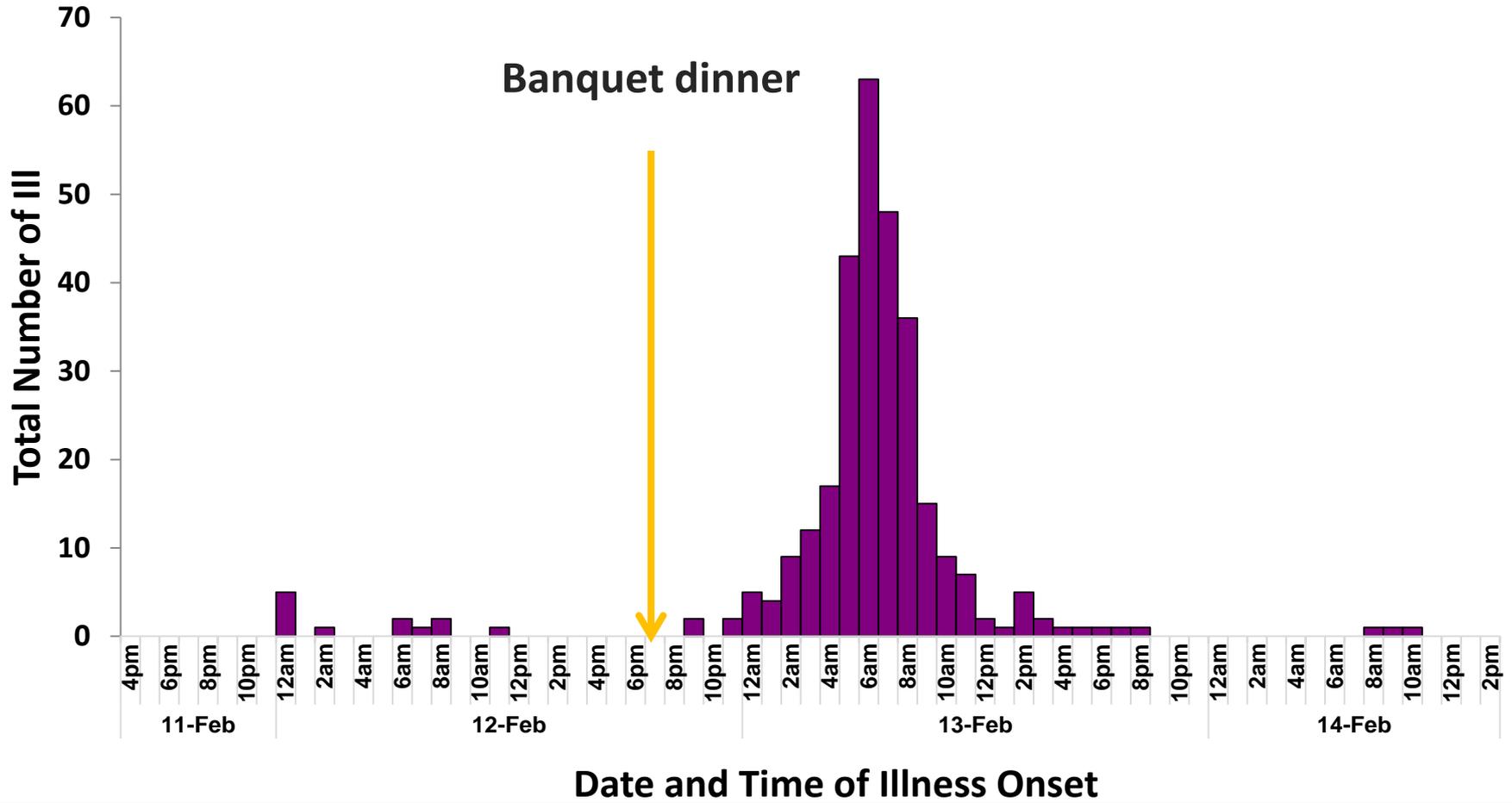
Example – Develop Hypothesis

- Case and clinical information:
 - Acute gastroenteritis
 - Most aged 14 – 18 years
 - 307 ill persons (cases)
 - Onset of illness: 12am Feb 12 – 10am Feb 14
- Common exposures:
 - Attending youth conference

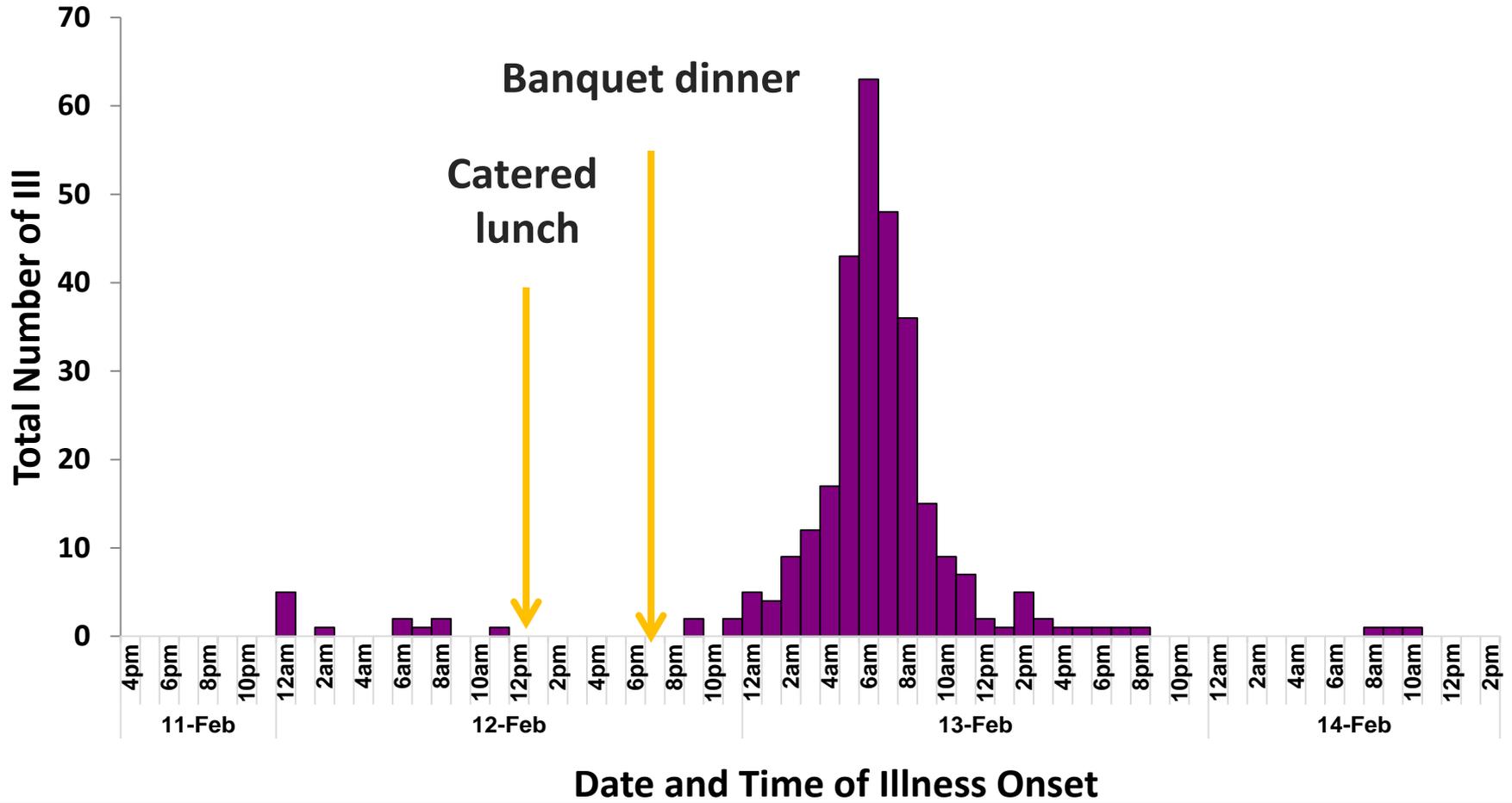
Example: Cases of Gastroenteritis by Time of Symptom Onset (n=307)



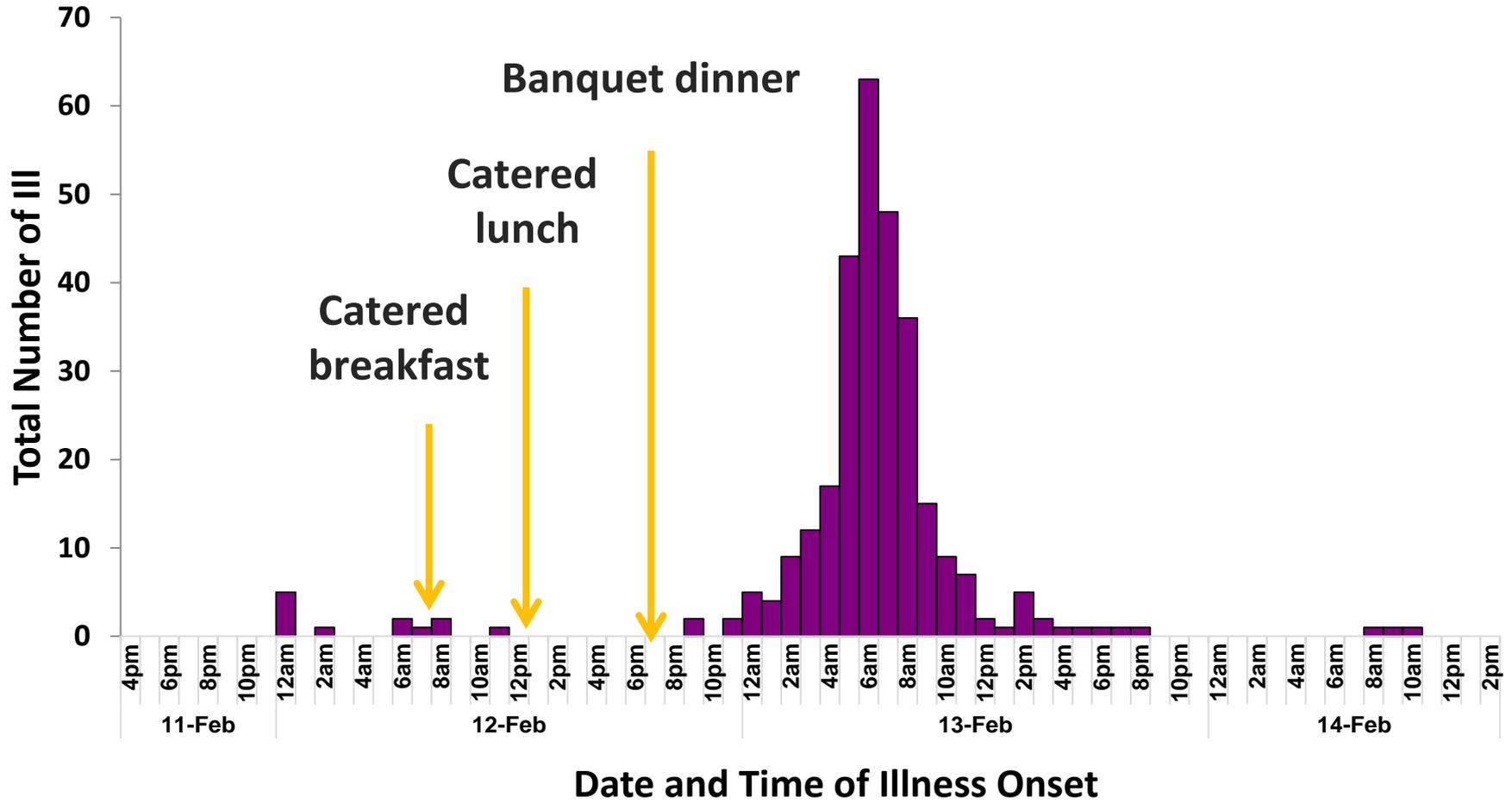
Example: Cases of Gastroenteritis by Time of Symptom Onset (n=307)



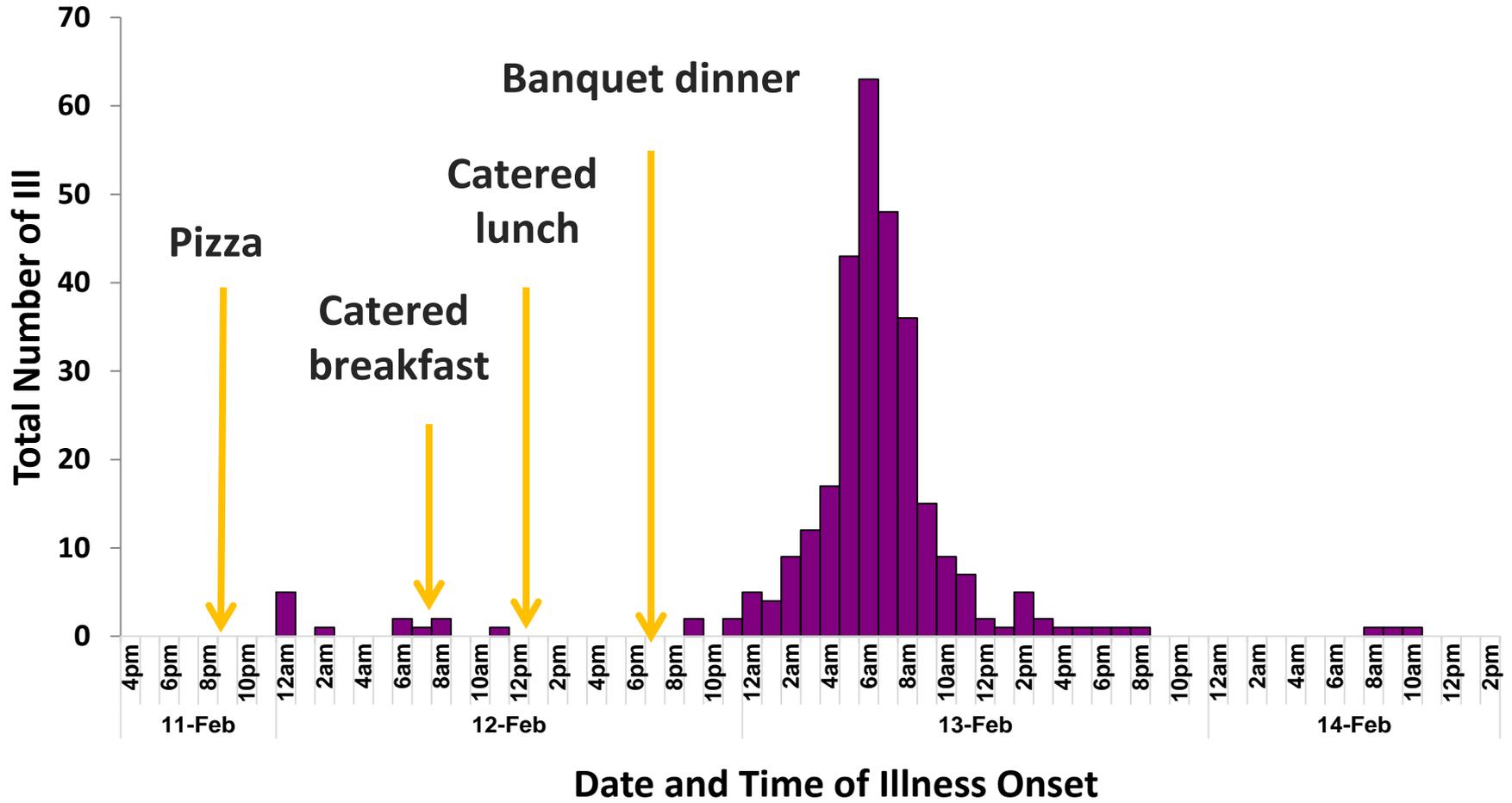
Example: Cases of Gastroenteritis by Time of Symptom Onset (n=307)



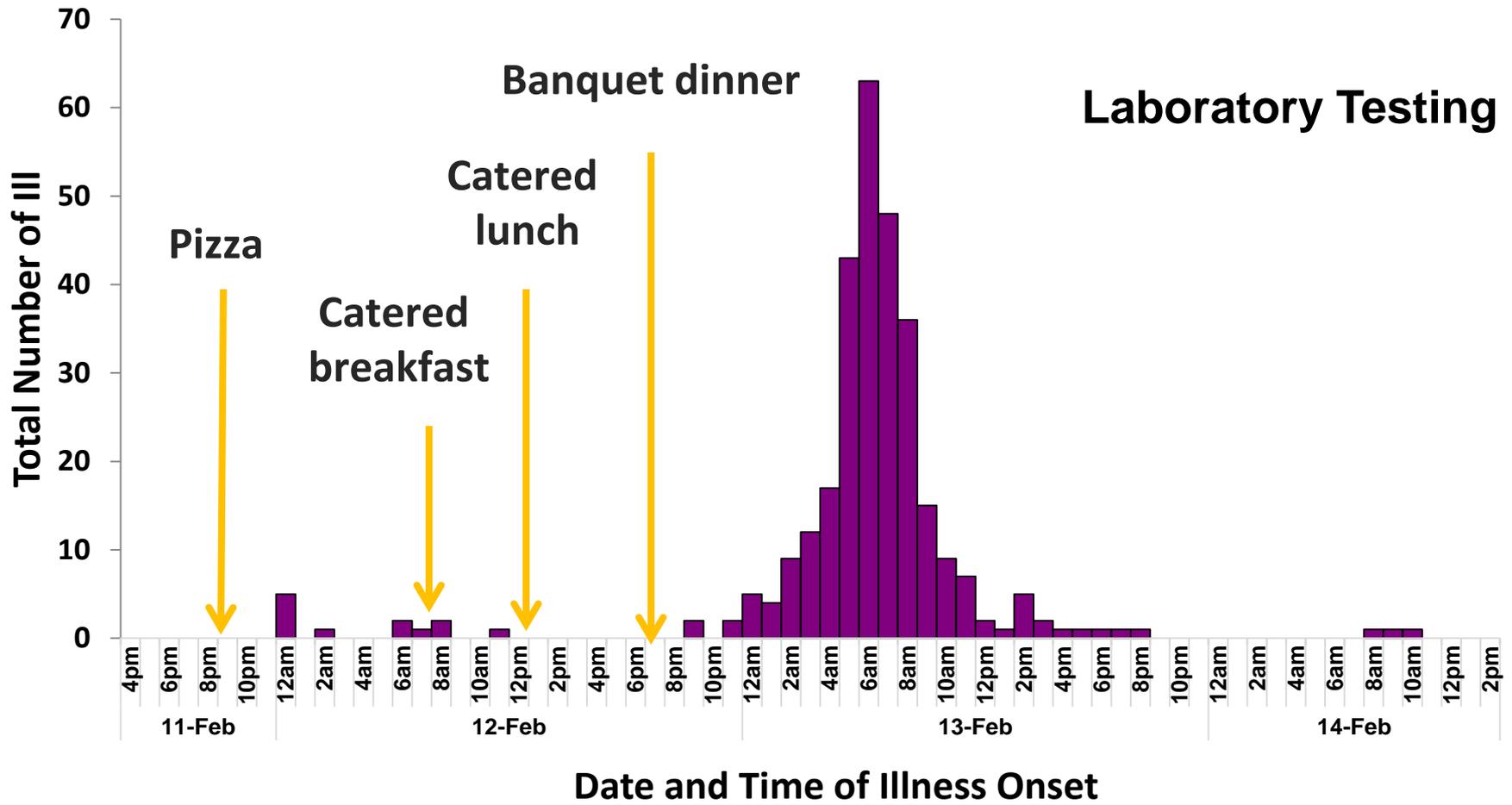
Example: Cases of Gastroenteritis by Time of Symptom Onset (n=307)



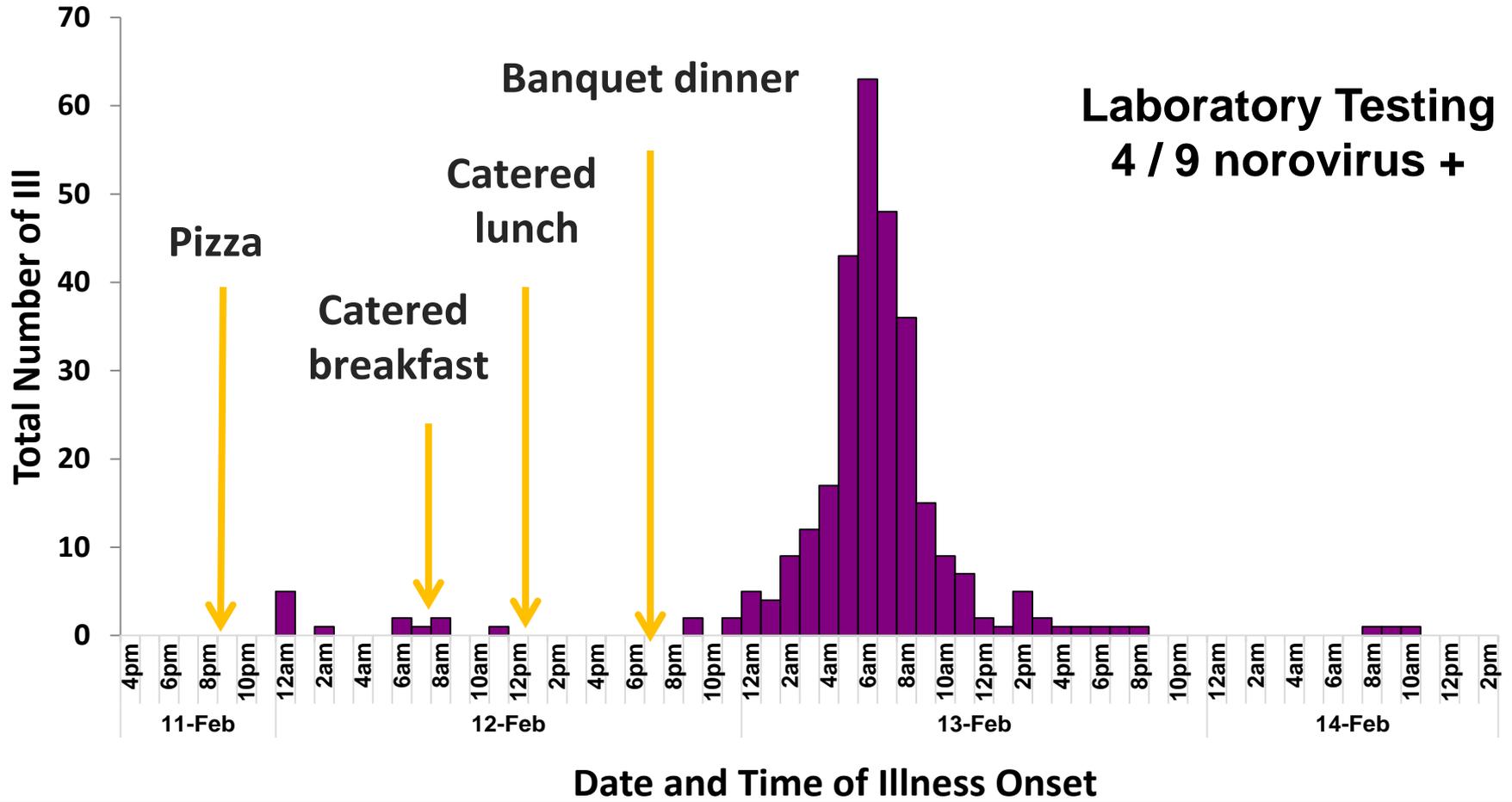
Example: Cases of Gastroenteritis by Time of Symptom Onset (n=307)



Example: Cases of Gastroenteritis by Time of Symptom Onset (n=307)



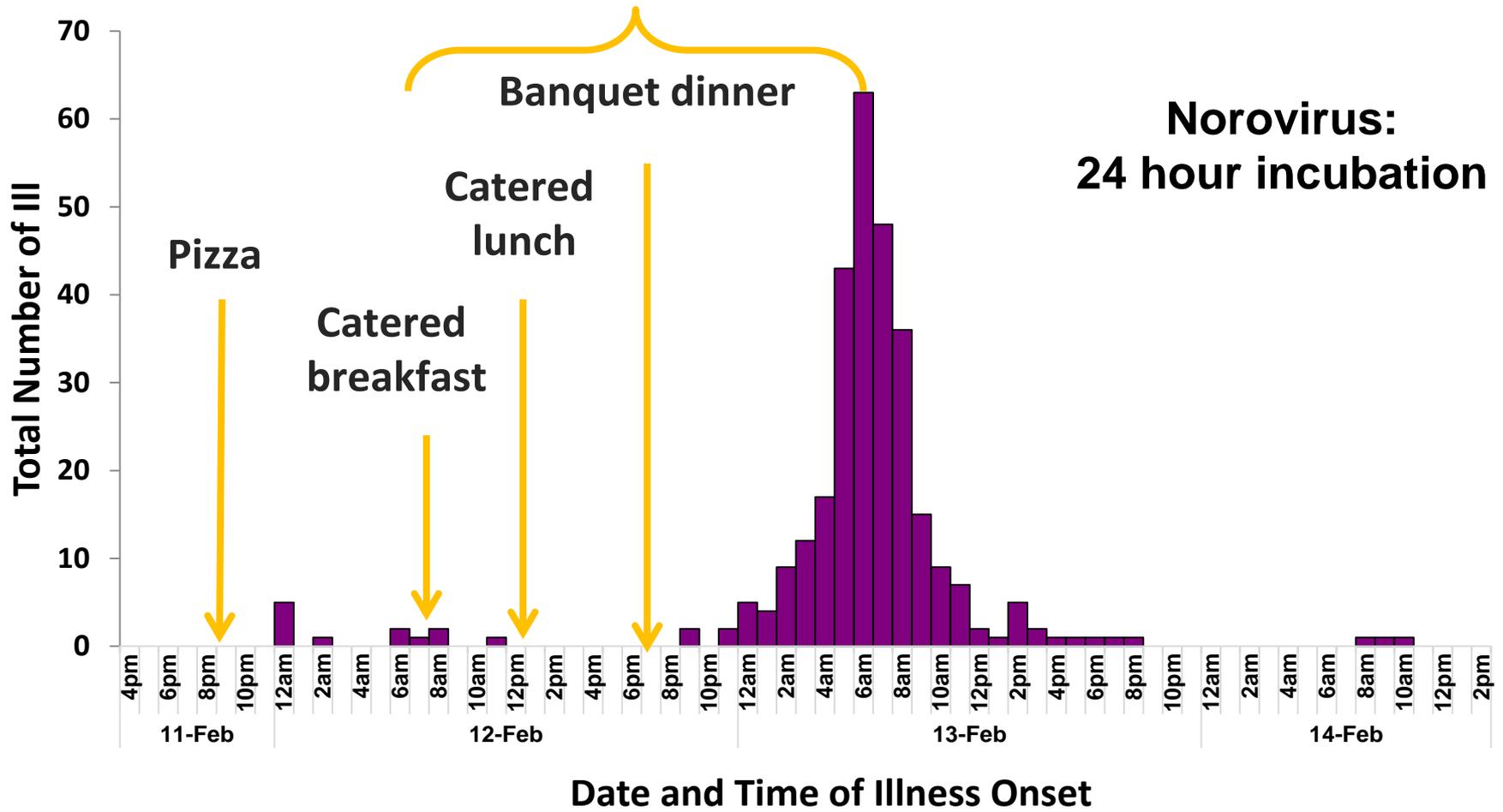
Example: Cases of Gastroenteritis by Time of Symptom Onset (n=307)



Norovirus Infection

- RNA virus
- Resistant to environmental stress
- Incubation period:
 - usually 24 hours
 - range 12-72 hours
- Causes GI illness with watery diarrhea and >50% vomiting

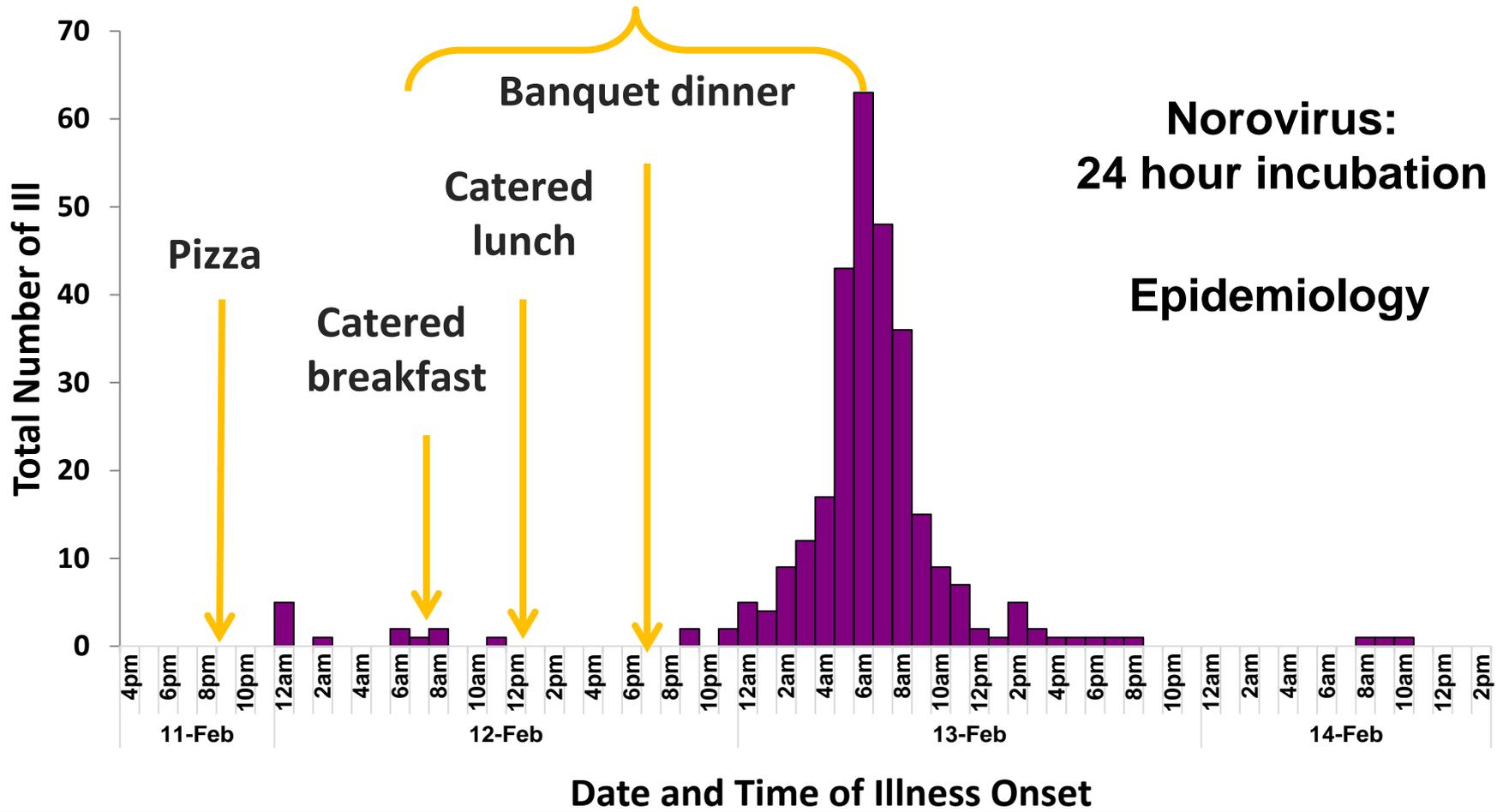
Example: Cases of Gastroenteritis by Time of Symptom Onset (n=307)



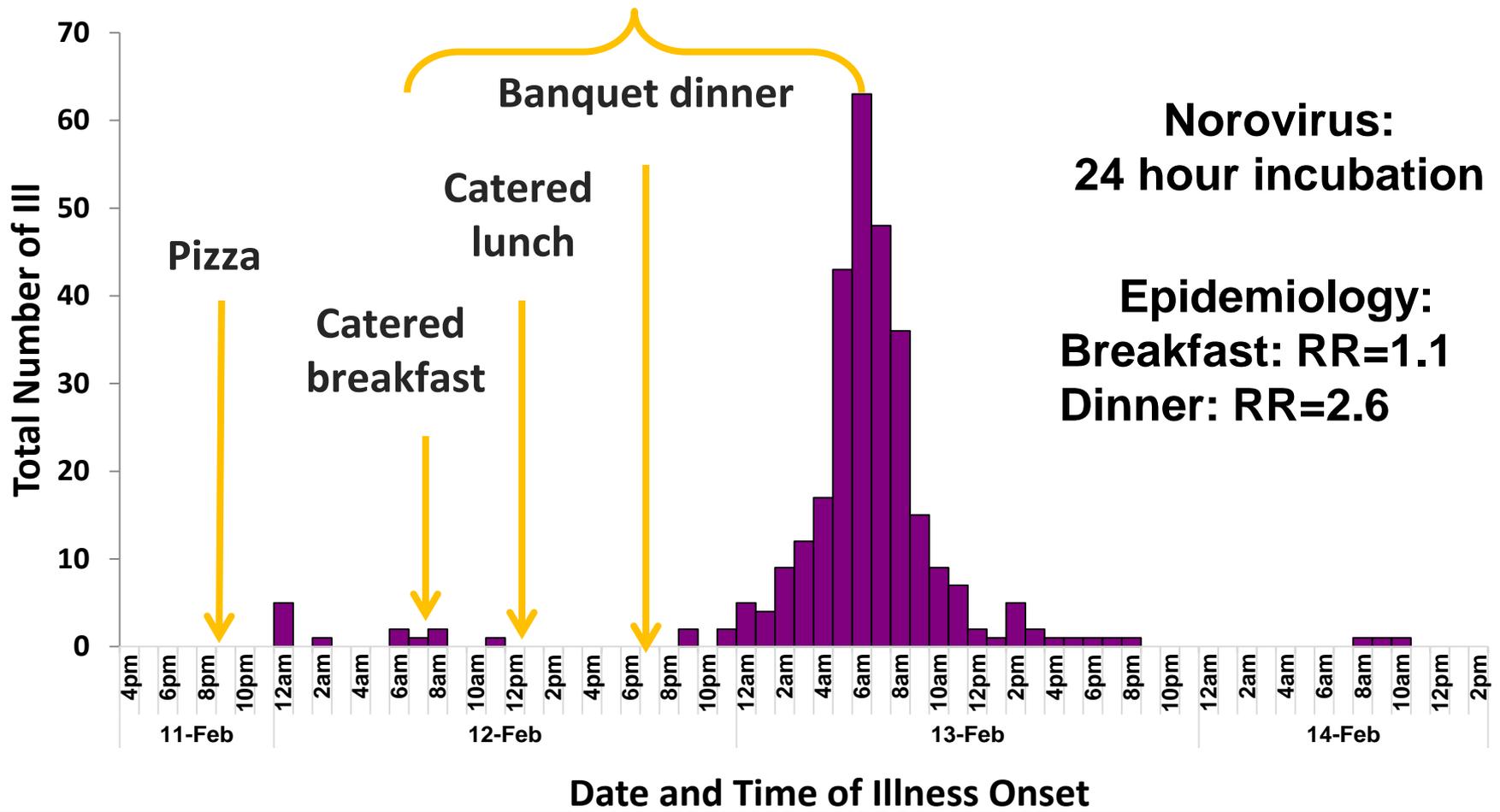
Example – Initial Hypothesis

- We hypothesize that:
 - norovirus was the causative agent of the outbreak, and
 - eating breakfast served on February 12 was the most likely exposure to norovirus

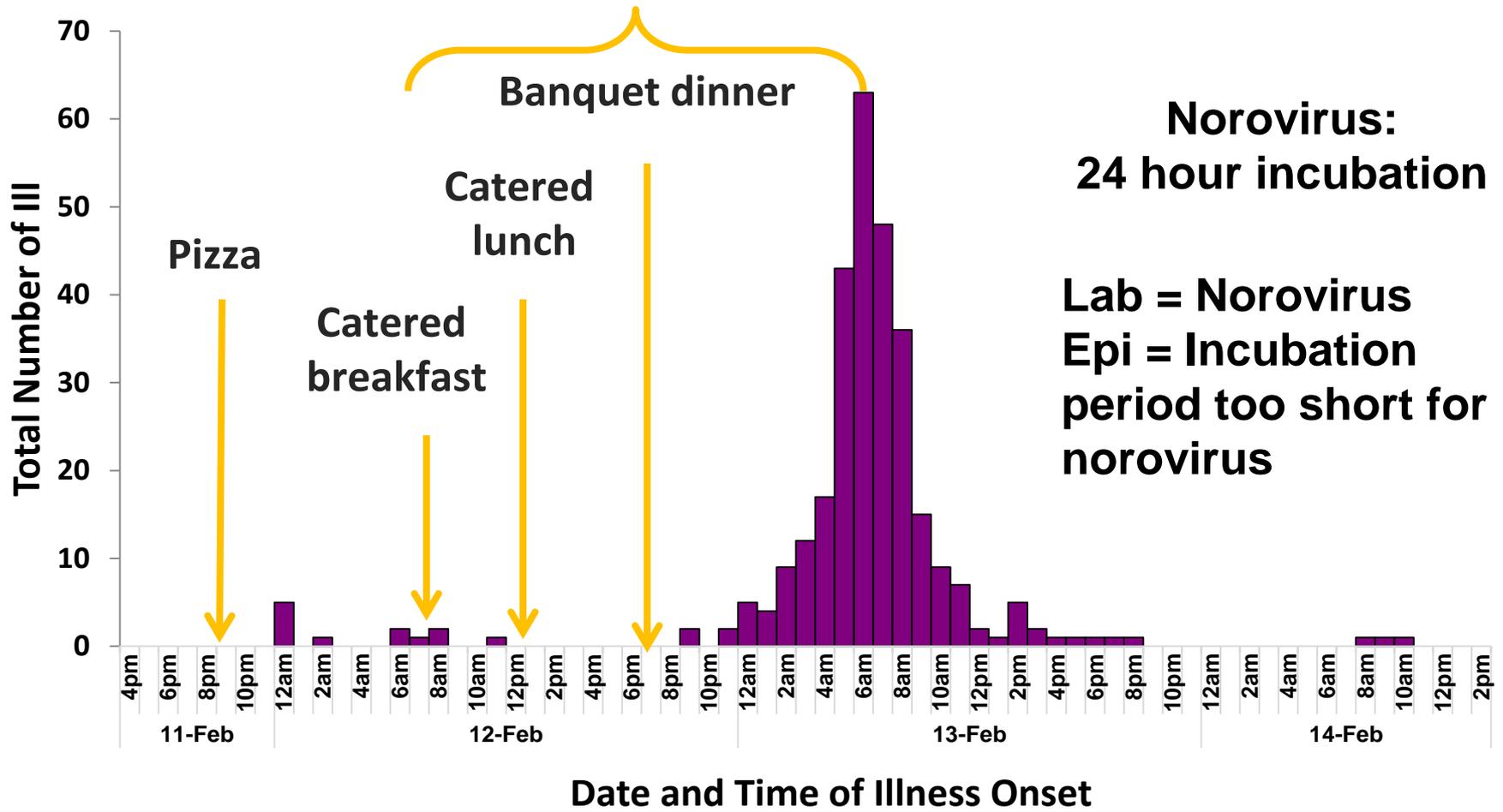
Example: Cases of Gastroenteritis by Time of Symptom Onset (n=307)



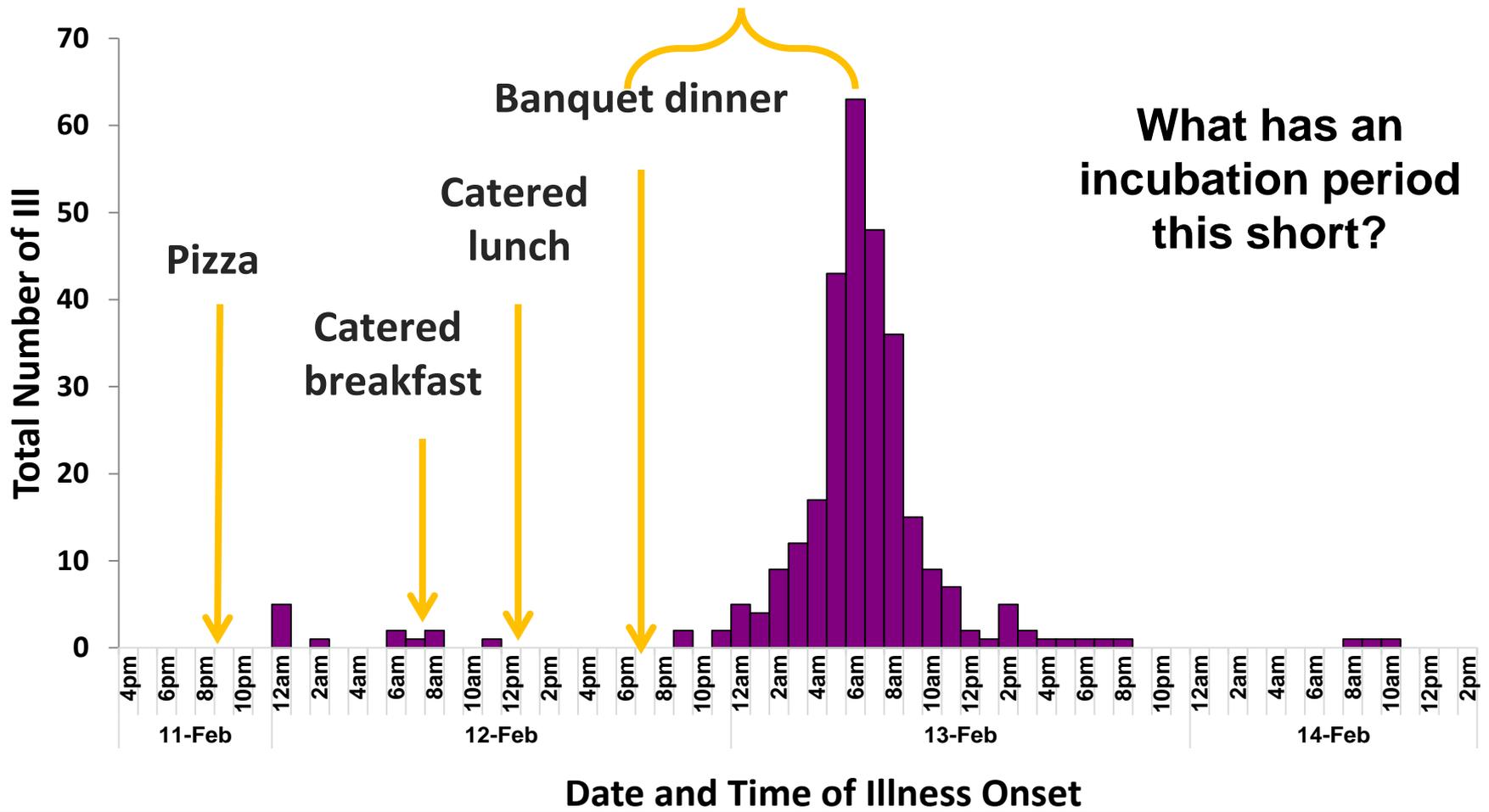
Example: Cases of Gastroenteritis by Time of Symptom Onset (n=307)



Example: Cases of Gastroenteritis by Time of Symptom Onset (n=307)



Example: Cases of Gastroenteritis by Time of Symptom Onset (n=307)



Clostridium perfringens Toxicoinfection

- Spore-forming Gram positive rod
 - Arises after consumption of bacteria-containing food
 - Toxin produced within the small intestine following ingestion
- Diarrhea predominant illness with little vomiting
- Incubation period usually 6–12 hours
- Associated with poorly cooked meat

Example – Additional Lab Information

- Norovirus testing
 - Reverse transcription PCR (RT-PCR)
 - Sent to CDC for confirmation
- *Clostridium perfringens* enterotoxin testing
 - Oxoid toxin detection kit
 - PCR

Example – Additional Lab Information

- Testing did not confirm the presence of norovirus
- After 4 weeks at 4 C, stool tested for *Clostridium perfringens* enterotoxin
 - Toxin present in 8 of 9 specimens tested
 - Enterotoxin gene detected in 5 of 6 specimens tested

Example – Final Hypothesis

- We hypothesize that:
 - *Clostridium perfringens* toxicoinfection was the causative agent of this point source outbreak
 - Associated with consumption of inappropriately-cooked chicken at the dinner served on February 12

6. Develop Hypotheses

- Questions to ask yourself regarding hypothesis:
 - Is hypothesis stated in a way that can be ‘tested’
 - Does it address:
 - agent
 - vehicle / source
 - mode of transmission
 - exposure that caused illness

6. Test the Hypothesis

- We hypothesize that:
 - *Clostridium perfringens* toxicoinfection was the causative agent of this point source outbreak
 - Associated with consumption of inappropriately-cooked chicken at the dinner served on February 12
- Testable ✓
- Agent ✓
- Vehicle or source of agent ✓
- Mode of transmission ✓
- Exposure ✓

10 Steps of an Outbreak Investigation

1. Identify investigation team and resources
2. Establish existence of an outbreak
3. Verify the diagnosis
4. Construct case definition
5. Case finding: Find cases systematically / develop line list
6. Perform descriptive epidemiology / develop hypotheses
7. Evaluate hypotheses / perform additional studies (as necessary)
8. Implement control measures
9. Communicate findings
10. Maintain surveillance

7. Evaluate Hypotheses

- Two methods:
 - Compare hypothesis with established facts
 - Perform additional studies (e.g., analytic)
 - Cohort or case-control
 - Assess exposures equally among ill and non-ill persons

7. Evaluate Hypotheses

- Compare hypothesis with established facts
 - Evidence is so strong that hypothesis does not need to be tested
 - E.g., Salmonella Paratyphi B with PFGE pattern .1228 (the outbreak strain) isolated from unpasteurized tempeh
 - E.g., norovirus identified in a nursing home; norovirus is known to be circulating in the community

7. Perform Additional Studies

- Used when the relationship between exposure and disease is less clear

Value of Analytic Studies

- Support for specific public health action (e.g., recall)
- Describe new diseases, learn more about known diseases
- Address public and political concern
- Develop strategies to prevent future outbreaks
- Fulfillment of legal obligations and duty of care for the public

7. Perform Additional Studies

- Cohort
 - Able to identify every person in group ('cohort')
 - Possible when group is well defined
 - Include *EVERYONE* who could have been exposed
 - E.g., Meeting attendees, students, wedding reception, LTCF residents

7. Perform Additional Studies

- Case-control
 - Compare exposures among ill persons (case) and non-ill persons (controls)
 - Used when a complete list is not available or too large
 - Controls are sample of same population from which cases arose (e.g., source population)
 - E.g., same city, attend same restaurant
 - If a control had developed illness, would have been included as a case

7. Perform Additional Studies

****Step 7 will almost always be performed in consultation with DPH and we will assist you. This will not be addressed in further detail at this initial training, but may be addressed in a later training.****

7. Example – Evaluate the Hypothesis

- What type of analytic study could be used to evaluate the *C. perfringens* hypothesis?
 - *Clostridium perfringens* toxicoinfection was the causative agent of this point source outbreak
 - Associated with consumption of inappropriately-cooked chicken at the dinner served on February 12

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8. Implement Control Measures

- Immediate implementation of control measures from Step 1
 - Source is identified
 - Continued risk of either exposing others or being exposed
 - E.g., food handler

8. Implement Control Measures

- Required response from public health
- Can occur at any point during the outbreak
- Prevent further exposure, future outbreaks
- Should be guided by epidemiologic results in conjunction with environmental investigation
- Performed in conjunction with DPH, regulators, industry, other agencies
- Balance between preventing further disease, protecting credibility and reputation of institution
- Identify one person to communicate control measures

8. Example – Control Measures

- Summary:
 - Attendees at a youth conference
 - > 1,000 attendees
 - 307 ill persons (cases)
 - *Clostridium perfringens* toxicoinfection
 - Associated with inappropriately cooked chicken
- Recommended control measures?

8. Example – Control Measures

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9. **Communicate findings**
10. Maintain surveillance

9. Communicate Findings

- Two forms:
 - Oral:
 - Internally with team
 - Externally to public, media, health care providers
 - Written:
 - Daily updates (Situation Reports)
 - Final outbreak report, which is a public record

9. Communicate Findings

- Public and media:
 - Single member of team should interact with media, communicate progress and findings
 - Media attention desirable if public action is needed
 - Response to media attention important to address public concerns about outbreak
 - Opportunity to educate community
 - Single overriding communication objective (SOCO)

9. Communicate Findings

- Daily updates (Situation Reports)
 - Narrative
 - Number of persons ill
 - Number of persons potentially exposed (if known)
 - Range of onset dates
 - Type of symptoms
 - Available laboratory results
 - Number hospitalized / died
 - Actions already taken
 - Action Items
 - Summary of recommendations and plans for surveillance, control

Example – Situation Report

SIT REP: Unknown respiratory illness in a LTCF, Guilford County

Fleischauer, Aaron

 This message was sent with High importance.

Sent: Fri 6/1/2012 4:26 PM

To: **sit.rep**

Cc: brogers@co.guilford.nc.us; philliard@co.guilford.nc.us; wrobinson@co.guilford.nc.us

SIT REP – June 1, 2012

Reported by: Aaron Fleischauer, 919-715-6431

Event: Unknown respiratory illness *outbreak* in a long-term care facility (LTCF), Guilford County, NC

LHD Contact: Betty Rogers, Guilford County Health Department, 336-641-6500

Dr. Ward Robinson, Guilford County Health Department, 336-549-9724

DPH Contact: Dr. Jean-Marie Maillard, 919-7157395

Narrative:

- Guilford County reports an unknown respiratory illness *outbreak* at a LTCF (Adams Farm Living and Rehab, Jamestown, NC)
- An estimated 20-30 residents and at least 2 staff have reported febrile respiratory illness during past 2-3 weeks
 - Several residents have been admitted to Moses Cone and High Point Regional Hospitals
 - Possibly 4 deaths secondary to pneumonia have also been reported
- The facility has been closed to new admissions

Action Items:

- Guilford County will visit the facility this afternoon to:
 - Begin line list of ill persons

9. Communicate Findings: Outbreak Report

- Outbreak report
 - Final summary of investigation
 - Actions taken
 - Recommendations provided

Example – Outbreak Report

North Carolina Division of Public Health Outbreak Report Form

Within 30 days of the end of an outbreak, complete this form and e-mail it to your TATP nurse consultant. The TATP nurse consultant will assure creation of a NCEDSS outbreak event and attachment of this form and a line list. Do not e-mail a line list.

General Information

Today's Date County Person completing this form

Lead Investigator Title Telephone

Outbreak Information

Date LHD notified Date investigation initiated Suspected transmission mode

Facility Name / Setting Facility Address

Setting Type: Nursing Home Assisted Living School Day Care Prison City Zip

Restaurant Community Other: NCEDSS Event #

Date of Illness Onset for 1st Case Date of Illness Onset for Last Case

Residents / Students / Patrons	Number	Faculty / Staff / Employees	Number
Total number in facility / setting*	<input type="text"/>	Total number in facility / setting*	<input type="text"/>
Number exposed*	<input type="text"/>	Number exposed*	<input type="text"/>
Number ill	<input type="text"/>	Number ill	<input type="text"/>
Number investigated / interviewed	<input type="text"/>	Number investigated / interviewed	<input type="text"/>
Number sought medical care	<input type="text"/>	Number sought medical care	<input type="text"/>
Number hospitalized	<input type="text"/>	Number hospitalized	<input type="text"/>
Number of deaths	<input type="text"/>	Number of deaths	<input type="text"/>
Number w/ laboratory confirmation	<input type="text"/>	Number w/ laboratory confirmation	<input type="text"/>
Number vaccinated before outbreak*	<input type="text"/>	Number vaccinated before outbreak*	<input type="text"/>
Number vaccinated after outbreak started*	<input type="text"/>	Number vaccinated after outbreak started*	<input type="text"/>
Number received Post-exposure prophylaxis*	<input type="text"/>	Number received Post-exposure prophylaxis*	<input type="text"/>

*Might not be applicable in all situations Nausea Vomiting Abdominal Cramps Diarrhea Bloody Diarrhea Fever

Predominant Symptoms: Cough Difficulty Breathing Renal Failure Other:

Investigation Methods

Site Visit Develop outbreak case definition Perform case finding Conduct interviews Conduct chart reviews

Collect specimens Confirm diagnosis Conduct environmental inspection Perform environmental sampling

Other:

Laboratory Methods

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10. Maintain Surveillance

- Evaluate / document effectiveness of control measures
- To ensure outbreak is over
- To ensure secondary outbreak is not occurring
- It is recommended to maintain surveillance for 2 average incubation periods following the last date of illness onset

Conclusions

- Epidemiologic investigations essential component of public health, present opportunities to:
 - Characterize diseases
 - Identify populations at risk
 - Evaluate programs, policies, or existing prevention strategies
 - Train public health staff
 - Educate the public
 - Fulfill legal obligations and duty of care for the public
- 10 steps provide systematic framework necessary to investigate any outbreak

Acknowledgements

- CDB Epidemiologists
- TATP Regional Nurse Consultants
- CDB Field Services Unit
- Patricia Kempton, DON, Moore County Health Department
- Tammra Morrison, Wilson County Health Department

Post Test

Activity 4

Oswego – An Outbreak of Gastrointestinal
Illness following a Church Supper



Case Study No. 401-303

Centers for Disease Control and Prevention
Epidemiology Program Office

