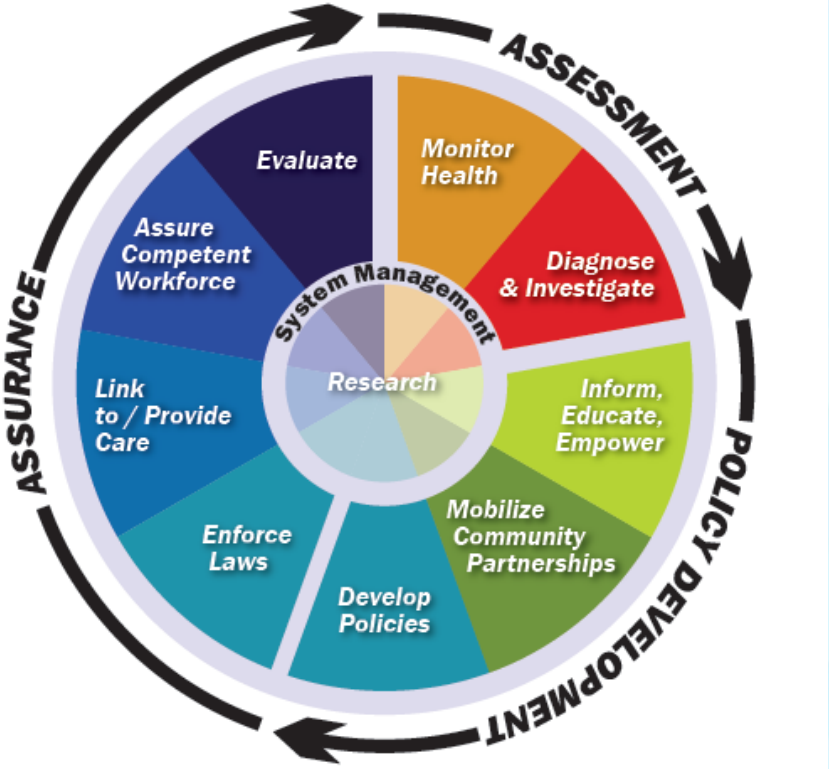
Public Health 101 Series



Introduction to Epidemiology

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Course Topics

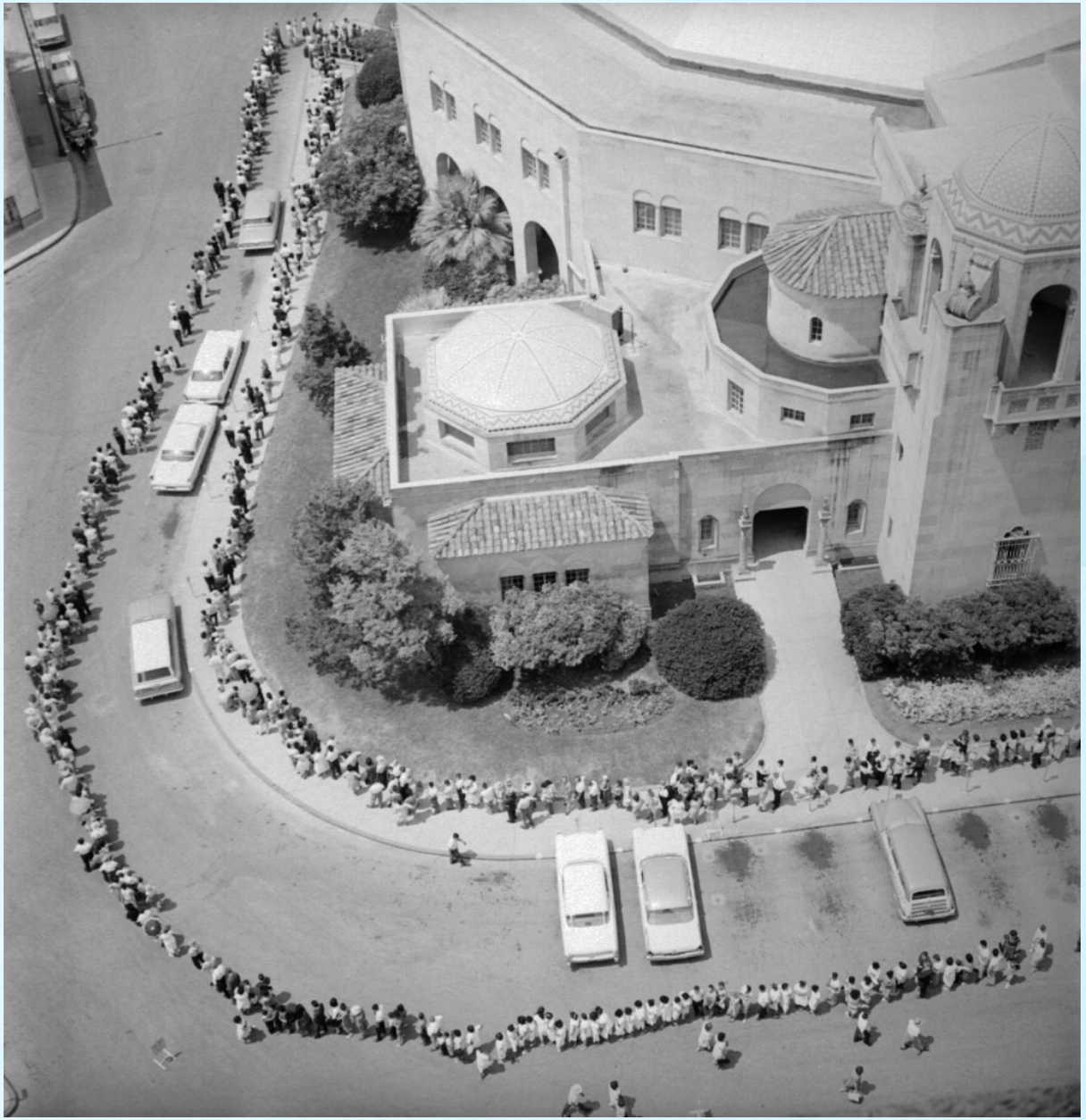
Introduction to Epidemiology

1. A Public Health Approach
2. What Is Epidemiology?
3. Approach and Methodology
4. Data Sources and Study Design
5. Investigating an Outbreak

Learning Objectives

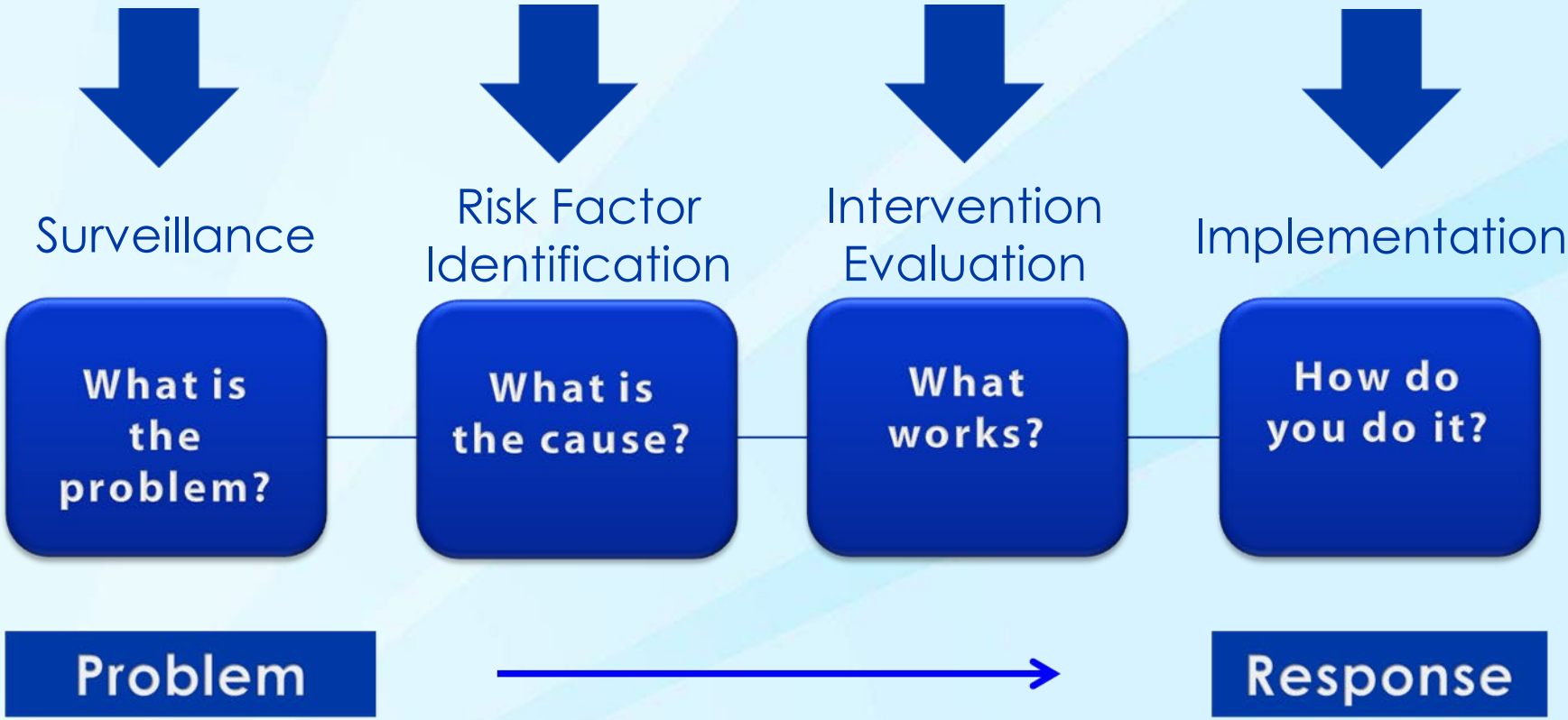
After this course, you will be able to

- define epidemiology
- describe basic terminology and concepts of epidemiology
- identify types of data sources
- identify basic methods of data collection and interpretation
- describe a public health problem in terms of time, place, and person
- identify the key components of a descriptive epidemiology outbreak investigation



Topic 1
A Public Health Approach

A Public Health Approach



Public Health Core Sciences

Topic 2
What Is Epidemiology?

Outbreak - 1995

Contagion - 2011

Epidemiology — Defined

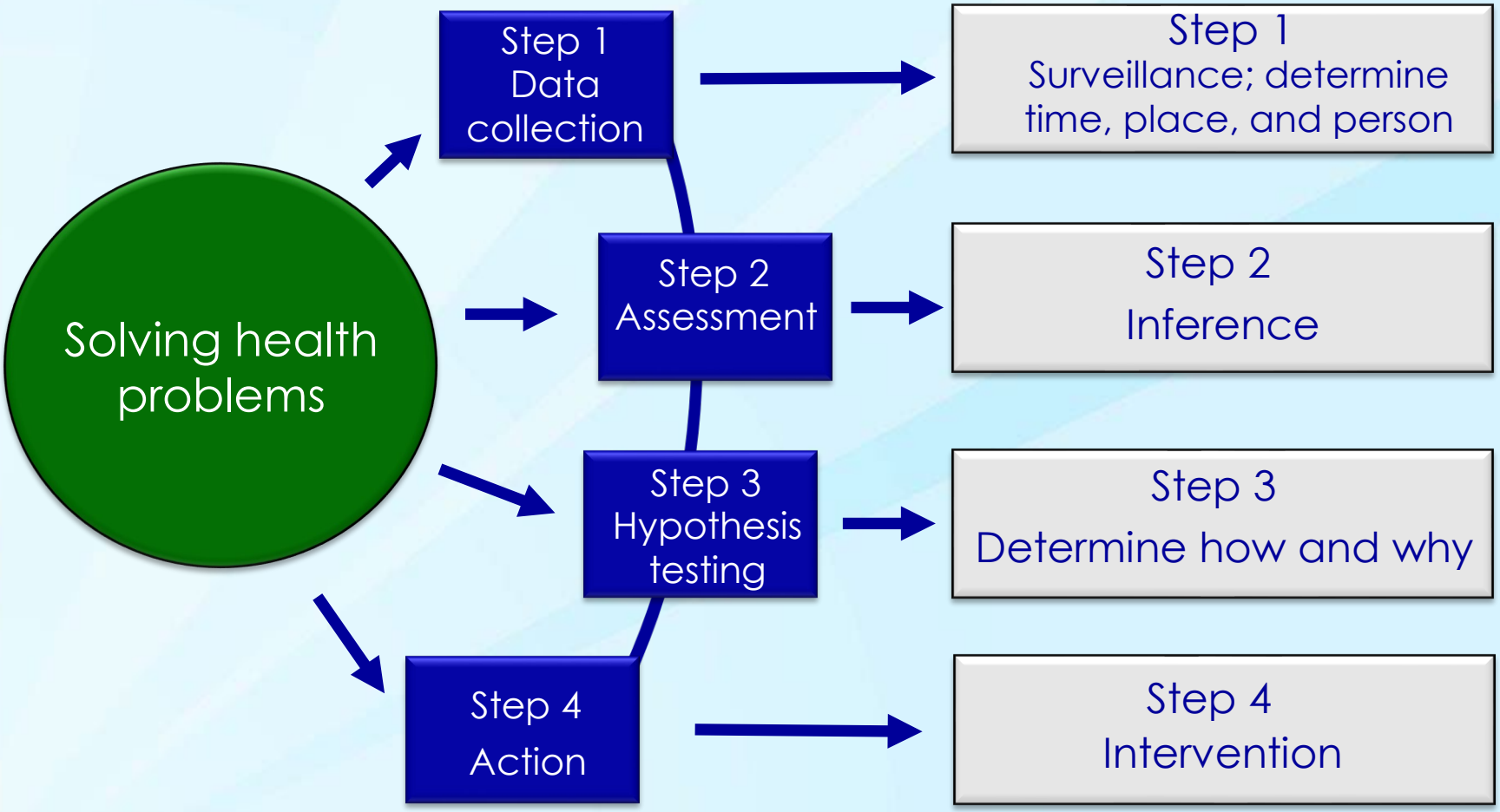
Study of the distribution and determinants of health-related states among specified populations and the application of that study to the control of health problems

Adapted from: Last JM, ed. A dictionary of epidemiology. 2nd ed. Toronto, Canada: Oxford University Press; 1988.

Epidemiology Purposes in Public Health Practice

- Discover the agent, host, and environmental factors that affect health
- Determine the relative importance of causes of illness, disability, and death
- Identify those segments of the population that have the greatest risk from specific causes of ill health
- Evaluate the effectiveness of health programs and services in improving population health

Solving Health Problems



Knowledge Check

All of the following illustrate the purpose of epidemiology in public health, except

A. identifying populations who are at risk for certain diseases.

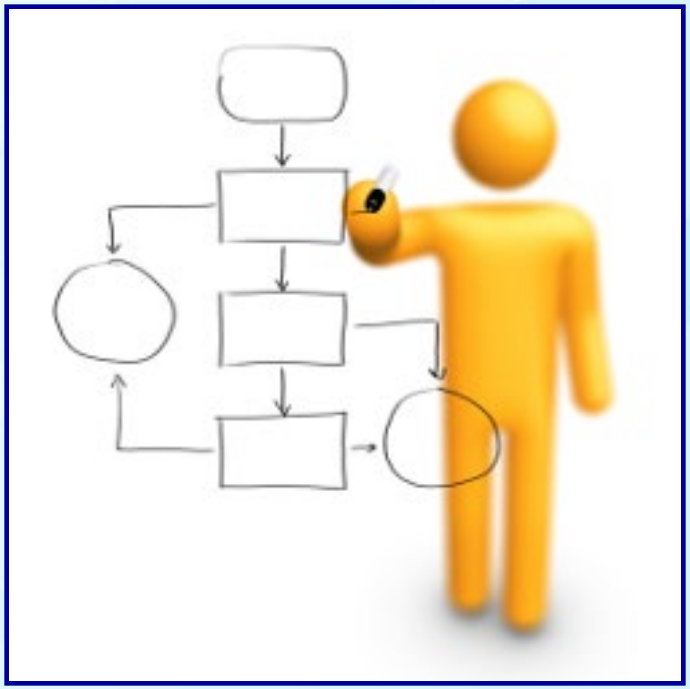
B. assessing the effectiveness of interventions.

C. providing treatment for patients in clinical settings.

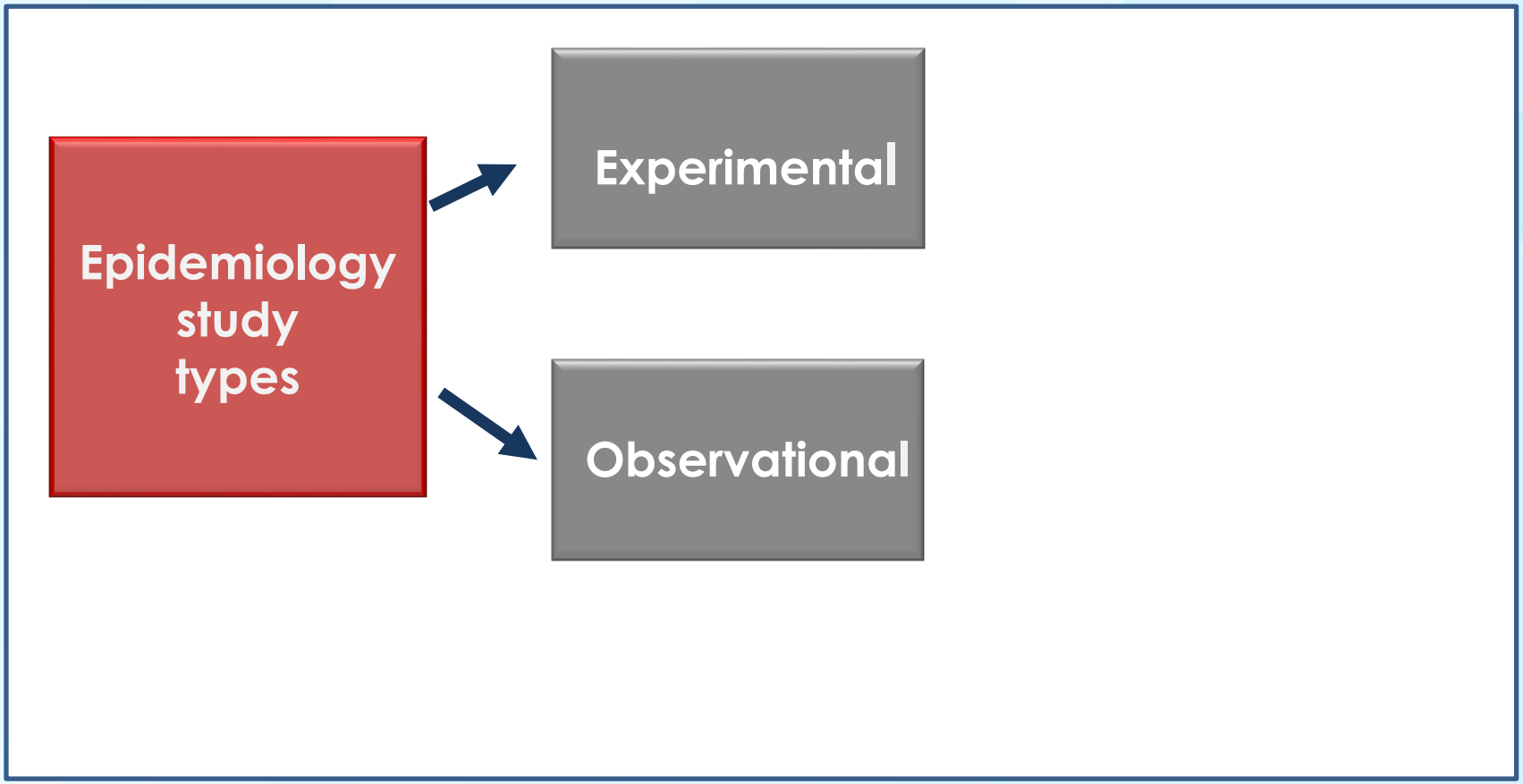
D. determining the importance of causes of illness

Topic 3

Epidemiology Approach and Methods



Epidemiology Study Types



Descriptive and Analytic Epidemiology

Descriptive epidemiology
When was the population affected?
Where was the population affected?
Who was affected?

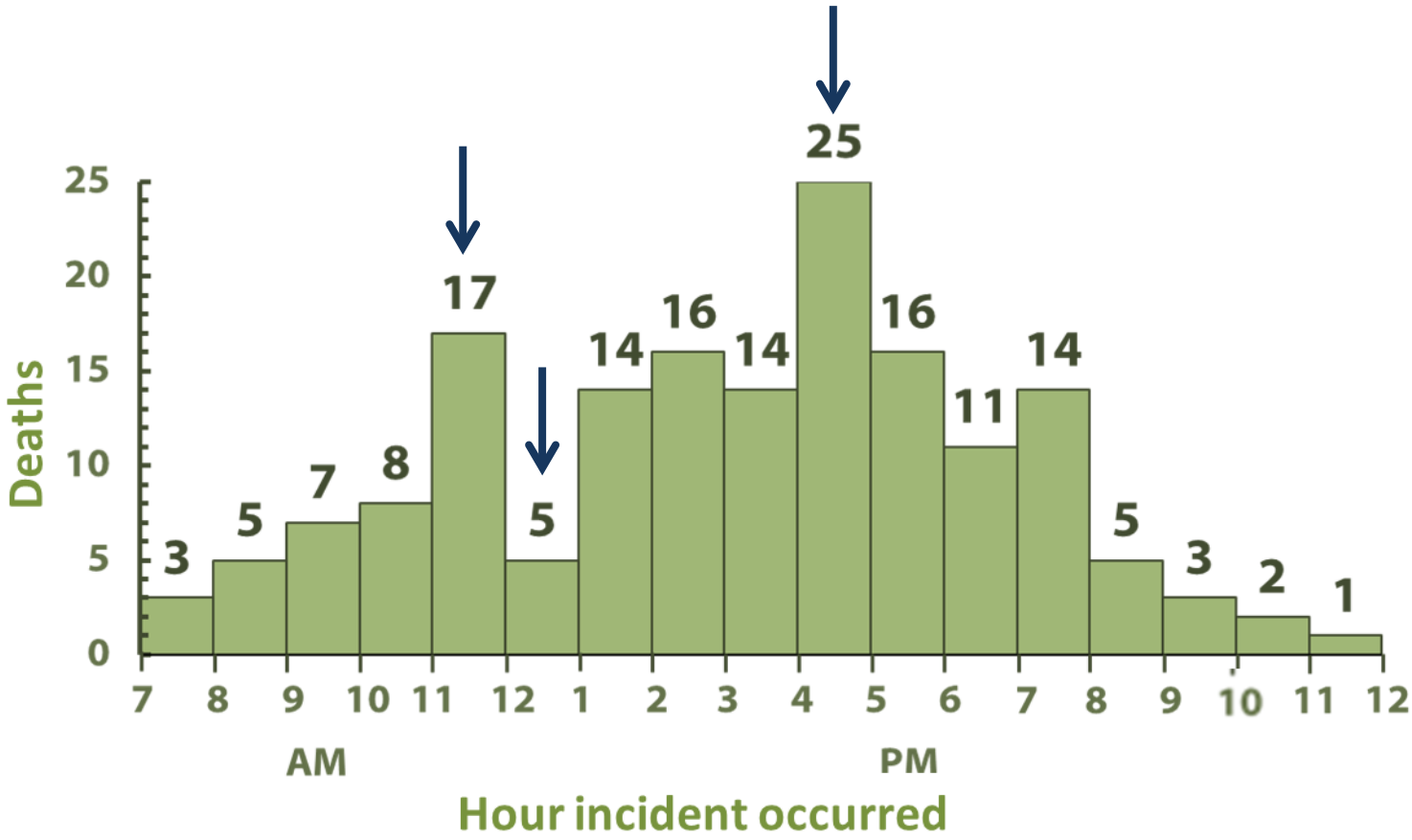
Descriptive and Analytic Epidemiology

Descriptive epidemiology	Analytic epidemiology
When was the population affected?	**How** was the population affected?
Where was the population affected?	**Why** was the population affected?
Who was affected?	

Fatalities Associated with Farm Tractors

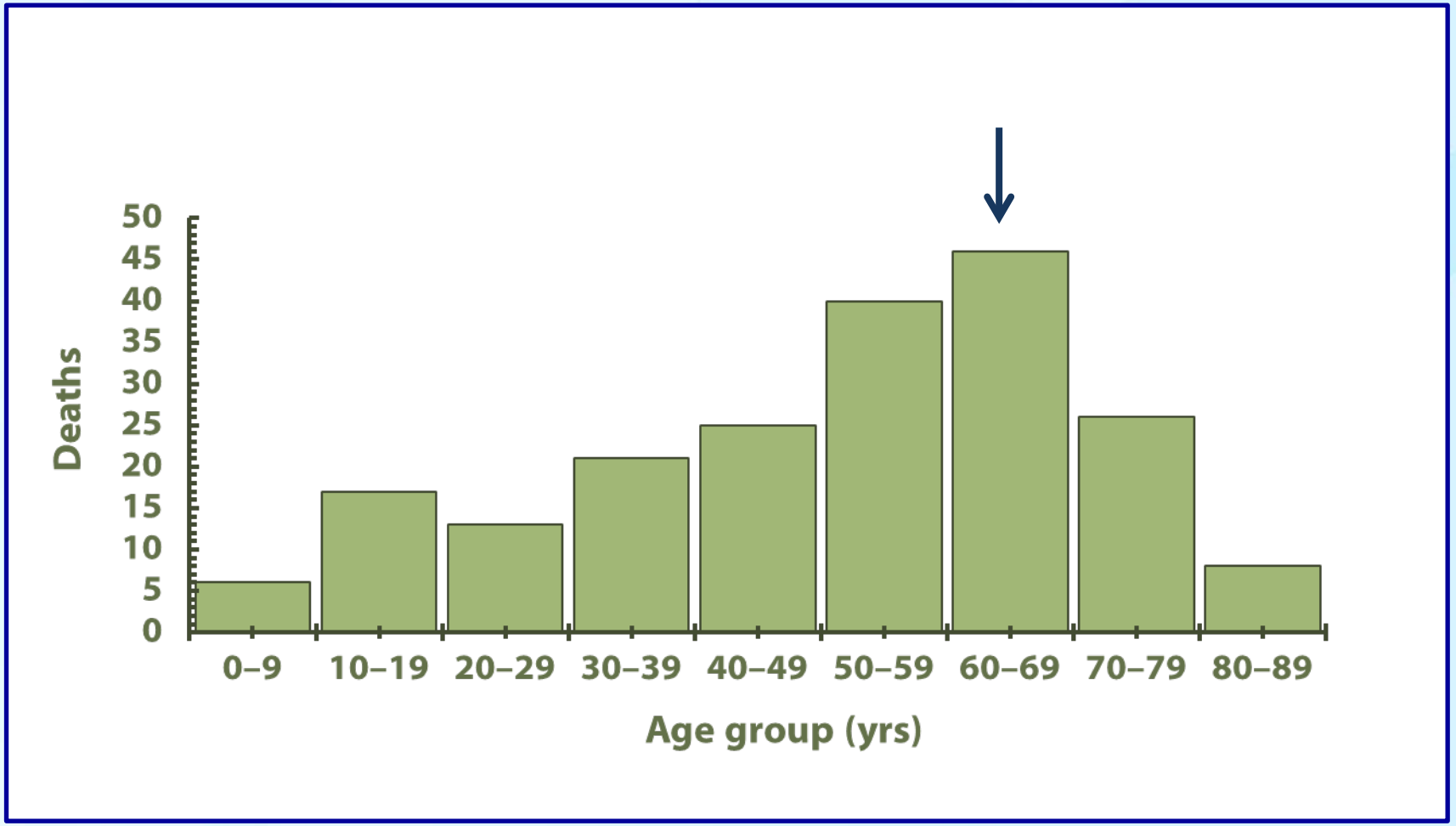
In 1982, the number of farm tractor-associated deaths was described in terms of time, place, and person by using records from an existing surveillance system

Fatalities Associated with Farm Tractors



Goodman RA, Smith JD, Sikes RK, et al. Fatalities associated with farm tractor injuries: an epidemiologic study. Public Health Rep 1985;100:329–33.

Fatalities Associated with Farm Tractors



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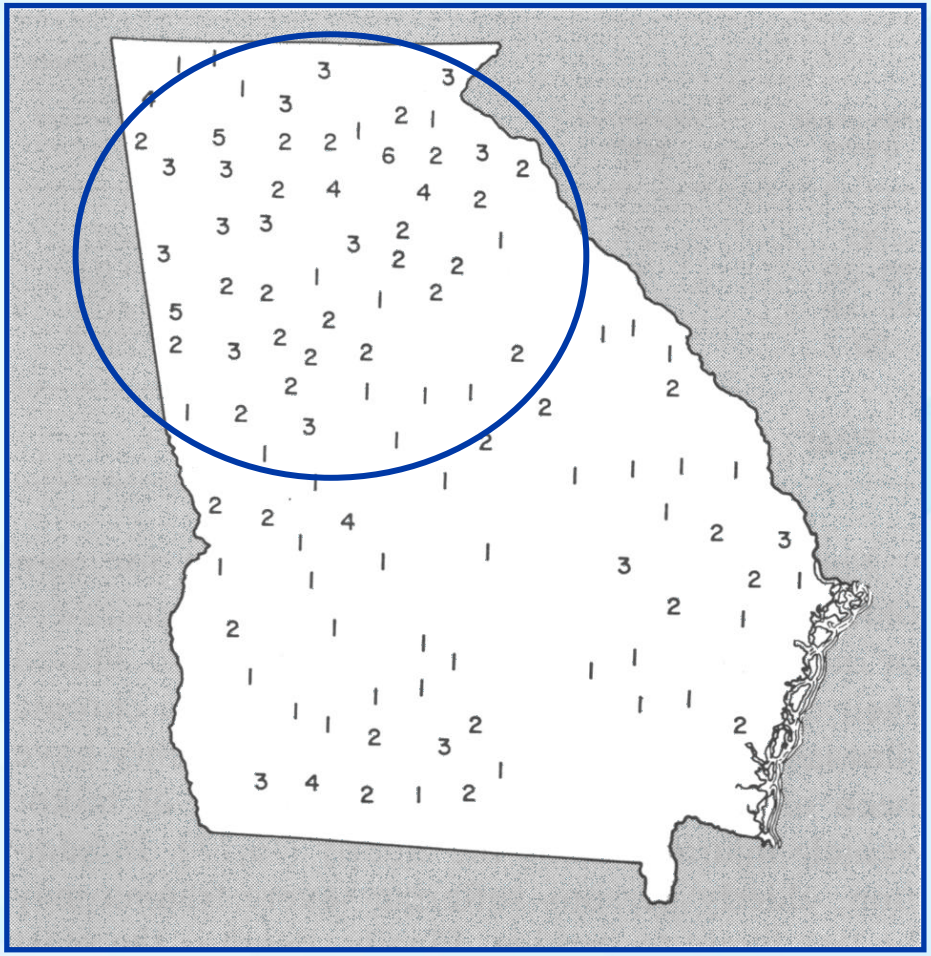
Fatalities Associated with Farm Tractors



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Knowledge Check

Choose the correct answer from the following choices:

A. Qualitative	B. Experimental	C. Observational

C. Observational

An epidemiologist is doing a study on the sleep patterns of college students but does not provide any intervention. What type of study is this?

Knowledge Check

Match each term to the correct example below.

A. Descriptive	B. Analytic

B. Analytic 1. A study of heart disease comparing a group who eats healthy foods and exercises regularly with one who does not in an effort to test association

A. Descriptive 2. A study to describe the eating habits of adolescents aged 13–18 years in Community X

Topic 5
Investigating an Outbreak

Steps in an outbreak investigation

Prepare for field work
Verify the reported diagnosis
Prepare a case definition, identify and count cases (line list)
Establish the existence of an outbreak (epi curve)
Describe and orient data in terms of time place and person
Develop hypothesis
Evaluate hypothesis
Reconsider and refine hypothesis
Plan and implement additional necessary studies
Implement control and preventive actions
Communicate findings

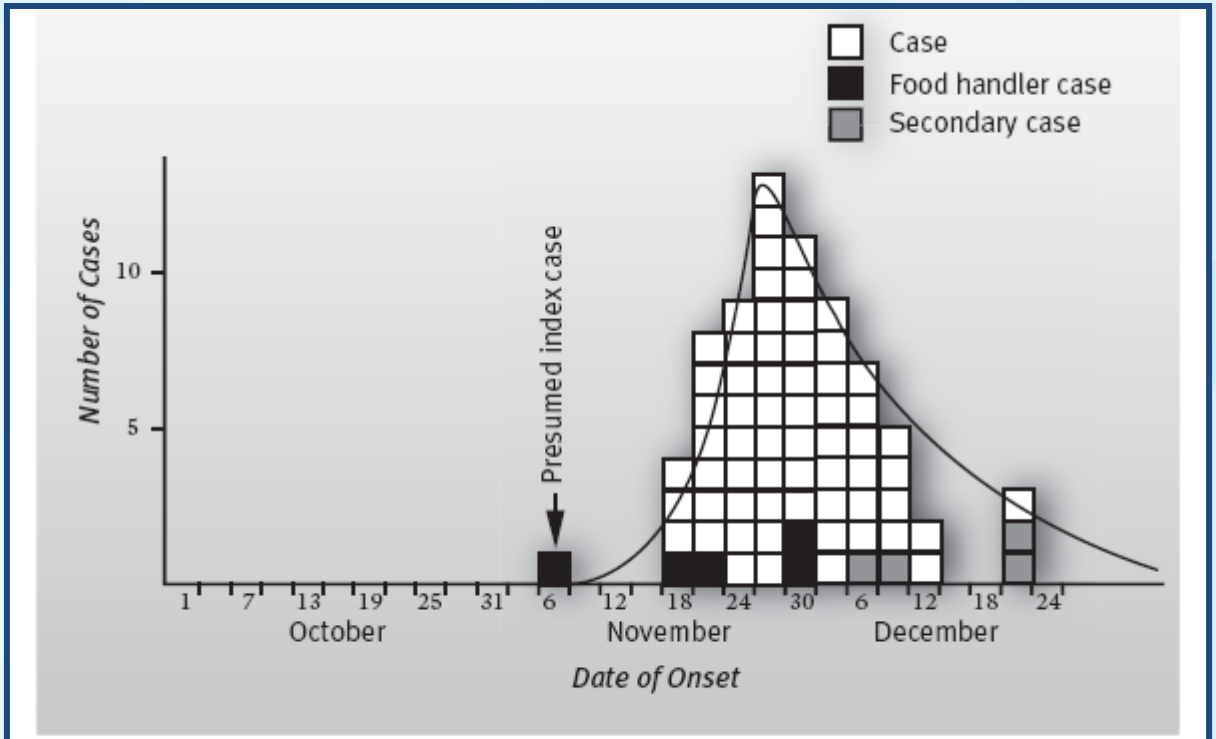
Line list

Case #	Initials	Date of Report	Date of Onset	Diagnostic							Lab		Age	Sex
				MD Dx	Signs and Symptoms						HA IgM	Other		
					N	V	A	F	DU	J				
1	JG	10/12	10/6	Hep A	+	+	+	+	+	+	+	SGOT ↑	37	M
2	BC	10/12	10/5	Hep A	+	–	+	+	+	+	+	ALT ↑	62	F
3	HP	10/13	10/4	Hep A	±	–	+	+	+	S*	+	SGOT ↑	30	F
4	MC	10/15	10/4	Hep A	–	–	+	+	?	–	+	HBs Ag-	17	F
5	NG	10/15	10/9	NA	–	–	+	–	+	+	NA	NA	32	F
6	RD	10/15	10/8	Hep A	+	+	+	+	+	+	+		38	M
7	KR	10/16	10/13	Hep A	±	–	+	+	+	+	+	SGOT = 240	43	M
8	DM	10/16	10/13	Hep A	–	–	+	+	+	–	+		57	M
9	PA	10/18	10/7	Hep A	±	–	+	±	+	+	+		52	F
10	SS	10/18	10/11	r/o Hep	+	+	+		+		pending		34	

S* = scleral
N = nausea
V = vomiting
A = anorexia
F = fever
DU = dark urine
J = jaundice
HA IgM = Hepatitis A IgM antibody test

SOURCE: Centers for Disease Control and Prevention (1992a).

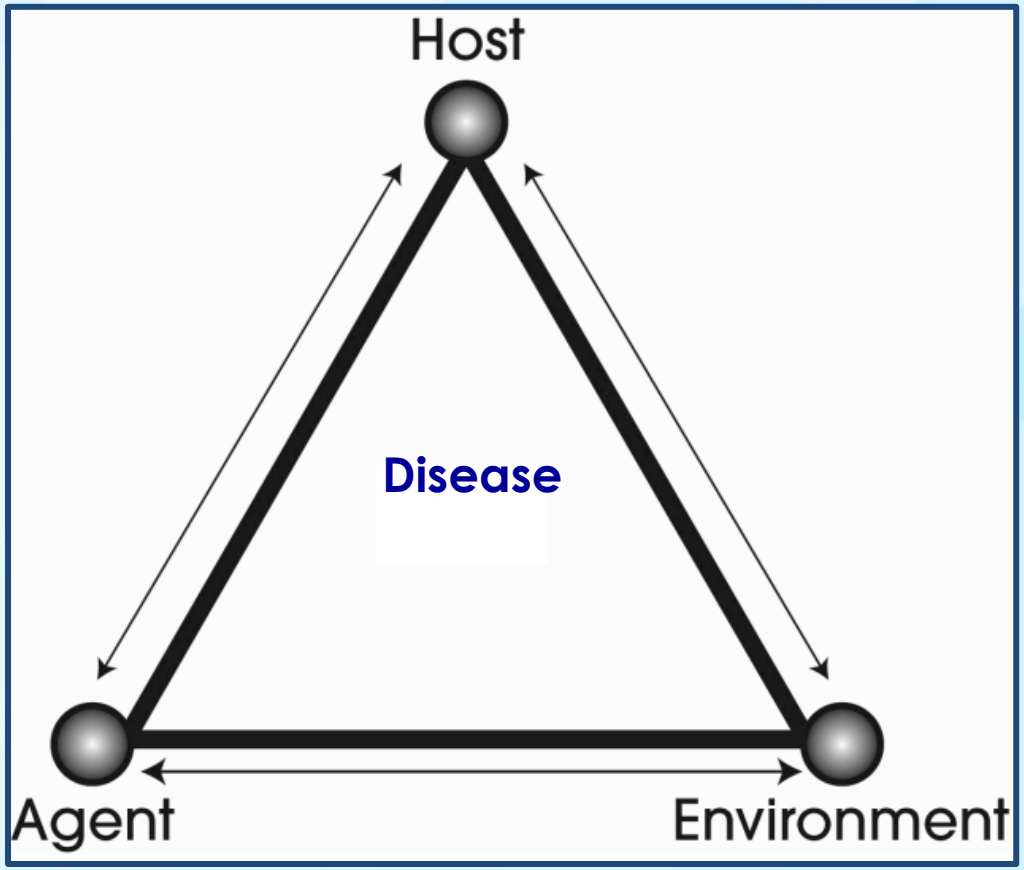
Epidemic curve



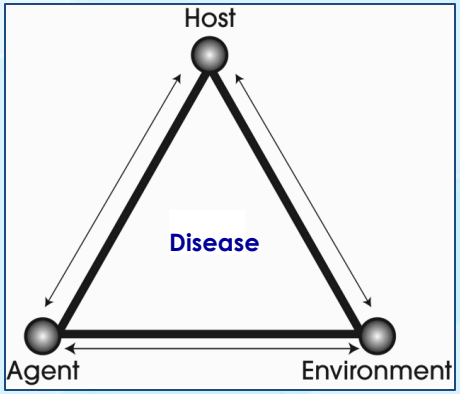
SOURCE: Centers for Disease Control and Prevention (1979).

Describe data in terms of person, place, time

The epidemiologic triangle



Control/prevention of disease



- Destroy agent
  - Pasteurization, chlorination, radiation, heat
- Break cycle of transmission
  - Eliminate means of transmission (e.g., drain swamp, sewage treatment)
  - Reduce direct contact (e.g., wear condoms)
- Increase immunization/resistance
  - Immunization programs, good health habits
- Reduce risk factors
  - Behaviors, diet, etc.
  - Good hygiene, food handling, protective clothing, repellants
- Isolate infectious cases
  - Isolation—separate infectious cases during communicability
  - Quarantine—limit freedom/movement of exposed well people

Knowledge Check

Epidemiologists use a model for studying infectious disease and its spread that involves the microbe that causes the disease, the organism that harbors the disease, and the external factors that cause or allow disease transmission. This is also known as

A. host, vector, and transmission.

B. transmission, host, and environment.

C. host, agent, and environment.

D. organism, transmission, and environment.

Knowledge Check

In 1976, during an American Legion Convention, 11 attendees had died of apparent heart attacks by August 1. Dr. Campbell contacted the Pennsylvania Department of Health after realizing he had treated 3 of those 11 attendees. What is the first step the Pennsylvania Department of Health should have followed?

✓ A. Verify the diagnosis.

B. Establish a case definition to identify cases.

C. Communicate findings to the public.

D. Implement prevention measures.

Knowledge Check

CDC then launched an investigation. However, no effective communication existed between scientists in the field interviewing patients and those in the laboratory who were testing specimens.

As the next step in stopping this outbreak, what should the team have done to identify persons who were part of the outbreak?

A. Verify a diagnosis.

✓ B. Establish a case definition to identify cases.

C. Communicate findings to the public.

D. Implement prevention measures.

Knowledge Check

The finding from this outbreak investigation lead to development of new regulations worldwide for climate control systems. What step does this illustrate?

A. Communicate the findings.

✓ B. Implement control and prevention measures.

C. Perform descriptive epidemiology.

D. Refine the hypothesis.

Course Summary

During this course, you learned to

- define epidemiology
- describe basic terminology and concepts of epidemiology
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QUESTIONS?