

Public Health Informatics

Avetis Health Informatics Training Fellowship

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Plan for today



Check-in

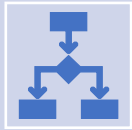


Contact info.



Talk on public health
informatics

Check-in



How are you doing?



How are we doing?



Any questions?



Who am I?

- Your professor/teacher = mentor, Cheerleader, champion, learning facilitator, etc.
- Mom
- Educator
- Lifelong learner
- Immigrant
- Armenian
- First gen college student
- First in family to get Masters, then doctorate
- Dog lover
- Loves cooking, reading and spending time with family!



Keck Medical
Center of USC
Keck Medicine of USC

Learning Objectives



Introduce public health informatics as a field



Differentiate between the various forms of public health surveillance systems



List several common sources of data for surveillance



Apply this knowledge to current covid pandemic

Key Terms

- Informatics = Science of how to use data, information and knowledge to improve human health and the delivery of health care services
- BMI = Biomedical Informatics
- HI = Health Informatics
- Health IT / HIT = Health Information Technology

What is Biomedical and Health Informatics?

- Application of principles of computer and information science to the advancement of life sciences research, health professions education, public health, and patient care
- Multidisciplinary, interdisciplinary and integrative field
- Focuses on health information technologies (HIT)
- Involves the computer, cognitive, and social sciences.

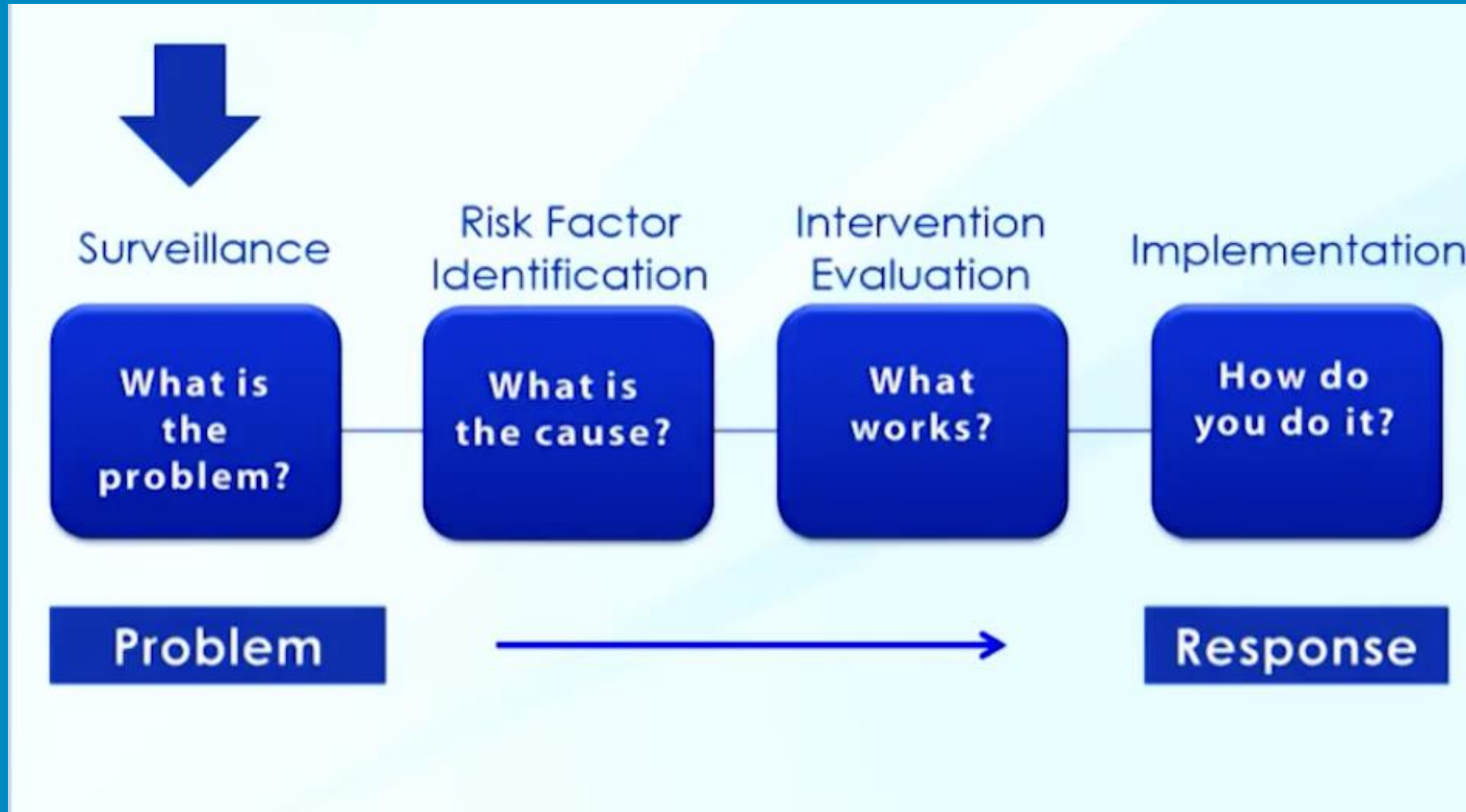
Public Health:

The science and art of preventing diseases, prolonging life, and promoting health through the organized efforts and informed choices of society, organizations, public and private communities, and individuals.

Public Health Informatics:

The systematic application of information and computer science and technology to public health practice, research and learning.

The Public Health Approach



Who are informaticians?
What do they do? 😊



ICD-1

Public Health Informatics



What is Public Health Informatics?

- The application of informatics in areas of public health, including surveillance, prevention, preparedness, and health promotion
- Population informatics is a part of public health informatics
- Enables the development and use of interoperable information systems for public health functions
- Includes:
 - Surveillance (including Biosurveillance)
 - Outbreak management
 - Electronic laboratory reporting
 - Prevention (very broad, environmental health to endemics)



Few More Key Words

- Information Systems (IS) = Technical and human resources that support the storage, computing, distribution, and communication of information required by all or some part of a health/medical or public health enterprise
- Public Health Surveillance (PHS) = Ongoing systematic collection, analysis and interpretation of health-related data essential to the planning, implementation and evaluation of public health practice, closely integrated with the timely dissemination of these data to those who need to know; Use data generation for prevention and control of diseases

So, How Do We Build Public Health Information Systems?

- ✓ Step 1?
- ✓ Step 2?
- ✓ Let's discuss... Similar to building a house....
 - ✓ How do we build a house?

Building Your Dream Home



Electrician



Framer



Developer/Architect



Brick Layer



Plumber



Painter

Building Your Public Health Information System



Programmer



Database Administrator



Informatician



Web Designer



Security Specialist



Network Administrator

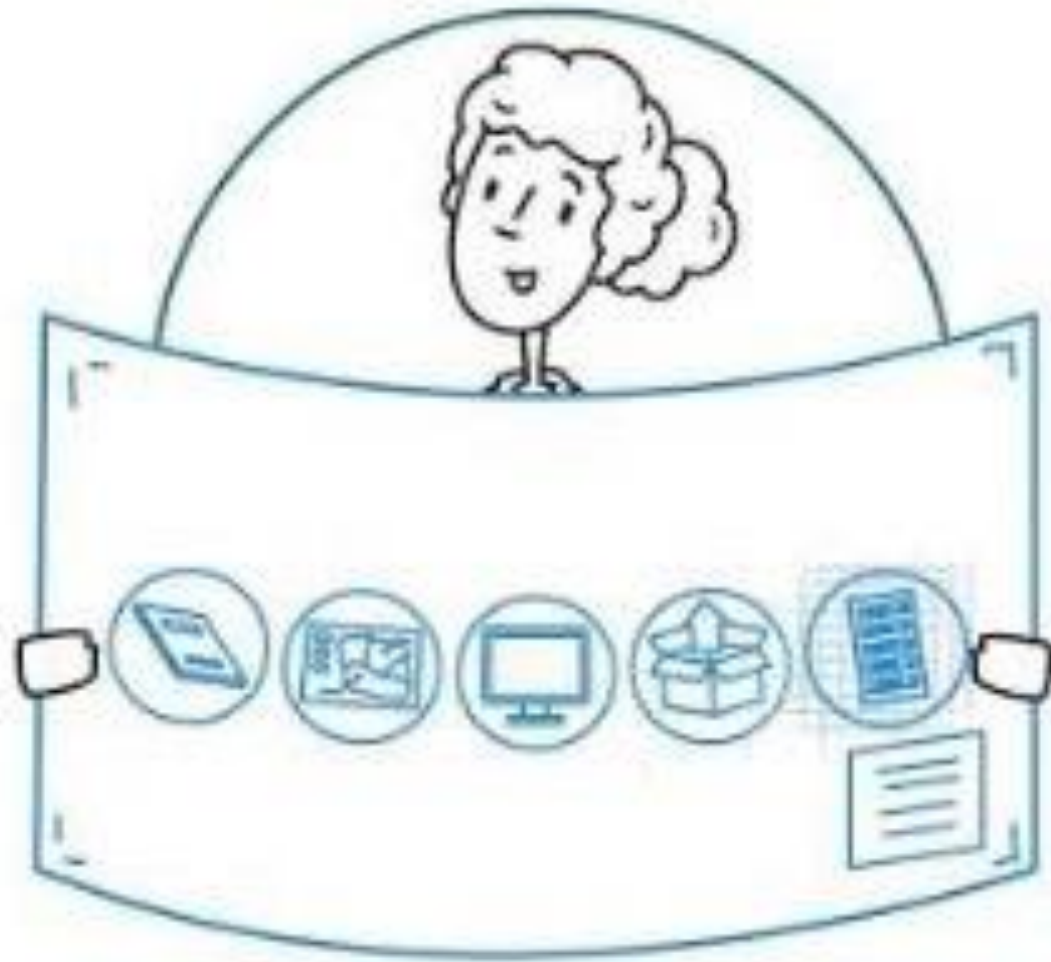
Step 1: Vision and planning

Step 2: Health data standards and integration

Step 3: Data privacy and security

Step 4: Systems design and implementation

Step 5: Vision, analysis, and reporting data



Public Health Surveillance



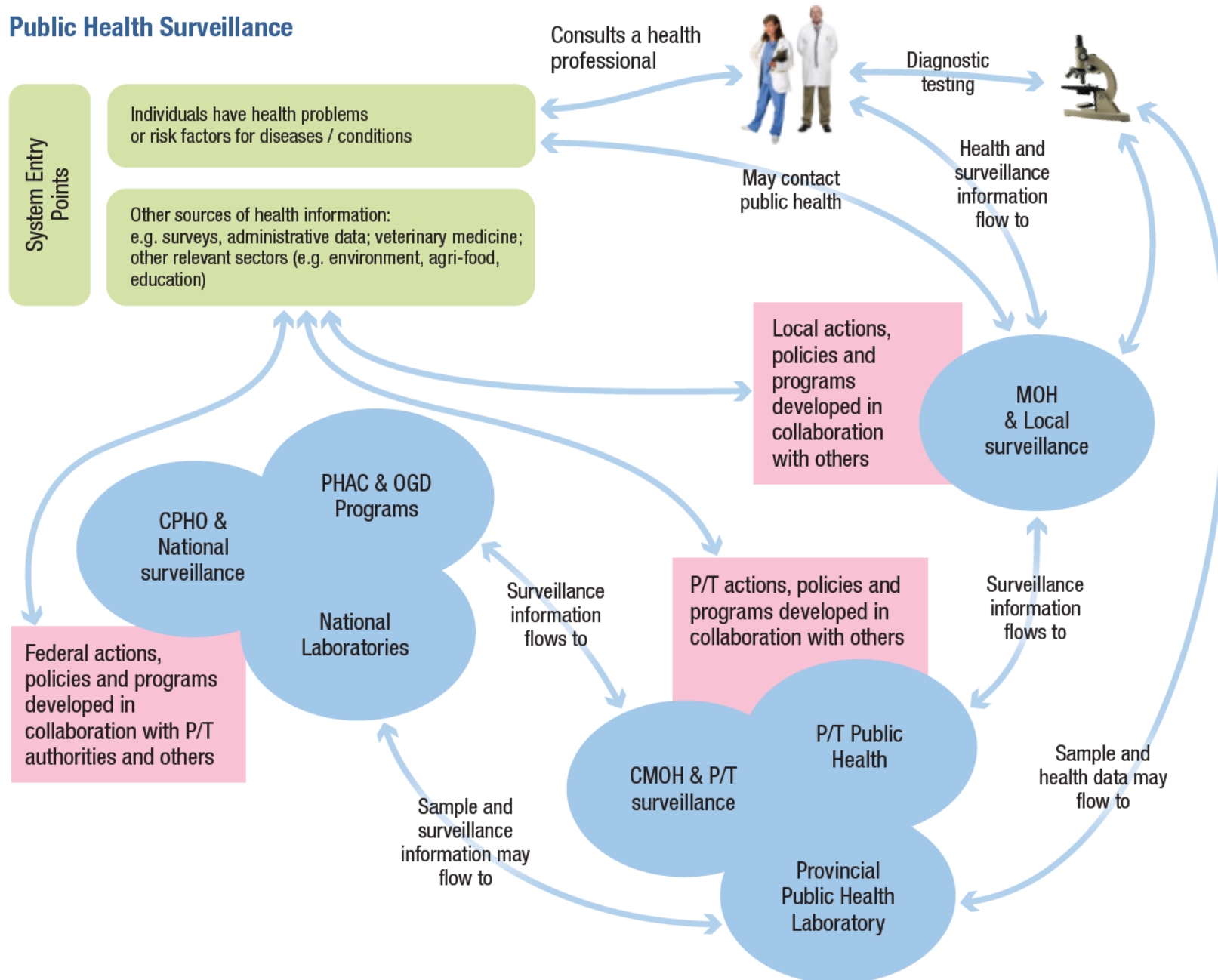
Public Health Surveillance (PHS)

- Essential for understanding of population health
- Interoperability is key!

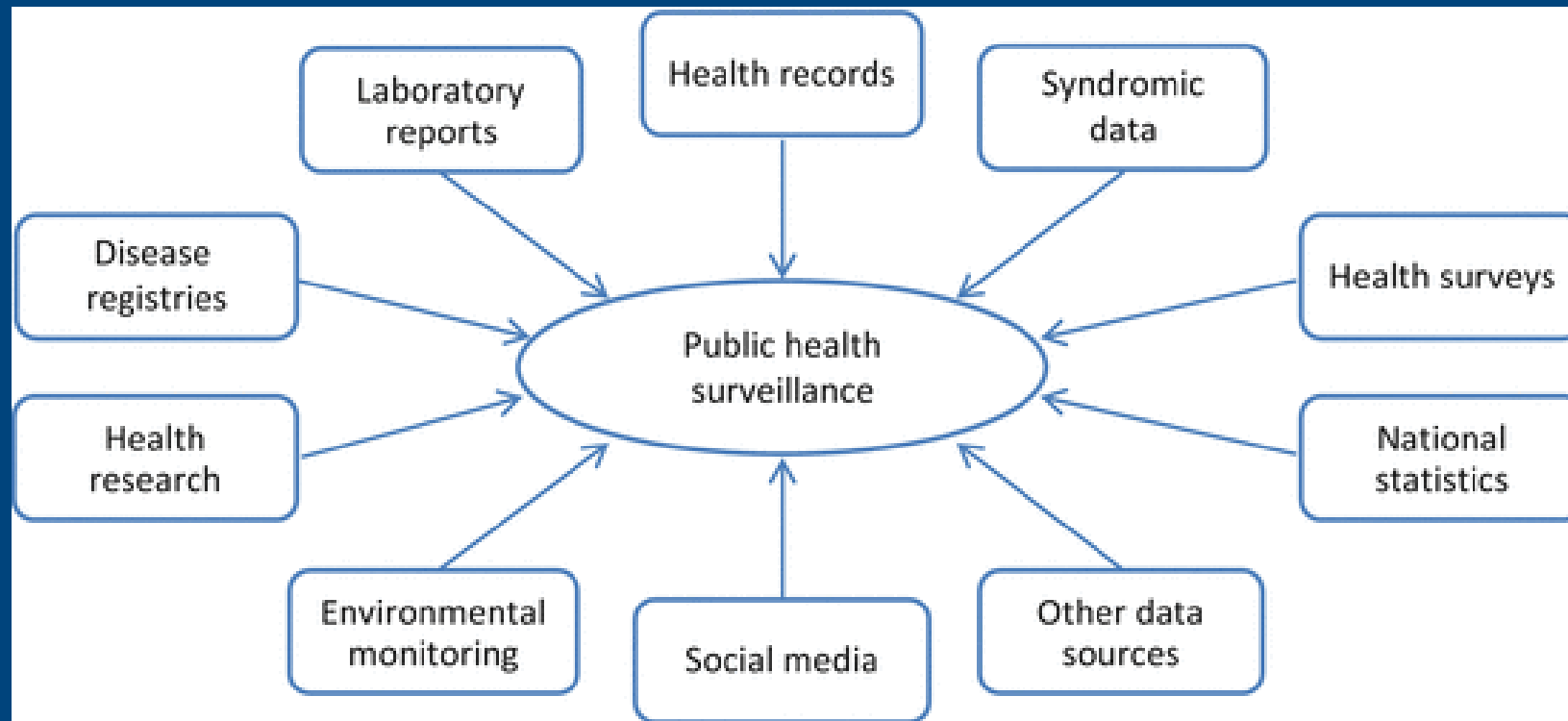
Public Health Surveillance (PHS) Functions

- Estimate the significance of a problem
- Determine the distribution of illness
- Outline the natural history of a diseases
- Detect epidemics
- Identify epidemiological and laboratory research needs
- Evaluate programs and control measures
- Detect changes in infectious diseases
- Monitor changes in health practices and behaviors
- Assess the quality and safety of health care, drugs, devices, diagnostics and produces
- Support planning of public health initiatives

Public Health Surveillance



Public Health Surveillance (PHS)



Public Health Surveillance (PHS)

FOCUS

- Identify a trend or an emerging trend
- Verify signal
 - Gather additional data
 - Corroborate signal with other sources (when possible)
- Confirm outbreak
- Identify source
- Take measure for prevention

Public Health Surveillance (PHS)

FOCUS

- Usual trends include
 - Increased prevalence
 - Decreased incidence
- Emerging trends include
 - Unknown disease
 - Outbreak of a known disease
 - **Potential trend or emerging threat is known as a signal**

Case Based Surveillance

Public Health Surveillance



Types of Surveillance Systems

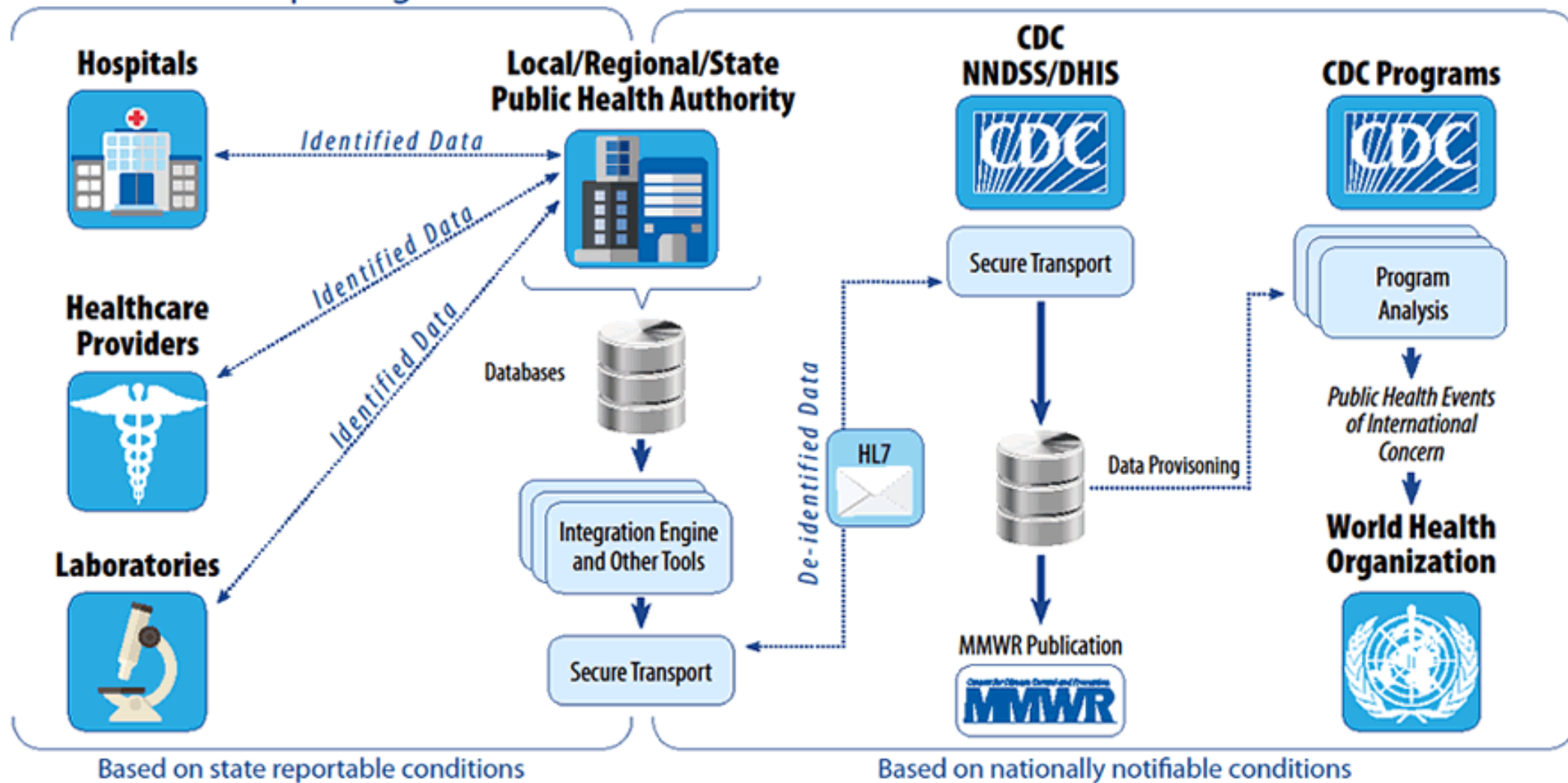
Case-Based Surveillance Systems

- ❑ Collect data on *individual cases of a disease* with previously determined case definitions or criteria outlines for person, time, place, clinical or laboratory diagnosis
- ❑ Analyze case counts and rates, trends over time and geographic clustering patterns
- ❑ More of a historical focus of public health informatics
- ❑ Example (in USA):
 - ❑ National Notifiable Disease Surveillance System (NNDSS)

National Notifiable Diseases Surveillance System Data Flow

Case Reporting

Case Notification



WHY WE DO NOTIFIABLE DISEASE SURVEILLANCE



Detect Disease
When and
Where It Happens



Stop Disease
Before It Spreads



Study Disease
to Strengthen
the Science



Improve How
We Prevent
and Control Disease



Keep People
Healthy

Top 10 nationally notifiable infectious diseases among children and adolescents in 2017, by age group*

<1 year	1-4 years	5-14 years	15-24 years
Salmonellosis	Salmonellosis	<i>Chlamydia trachomatis</i> infection	<i>Chlamydia trachomatis</i> infection
Pertussis	Campylobacteriosis	Lyme disease**	Gonorrhea
Campylobacteriosis	Shigellosis	Pertussis	Syphilis
Congenital syphilis	Pertussis	Salmonellosis	Campylobacteriosis
Varicella	Varicella	Campylobacteriosis	HIV
Invasive pneumococcal disease**	Shiga toxin-producing <i>Escherichia coli</i>	Varicella	Salmonellosis
<i>Chlamydia trachomatis</i> infection	Giardiasis	Shigellosis	Pertussis
Invasive <i>Haemophilus influenzae</i> disease	Lyme disease**	Gonorrhea	Lyme disease**
Shiga toxin-producing <i>Escherichia coli</i>	Cryptosporidiosis**	Giardiasis	Coccidioidomycosis
Shigellosis	Invasive pneumococcal disease**	Shiga toxin-producing <i>Escherichia coli</i>	Giardiasis

*Listed from highest to lowest rate for each age group

**Includes confirmed and probable cases

Note: The diseases/conditions in red highlight those that occur in all child/adolescent age groups.

Source: National Notifiable Disease Surveillance System, Centers for Disease Control and Prevention

Syndromic Surveillance

Public Health Surveillance



Syndromic Surveillance Systems

- ❑ **Syndrome = Symptom groups**
- ❑ Clusters of symptoms and clinical features of an undiagnosed disease or health event in near real time
- ❑ Real time geographic and temporal aberration and geographic clustering analyses are performed
- ❑ Most syndromes were developed as a response to bioterrorism events

Types of Surveillance Systems

Syndromic Surveillance Systems

Data

- Bins = categories of similar data
 - Gastrointestinal symptoms
 - Tummy aches
 - Upset stomach
 - Example: Flu like illnesses
 - Fever
 - Respiratory issues

Types of Surveillance Systems

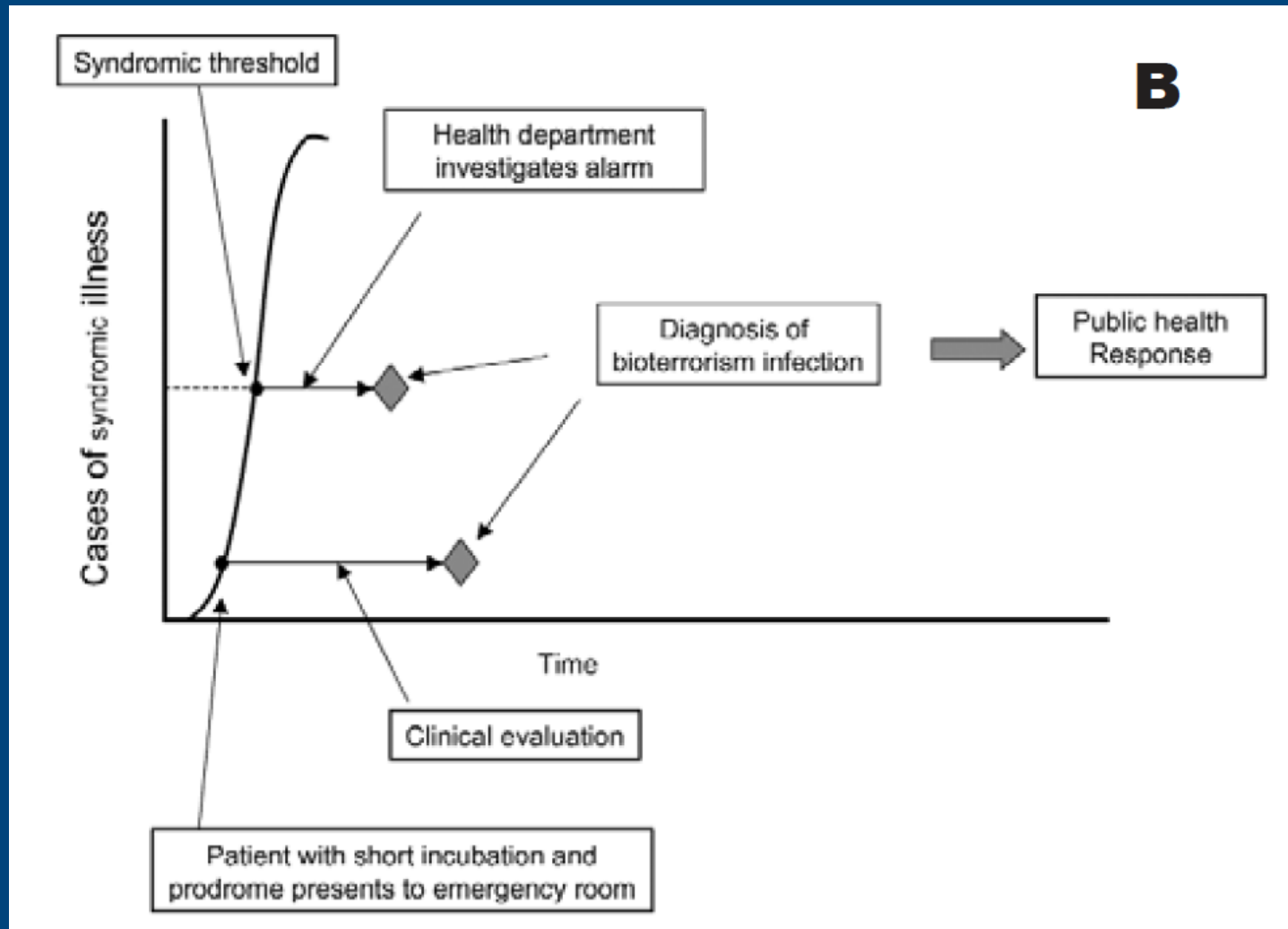
Syndromic Surveillance Systems

Examples of Syndrome Categories

- Botulism-like illnesses
- Febrile (fever) illnesses
- Gastrointestinal symptoms
- Neurological syndromes
- Rash associated illnesses
- Respiratory syndromes
- Shock or coma

Types of Surveillance Systems

Syndromic Surveillance Systems

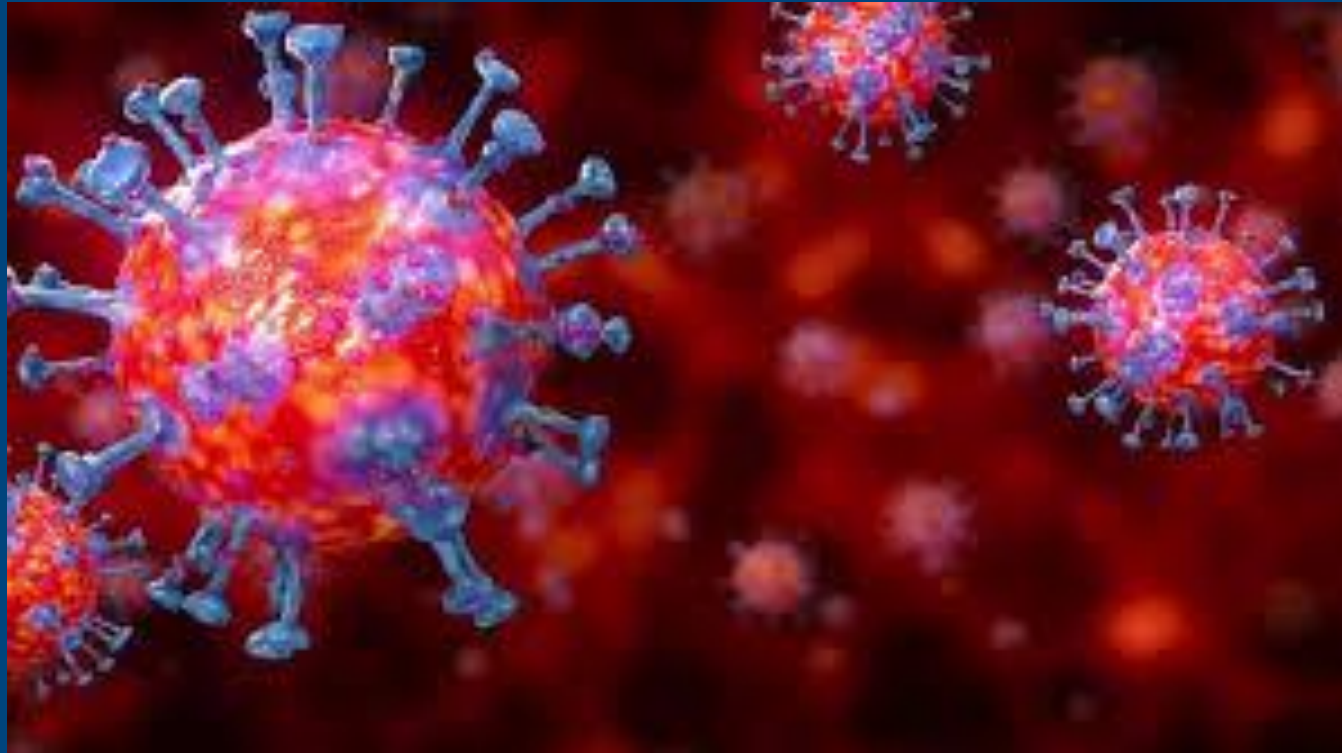


Types of Surveillance Systems

Syndromic Surveillance Systems



Develop a syndrome category for COVID-19

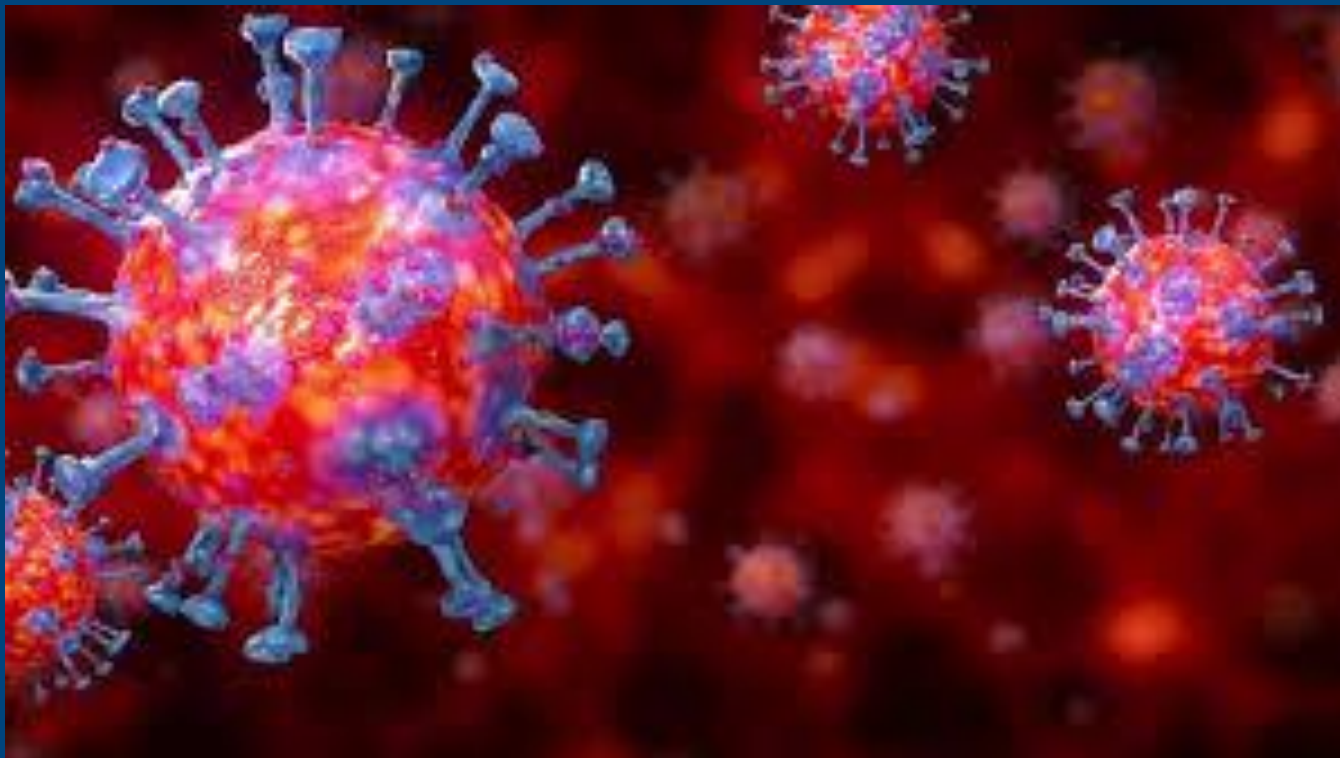


Types of Surveillance Systems

Syndromic Surveillance Systems



To develop Coronavirus syndrome, you'll use some of the known symptoms



CORONAVIRUS PANDEMIC COVID-19






COVID-19 is an infectious disease caused by SARS-CoV-2, a new type of coronavirus detected in China in late 2019.

Data shows the disease is mild in 80 percent of patients, severe in 13 percent, and critical in 6 percent.

Most common symptoms:

-  Fever
-  Fatigue
-  Dry cough

Some patients may also have:

-  Aches and pains
-  Runny nose
-  Sore throat
-  Shortness of breath
-  Diarrhoea

In critical cases, COVID-19 can cause severe pneumonia or a multiple-organ failure and can lead to death.



Source: World Health Organization | Last updated: March 12, 2020

@AJLabs ALJAZEERA



CORONAVIRUS SYMPTOMS TIMELINE

DAY 1 Fever, fatigue, muscle pain and a dry cough



DAY 2 Difficulty breathing



DAY 7 Those still with breathing troubles admitted to hospital



DAY 8 Acute respiratory distress



DAY 10 Intensive care unit



DAY 12 Fever ends



Types of Surveillance Systems

Syndromic Surveillance Systems

Data collection

- ❖ Clusters of symptoms and clinical features of an undiagnosed disease or health event in near real time
- ❖ Real time geographic and temporal aberration and geographic clustering analyses are performed

Types of Surveillance Systems

Syndromic Surveillance Systems

Possible Data Sources

- ✓ Emergency Departments (ED)
- ✓ Discharge and Transfer messages
- ✓ Insurance claims
- ✓ School and work absenteeism reports
- ✓ Over the counter (OTC) medication sales
- ✓ Health inquiries on the internet
- ✓ Mortality reports
- ✓ Animals illnesses or death

Sentinel Surveillance

Public Health Surveillance



Types of Surveillance Systems

Sentinel Surveillance Systems

- Collect and analyze data from designated health care facilities selected for their geographic location, medical specialty, and ability to accurately diagnose and report high quality data
- Examples:
 - Health facilities or laboratories in selected locations
- Useful for suspected health conditions/diseases, but not always useful for national level events
- Examples:
 - PulseNet
 - FoodNet
 - ILINet

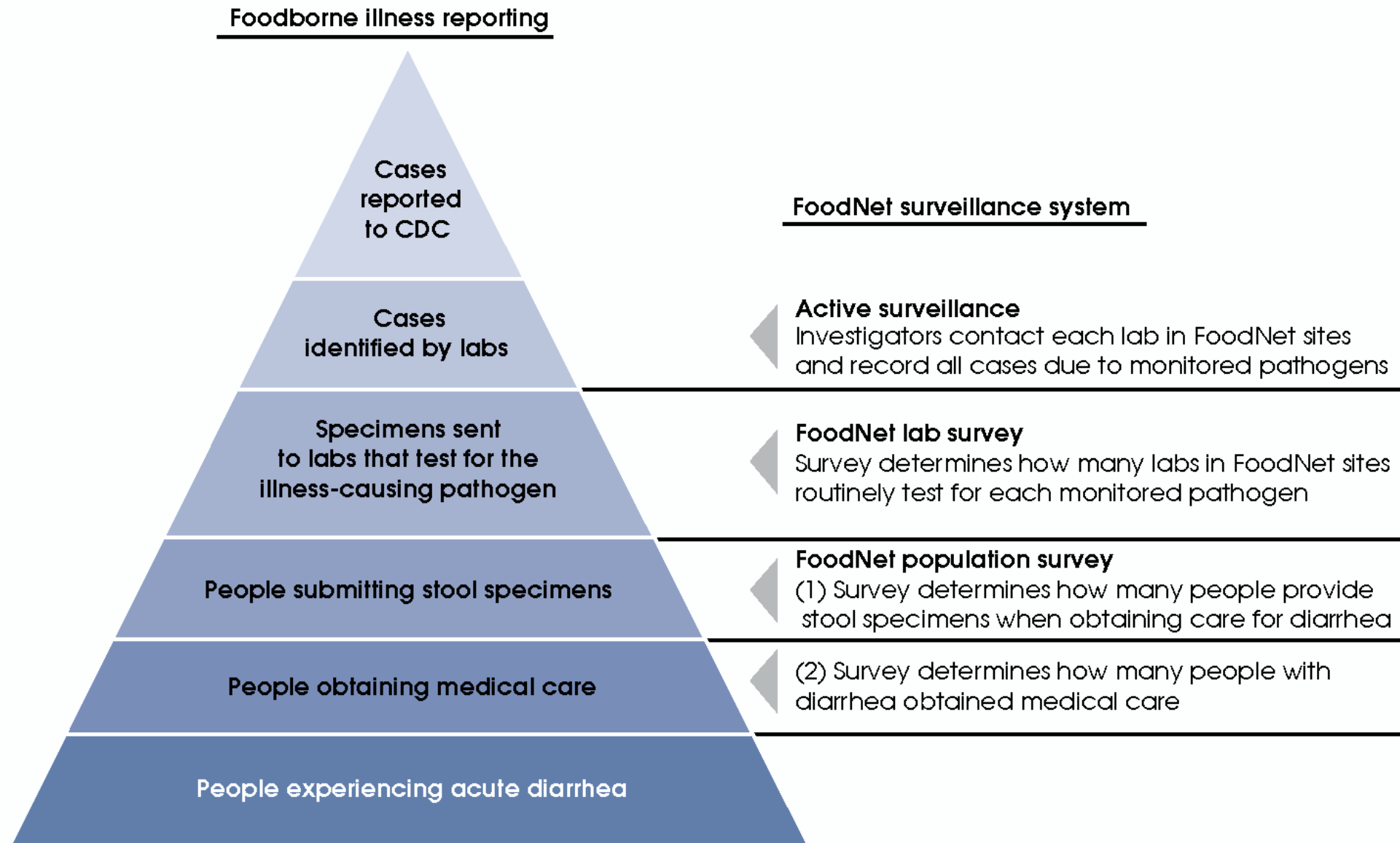
Types of Surveillance Systems

Sentinel Surveillance Systems

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Figure 1

FoodNet Examines Factors Responsible for Underreporting of Foodborne Illness



Behavioral Surveillance

Public Health Surveillance



Behavioral Surveillance Systems

- Collect data on health risks, behaviors, and health care access in relation to chronic diseases and injury
- Collect data on social determinants of health, including race, ethnicity, education, income, employment status, disability, etc.
- Used to understand impact of poverty, socioeconomic status, stress, social support, social exclusion and early life experiences
- Examples (USA):
 - Behavioral Risk Factor Surveillance System (BRFSS)
 - National Health Interview Survey (NHIS)

Surveillance Systems in Armenia

- **What systems do we have in Armenia?**
- **How can we use them to better health outcomes for our country?**



Questions
Comments
Feedback



Communication

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