Reporting and Surveillance

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Learning Objectives

At the end of this lecture, you will be able to:

1 Define surveillance

2 Know aims and uses of surveillance system

3 Understand the different types of surveillance systems

4 Recognize the elements of surveillance system

5 Be able to assist in establishing and evaluation a surveillance system

Session Overview

- Definition
- The Uses
- Aims
- Types
- Elements
- Evaluation
- National Examples

What is Surveillance?

The Centres for Disease Control and Prevention (CDC) defined Public Health Surveillance as

"Ongoing systematic collection, analysis, interpretation and dissemination of data regarding a health related event for use in public health action to reduce morbidity and mortality and to improve health"

- Surveillance means "information for action"

What is Surveillance?

- It is the eyes (and ears) of public health
- It is a network of people and activities to keep this process
- Functions at local to international levels.

Describing Surveillance?

- Surveillance systems provide descriptive information regarding **when and where health problems are occurring and who is affected** (the basic epidemiologic parameters of time, place, and person)

Surveillance Vs Monitoring

- Surveillance and Monitoring are often used interchangeably but they are distinct.
- **Monitoring** refers to "ongoing measurements of health services or a health programme with a view to '**evaluate**' the particular programme / service or intervention, with constant adjustment of performance in relation to the results.
- Surveillance concerns general populations while monitoring applies to specific target groups (e.g. vaccinated infants).

The Objectives of Public Health Surveillance

1. To study the trends of disease
2. Early warning of epidemics
3. To provide quantitative estimates of magnitude of health problem
4. To study the natural history of disease
5. Demonstrating the spread of a disease in time and Place
6. To develop epidemiologic research questions
7. To test epidemiologic hypothesis
8. Evaluation of control and preventive measures
9. Monitoring of change in infectious agent
10. Detecting changes in health practices

Types of Surveillance

Types of Surveillance

- Passive surveillance
- Active Surveillance
- Sentinel surveillance

Passive surveillance

WHO Definition

- Regular reporting of disease data by all institutions that see patients (or test specimens) and are part of a reporting network.
- There is no active search for cases.
- Relies on the cooperation of health-care providers — laboratories, hospitals, health facilities and private practitioners
- This is the more common type of surveillance.

Passive surveillance Cont.

- In this type of surveillance **criteria are established for reporting diseases**, risk factors or health-related events then health practitioners are notified of the requirements and they **report events** as they come to their attention.
- The data recipient has to wait for the data providers to report
- In most countries with a passive surveillance system, every health facility is required to send a monthly (sometimes weekly/daily) report of all cases on a standard form.

Passive surveillance Cont.

Advantages

- Simple to conduct
- Inexpensive
- Covers wide areas (whole countries or provinces)

Disadvantages

- It can be difficult to ensure completeness and timeliness of data (because it relies on an extensive network of health workers)
- Usually underestimate the true illness burden

Active Surveillance

Definition

- In active surveillance the organization conducting the surveillance actively seeks the relevant information (healthcare providers are contacted and asked to provide details of any cases they have seen).
- Data must be obtained by searching for cases (e.g. health workers go into the community, search for cases of fever and take their blood slide for malarial parasite), and also by periodically contacting those who may know of cases

Uses of Active Surveillance

- **Active surveillance is used when there is an indication that something unusual is occurring**
  - Rare disease
  - Disease on way to eradication
  - During outbreaks

- **Regular outreach to potential reporters, to stimulate the reporting of specific diseases or injuries.**

Active Surveillance
Cont.

Advantages

- Produce complete data of a good quality

Disadvantages

- Expensive
- high use of resources (For this reason, when it is used, it is for a limited time period)

Sentinel Surveillance

Definition

- Reporting of cases of specific diseases or risk factors that may indicate that the particular preventive or therapeutic activity is not working as planned.

- It is used when high-quality data are needed about a particular disease that cannot be obtained through a passive system.

Sentinel Surveillance Cont.

- It involves only a limited network of carefully selected reporting sites
- Data is obtained from selected hospitals who agree to report all cases of the disease
- Data collected in a well-designed sentinel system can be used to
  - Signal trends
  - Identify outbreaks
  - Monitor the burden of disease in a community

Sentinel Surveillance Cont.

Advantages

- Rapid
- Economical alternative to other surveillance methods (Because it is conducted only in selected locations

Disadvantages

- May not be as effective for detecting rare diseases or diseases that occur outside the catchment areas

Steps in Establishing a Surveillance System

Criteria for Identifying High Priority Areas for Establishing Surveillance Activities

- The Frequency of the disease (incidence of mortality, and incidence/prevalence of morbidity due to the disease)
- The Severity (case fatality ratio, proportionate mortality ratio, hospitalization rates due to the disease, disability rates)
- The Economic impact (direct costs that add due to medical treatment for the disease and indirect costs due to reduction in productivity)
- Preventability
- The Public interest (community and political attitudes towards the disease).

Features of a Surveillance System

- Practical, clear case definitions for each disease
- Workable, uniform and continuous data collection methods
- Rapidity of collection, analysis, interpretation and dissemination of data.

Organization and Structure of a Surveillance System

The essential components of a surveillance system are :

- **An overall organization** : Consisting of personnel, finances, logistics and administrative back up.
- **The originators of data** : This would include the sources of data, data collectors and data collecting mechanisms.
- **The transmission of data** to the surveillance centre, with specification of the mode of transmission and frequency of such transmission.

Organization and Structure of a Surveillance System Cont.

- **Data management and analysis** : This includes manual/ computerized data files, and statistical analysis procedures.
- The sensible **interpretation or results** : Including their consolidation and preparation of reports.
- A system of **feed back of results** : To the originators of data and to those who are in a position to enforce preventive steps.
- A system to **periodically evaluate** the surveillance system itself.

Steps in Establishing a Surveillance System

Step 1:

Is it Justifiable to Establish a Surveillance System?

- Confirming if the disease is of public health importance and whether prevention/ control measures are available

Steps in Establishing a Surveillance System

Step 2:

Spell out the objectives of surveillance system :

The following issues should be addressed :

- Clearly **specify the disease** (s) proposed to be brought under surveillance.
- *Specify* : **Who** needs **what** information, for **what purpose**?
- *The* **target population**
- *The* **health problem** : e.g. whether only Acute MI or entire spectrum of IHD is to be put to surveillance ?
- **Nature of control programmes** : e.g. if it is a rare disease or a disease moving towards eradication, a fine surveillance will be needed; on the other hand if it is a common disease, a crude surveillance would suffice

Steps in Establishing a Surveillance System

Step 3:

Specify the organization and structure of the surveillance ?

At the planning stage, clear specifications should be made as to “who will do what, how, and will be responsible to whom”.

Steps in Establishing a Surveillance System

Step 4:

Clearly define the disease(s) being considered for surveillance ?

- **Case definitions** should be accurately worked out after detailed consultation with experts.
- All those involved in the collection of data should be **well trained** in the use of these case definitions/ diagnostic methods.
- Case definitions/ diagnostic procedures should be **simple** enough so as to be understood and used by all those on which the system depends for reporting.

Case Definition

A set of uniform criteria used to define a disease for public health surveillance (possible, probable, confirmed)

- Enable public health officials to classify and count cases consistently across reporting areas.
- It is not intended to be used by healthcare providers for making a clinical diagnosis or determining how to meet an individual patient's health needs
- Refer to standard definitions stated by WHO and CDC
- Every year, case definitions are updated

Case Definition Gradient

Low Specificity

High Specificity

Suspected ***Probable*** ***Confirmed***

Example of Case Definition

Smallpox

Clinical Description

An illness with acute onset of fever >101 ° F followed by a rash characterized by vesicles or firm pustules in the same stage of development without other apparent cause.

Laboratory Criteria for Confirmation

- Isolation of smallpox (variola) virus from a clinical specimen, or
- Polymerase chain reaction (PCR) identification of variola DNA in a clinical specimen, or
- Negative stain electron microscopy (EM) identification of variola virus in a clinical specimen

Example of Case Definition

Probable Case of Smallpox

A case that meets the clinical case definition that is not laboratory confirmed but has an epidemiological link to another confirmed or probable case.

Confirmed Case of Smallpox

A case of smallpox that is laboratory confirmed.

Working Case Definition

Smallpox Outbreak

- Anyone who meets original case definition
- Anyone with fever (>101 ° F) or rash who was in a confirmed exposed area during the Bioterrorism (BT) event or came in contact with a confirmed or probable case should be considered a case. (*until confirmed; if not confirmed; will be under observation and could be classified as "case"; and others as "confirmed cases"*)

Steps in Establishing a Surveillance System

Step 5:

Specify the Details of Collection of Information

- Select the proper sources of data
- Specify the method of data collection
- The forms that will be used
- What time/place of diagnosis will be entered
- What will be the frequency of reporting?
- Decide the method of transmission of reports
- Central Collection of Data

Steps in Establishing a Surveillance System

Step 6:

The Organization and procedures of data Analysis

- Simple display of data :
  - Data can be displayed through histograms/ bar diagrams/ line diagrams describing the data according to various characteristics of person, place and time.
- Descriptive statistics :
  - Give the “Summary statistics” (Incidence rates / prevalence / proportions /Mean / Median) along with the measures of dispersion (SD) and the 95% confidence intervals.

Steps in Establishing a Surveillance System

Box - 1 : Suggested form for weekly or monthly reporting from PHC or CHC to next higher health care level							
Period covered by the report : From (Date) : _____ To (Date) : _____							
Name and address of health facility :							
Sl No	Name	Address	Age	Sex	Diagnosis	Level of Diagnostic certainty (suspected/ probable/confirmed)	Date of onset
1.							
2.							
3.							
4.							
5.							
Name				Designation :			
Date				Signature :			

Steps in Establishing a Surveillance System

Table - 1 : Distribution of cases according to age & sex					
Disease :			Reporting period :		
Sex	Age Group (Years)				
	0 - 4	5 - 14	15 - 44	≥45	Total
Males					
Females					
Total					

Steps in Establishing a Surveillance System

Table - 2 : **Distribution of cases according to place of residence**				
Disease :		Reporting period :		
Number of cases according to Villages				
Village - 1	Village - 2	Village - 3	Village - 4	Total

Steps in Establishing a Surveillance System

Step 7:

Making Scientific interpretations out of the results

- Consider whether the apparent, statistically significant, increases or decreases in the disease incidence at a given place and time represent true changes.
- False increase or decrease may be due to
  - Improvement in diagnostic procedures
  - Duplicate reporting
  - Enhanced reporting
  - Increase in population size

Steps in Establishing a Surveillance System

Step 8:

Ensure proper feedback to all concerned

- Provide regular (usually monthly) feedback reports to all those who are in a position to take action on the surveillance data (as, secretaries and directors of health department as well as other department concerned with human development)

Steps in Establishing a Surveillance System

Step 9:

Periodically evaluate / review the surveillance system

- Periodic evaluation is important to identify defects and reorient the methodology
  - See whether the case definitions need a change?
  - Are there some problems in the timely and accurate reporting
  - How can it be improved?

Evaluation of Surveillance System

1. Is the system detecting what it is supposed to detect?

   The surveillance system data need to be compared with data produced by another detection mechanism

2. Is the system producing data in time for appropriate responses?

3. Can the system cope with changes?

   The disease or our knowledge may be changing quickly. A surveillance system should adopt to such changes (flexibility)

Evaluation of Surveillance System Cont.

4. Is the system as simple and cheap as possible?

5. Are the public health responses timely and appropriate?

   Any system that does not lead to appropriate responses is flawed.

Example of National Surveillance Systems

- **Health Electronic Surveillance Network” (HESN) to control and manage infectious diseases and epidemics online**

HESN

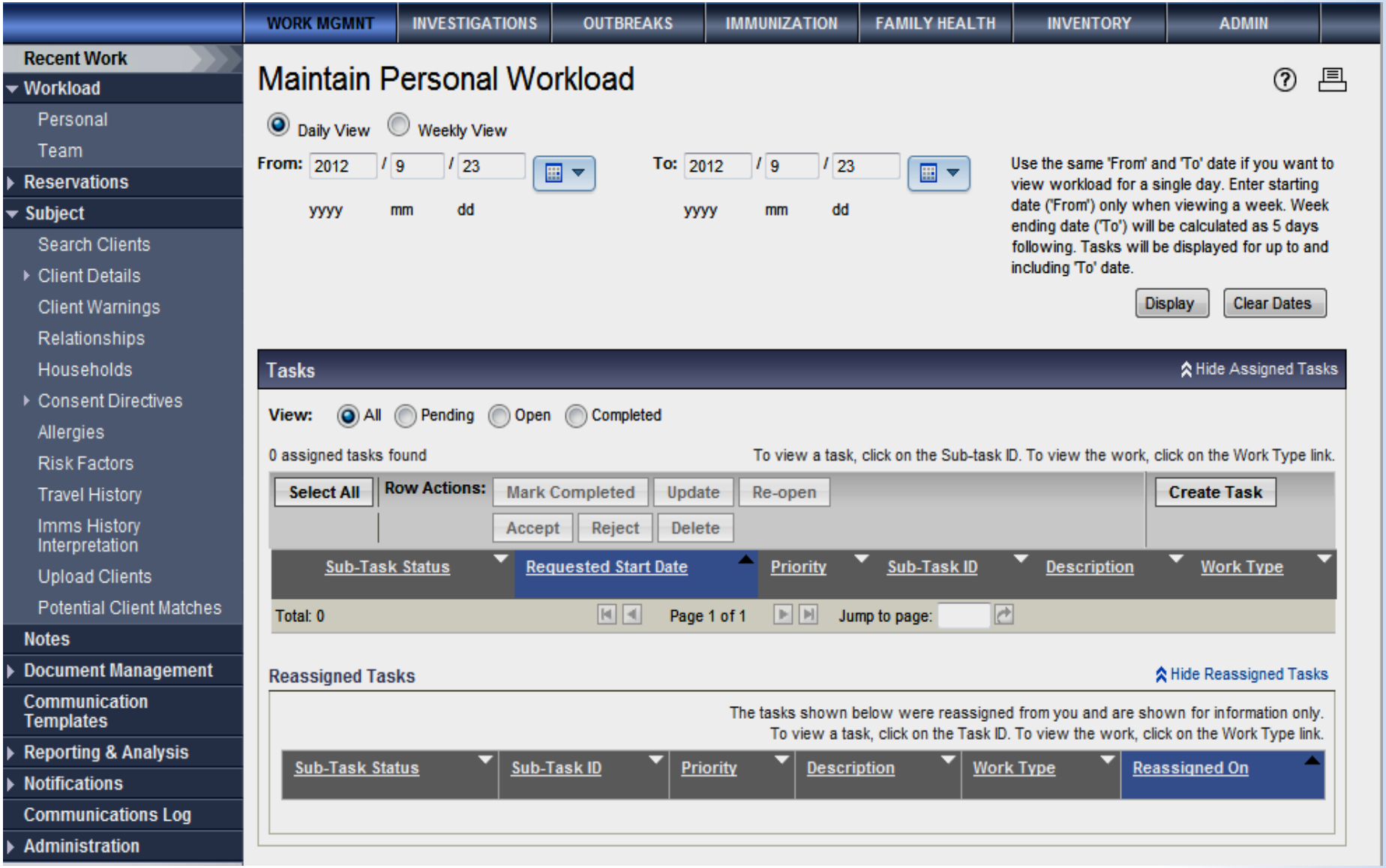
- It includes 7 modules they are:

- Investigations
- Outbreaks
- Immunization
- Family Health

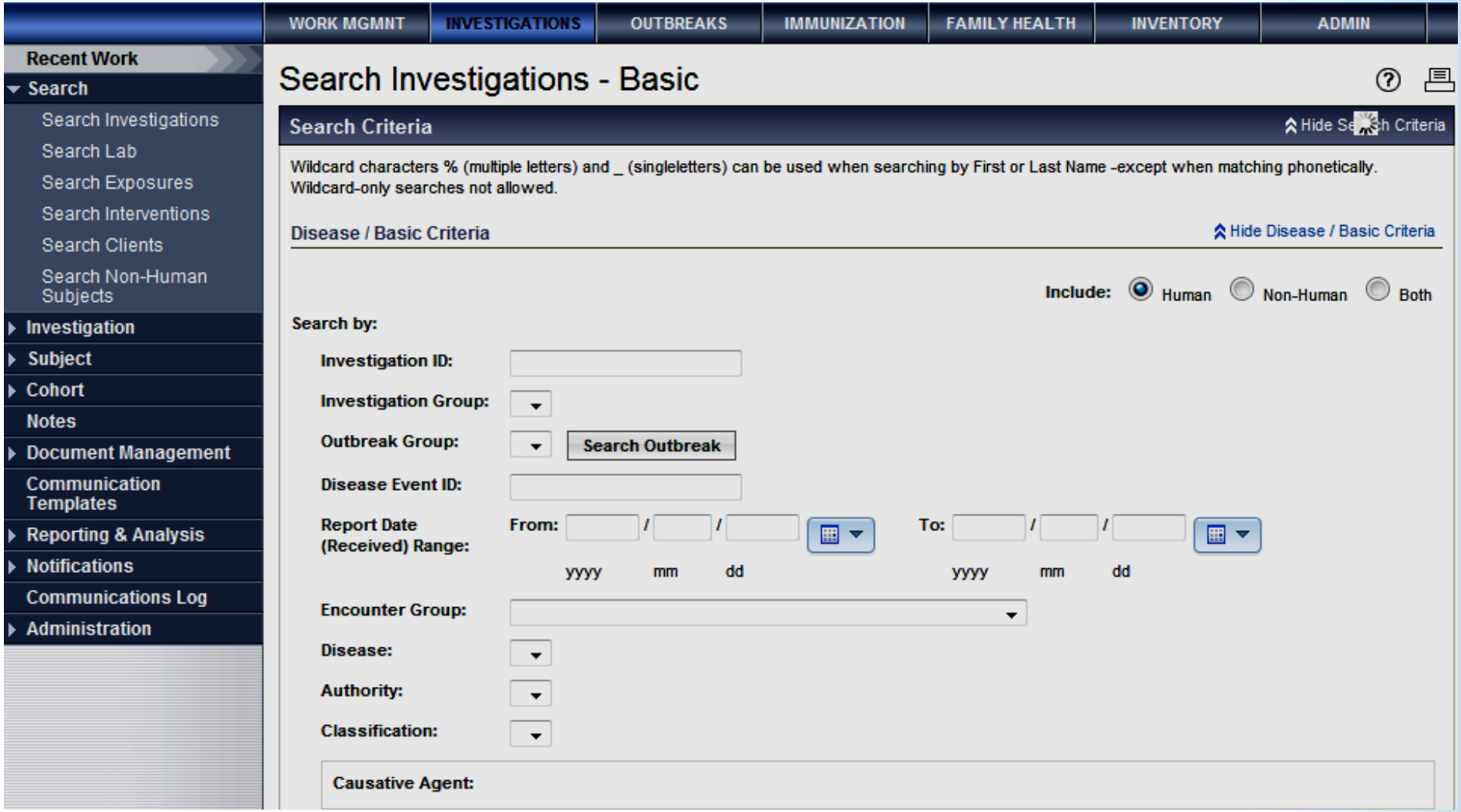
- Work Management
- Inventory
- Admin

HESN dashboard

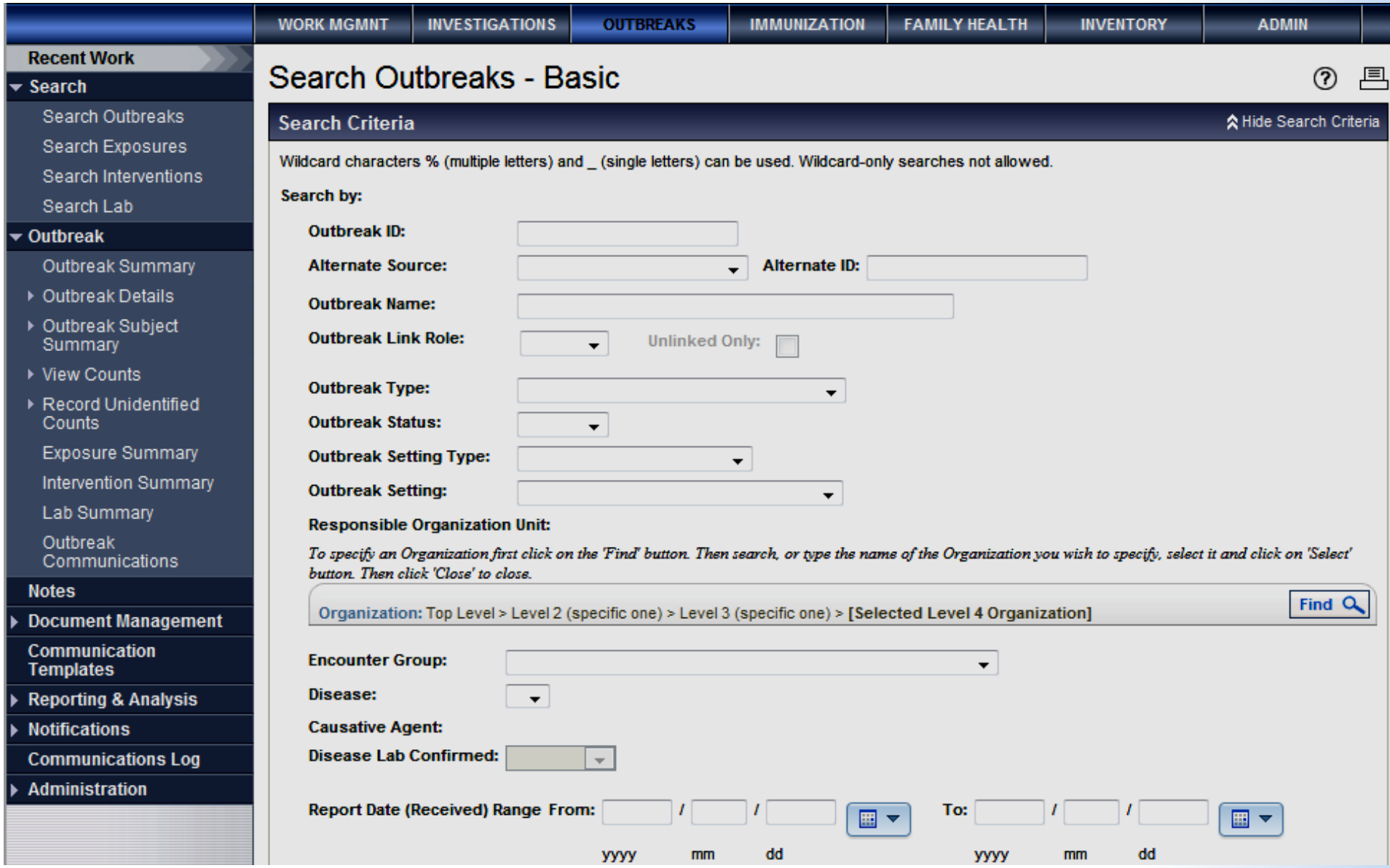
Work Management



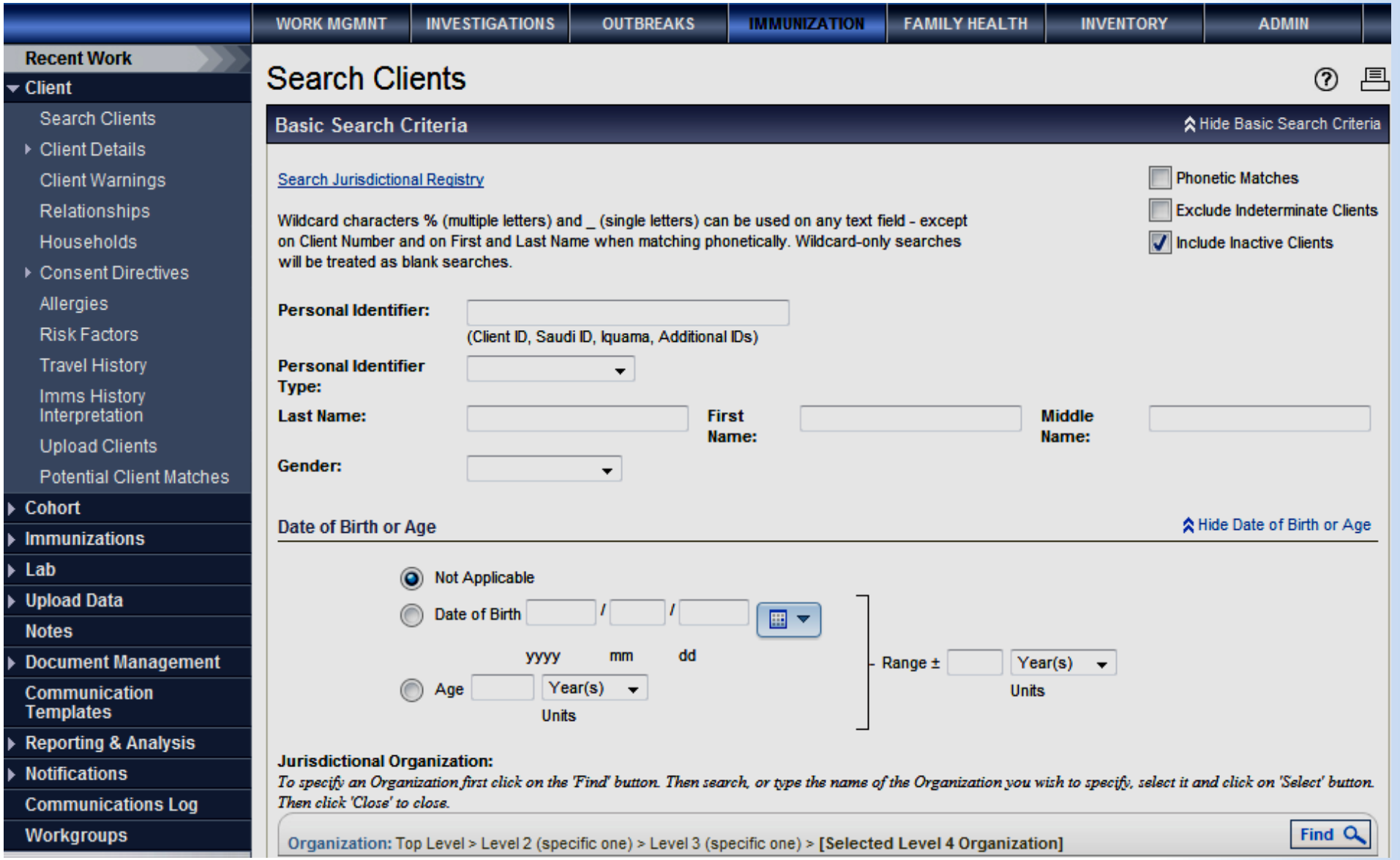
Investigation



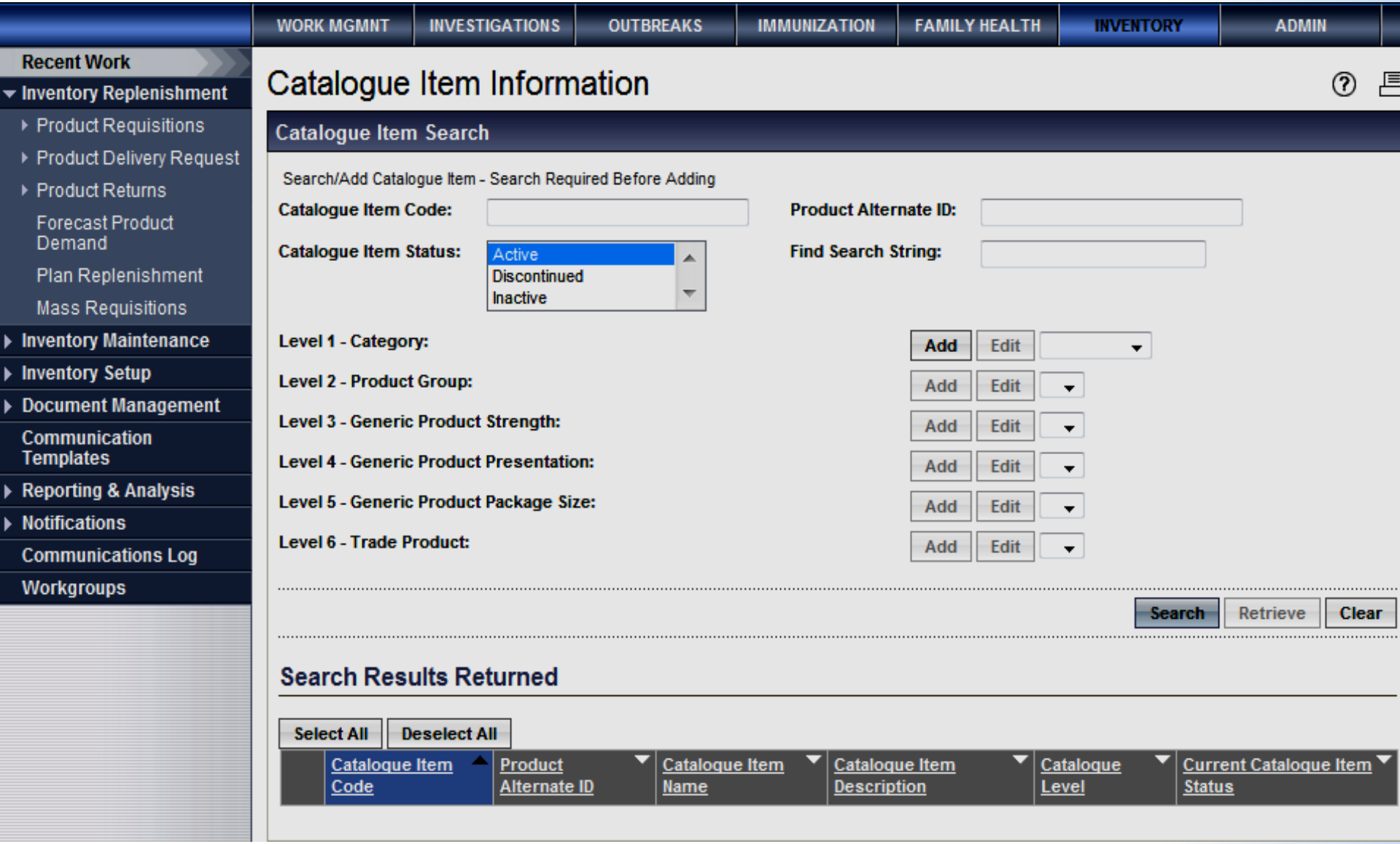
Outbreak


WORK MGMNT
INVESTIGATIONS
OUTBREAKS
IMMUNIZATION
FAMILY HEALTH
INVENTORY
ADMIN
Recent Work
Search
Search Outbreaks
Search Exposures
Search Interventions
Search Lab
Outbreak
Outbreak Summary
Outbreak Details
Outbreak Subject Summary
View Counts
Record Unidentified Counts
Exposure Summary
Intervention Summary
Lab Summary
Outbreak Communications
Notes
Document Management
Communication Templates
Reporting & Analysis
Notifications
Communications Log
Administration
Search Outbreaks - Basic
Search Criteria
Hide Search Criteria
Wildcard characters % (multiple letters) and _ (single letters) can be used. Wildcard-only searches not allowed.
Search by:
Outbreak ID:
Alternate Source:
Alternate ID:
Outbreak Name:
Outbreak Link Role:
Unlinked Only:
Outbreak Type:
Outbreak Status:
Outbreak Setting Type:
Outbreak Setting:
Responsible Organization Unit:
To specify an Organization first click on the 'Find' button. Then search, or type the name of the Organization you wish to specify, select it and click on 'Select' button. Then click 'Close' to close.
Organization: Top Level > Level 2 (specific one) > Level 3 (specific one) > [Selected Level 4 Organization]
Find
Encounter Group:
Disease:
Causative Agent:
Disease Lab Confirmed:
Report Date (Received) Range From:
To:
yyyy
mm
dd
yyyy
mm
dd

Immunization



Inventory


WORK MGMNT
INVESTIGATIONS
OUTBREAKS
IMMUNIZATION
FAMILY HEALTH
INVENTORY
ADMIN
Recent Work
Inventory Replenishment
Product Requisitions
Product Delivery Request
Product Returns
Forecast Product Demand
Plan Replenishment
Mass Requisitions
Inventory Maintenance
Inventory Setup
Document Management
Communication Templates
Reporting & Analysis
Notifications
Communications Log
Workgroups
Catalogue Item Information
Catalogue Item Search
Search/Add Catalogue Item - Search Required Before Adding
Catalogue Item Code:
Product Alternate ID:
Catalogue Item Status:
Active
Discontinued
Inactive
Find Search String:
Level 1 - Category:
Level 2 - Product Group:
Level 3 - Generic Product Strength:
Level 4 - Generic Product Presentation:
Level 5 - Generic Product Package Size:
Level 6 - Trade Product:
Add
Edit
Search
Retrieve
Clear
Search Results Returned
Select All
Deselect All
Catalogue Item Code
Product Alternate ID
Catalogue Item Name
Catalogue Item Description
Catalogue Level
Current Catalogue Item Status

Administration

Example of National Surveillance Systems

Influenza Surveillance In Saudi Arabia (ISSA)

- ***Objectives of influenza surveillance***

The goal of influenza surveillance is to minimize the impact of the disease by providing useful information to public health authorities, which will help in planning appropriate control and intervention measures, allocate health resources, and make case management recommendations

Appendix 2: ILI Data Collection set

Case definition

ILI case Definition: beginning at the last 10 days, did the patient experience:
- ☐ History of sudden onset fever or current fever (≥38°C)
- ☐ Cough

Does the patient meet ILI case definition?
- ☐ Yes
- ☐ No IF "No", DO NOT CONTINUE

Other suspected disease: _____

ID number:

Date of First Interview:

Demographic Information

Primary Health Care:

Patient's name: (family name), (given name(s))

Gender: ☐ Male ☐ Female

Nationality :

Visitor : ☐ Hajj ☐ Umrah ☐ Other reason

Date of birth (Gregorian)

or age: Years_____ Months (1-12)_____ (Gregorian)

Address: (Village/District/Governorate)

Contact Telephone Number:

Clinical History

Date of symptom onset

Temperature at first review: ___°C

Chronic medical conditions:

☐ Heart disease ☐ Asthma ☐ Chronic lung disease ☐ Chronic liver disease ☐ Diabetes
☐ Neuromuscular dysfunction ☐ Chronic kidney disease ☐ Chronic hematological disorder ☐ Immune compromised
☐ Other _____
☐ Unknown

Pregnancy: ☐ Yes ☐ No

Did the patient receive influenza antiviral within the last 14 days?

Vaccination for influenza in the last 6 months:

Specimen Collection

Nasopharyngeal swab collected?	Throat swab collected?	Date of specimen collection:

Specimen Laboratory Form

ID number:

Hospital:
Date specimen collected: _ _ / _ _ / _ _ _ _
Date of shipment: _ _ / _ _ / _ _ _ _
Ward/Department:

Date Lab received specimen: _ _ / _ _ / _ _ _ _

Type of specimen
- Oropharyngeal Specimen: ☐ Yes ☐ No
- Nasopharyngeal Specimen: ☐ Yes ☐ No
- Blood Specimen: ☐ Yes ☐ No

Other (specify): _____

Flu A: seasonal H1N1	☐	Pos (+)	☐	Neg (-)	Adenovirus	☐	Pos (+)	☐	Neg (-)
Flu A: seasonal H3N2	☐	Pos (+)	☐	Neg (-)	hPIV 1	☐	Pos (+)	☐	Neg (-)
Flu A: A(H1N1)pdm09	☐	Pos (+)	☐	Neg (-)	hPIV 2	☐	Pos (+)	☐	Neg (-)
Flu A: H5N1	☐	Pos (+)	☐	Neg (-)	hPIV 3	☐	Pos (+)	☐	Neg (-)
Flu A: Unsubtypeable/Novel	☐	Pos (+)	☐	Neg (-)	hMPV	☐	Pos (+)	☐	Neg (-)
Flu B	☐	Pos (+)	☐	Neg (-)	MERS-CoV	☐	Pos (+)	☐	Neg (-)
RSV	☐	Pos (+)	☐	Neg (-)	Others:	☐	Pos (+)	☐	Neg (-)

Date results reported: _ _ / _ _ / _ _ _ _

Comments:

Appendix 3: ILI Line List Data Collection set

حالات مشتبهة الأنفلونزا (ILI) المسجلة بالمركز

اسم المركز: التاريخ: رقم الأسبوع:

رقم NO	الاسم Name	رقم الهوية ID Number	العمر Age						الجنس Gender		حرارة Temp 38°	كحة Cough
			2<0	5<2	15<5	50<15	65<50	65+	ذكر M	انثى F		

المراقب الصحي:

المركز: التاريخ: رقم الأسبوع:

Appendix 5: Hospital Data Collection Form (Detailed form)

HBIS ID						Hospital name:	
Comp	Year	Month	Hospital ID		Patient ID	Department (Medicine=1; Pediatrics=2)	Date
						Unit (Inpatient=1; Outpatient=2)	Time (use 24 hr. time format)

Name		Age (YY-MM)	
Household head		Sex (Male=1; Female=2)	
Village / Para / Mahalla		Health care worker (Yes=1; No=2)	
Union / Ward		Poultry worker (Yes=1; No=2)	
Upazila / Thana		Poultry raising (Yes=1; No=2)	
District		Local Travel within 7 days (Yes=1; No=2)	
Phone number		Where?	
International travel within 30 days (Yes=1; No=2)		Where?	

Date of admission (DD-MM-YY)		Date of discharge (DD-MM-YY)	
Provisional diagnosis			
Outcome	Fully recovered=1; Partially recovered=2; Remains hospitalized=3; Transferred=4; Death=5; Unknown=9		

Symptoms (Yes=1; No=2, Unknown=9)		Date of onset	Was fever subjective or measured? (Subjective=1, Measured=2)		
			If measured, record in (in °F):		
			Other symptoms (Yes=1; No=2)		Date of onset
Fever			Others 1		
Cough			Others 2		
Difficulty breathing			Others 3		
Sore throat			Symptoms for <5 yrs. (Yes=1; No=2)		Date of onset
Running nose			Chest indrawing		
Headache			Stridor in a calm child		
Diarrhea			Being unable to drink		
Chills			Lethargy or unconsciousness		
Body ache			Vomits everything		
Hemoptysis			History of convulsions		
Pleuritic chest pain					

Medical History		Has any doctor told you have lung disease? (Yes=1; No=2)	
Do you smoke? (Regularly=1; Sometimes=2; In past=3; Never=4)		Are you pregnant? (Women only) (Yes=1; No=2)	
Has any doctor told you have heart disease? (Yes=1; No=2)		Visited OPD with current illness? (IPD only) (Yes=1; No=2)	
History of underlying or chronic illness (Check all that apply): ◻ Asthma ◻ Malaria ◻ HIV/AIDS ◻ Diabetes ◻ COPD(Chronic bronchitis/emphysema) ◻ Hypertension ◻ Cancer ◻ other underlying or chronic illness (Specify)			
History of pneumonia in the prior 30 days: 1=Yes; 2=No; 9=Unknown			

- Surveillance is an **important tool** for public health

- It is **defined** as an "**Ongoing systematic collection, analysis, interpretation and dissemination of data regarding a health related event for use in public health action to reduce morbidity and mortality and to improve health**"

- Routine surveillance data are available in regular reports by national and international sources all over the world

- Three main types of Surveillance:
  1. Passive (Common)
  2. Active
  3. Sentinel

- **Main aim** → disease control and prevention


Thank
You