

# **Surveillance for Healthcare-Associated Infections**

May, 2023

# Objectives

- **At the end of these sessions, participants will be able to:**
  - Understand the purpose of surveillance for healthcare-associated infections (HAIs)
  - Describe key terms and case definitions used in HAI surveillance
  - Complete bloodstream infection (BSI) and urinary tract infection (UTI) case report forms and denominator forms
  - Conduct basic analysis of HAI surveillance data
  - Understand the process for reporting surveillance data to the network database

# Agenda

## □ Introduction to HAI surveillance

- Roles and responsibilities in HAI surveillance
- Key terms

## □ BSI surveillance

- BSI case finding, denominators, and reporting forms
- Analysis of BSI data

## □ UTI surveillance

- UTI case finding, denominators, and reporting forms
- Analysis of UTI data

**What is surveillance?**

**Public health surveillance is "the ongoing, systematic collection, analysis, and interpretation of health-related data essential to planning, implementation, and evaluation of public health practice."**

[http://www.who.int/topics/public\\_health\\_surveillance/en/](http://www.who.int/topics/public_health_surveillance/en/)

# A “public health model” applied to hospitals

- ❑ **Perform surveillance to identify HAIs**
  - ❑ **Analyze surveillance data to find potential problems**
  - ❑ **Use epidemiological investigation techniques against epidemic and endemic HAIs**
  - ❑ **Implement interventions to protect those at risk (patients, staff, etc.)**
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**How can HAI surveillance help a  
National health system?**

# How can HAI surveillance help a health system?

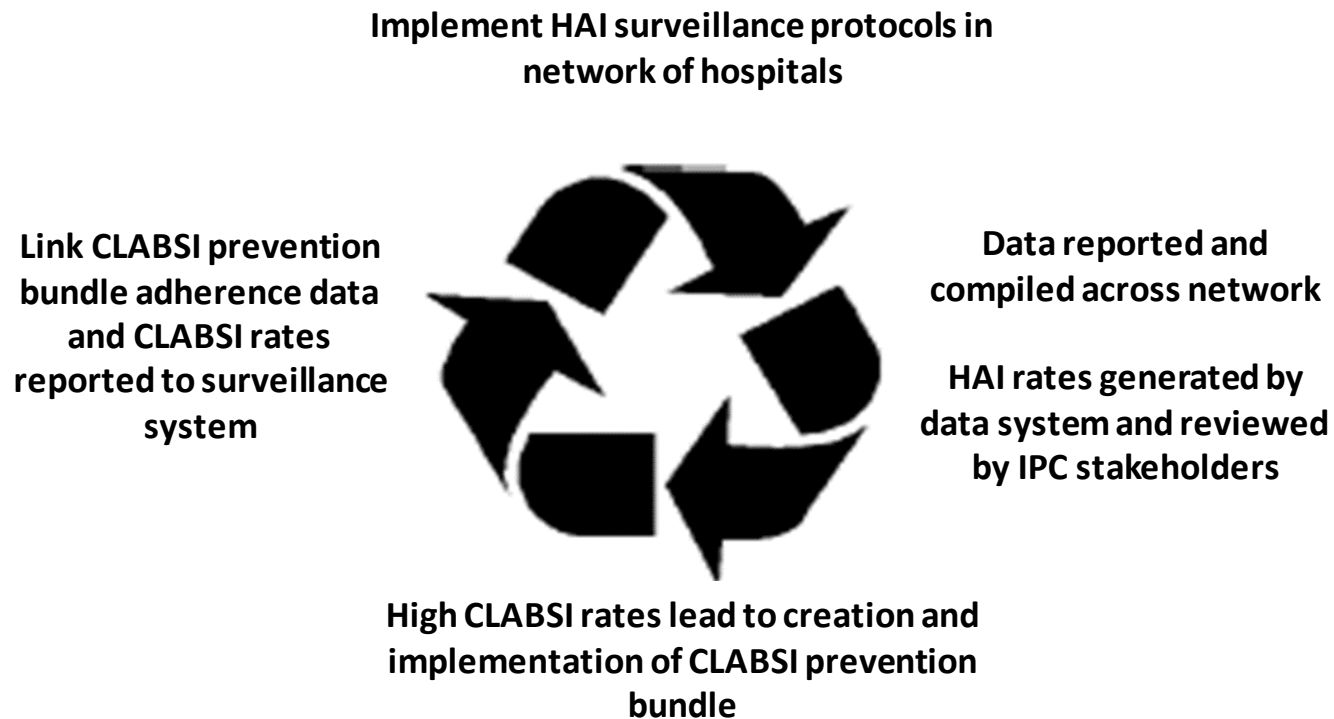
- **Systematic collection of data on HAIs and dissemination to stakeholders allows a health system to**
  - Estimate the burden of HAIs
    - Cases
    - Deaths
    - Costs
  - Detect outbreaks and emerging diseases
  - Evaluate impact of prevention strategies
  - Monitor the quality of infection control practices



# Surveillance should be a circular process



# The surveillance cycle – an HAI example



# HAI surveillance – a network approach

- **Building networks of health facilities that perform surveillance can be powerful**
  - Better estimation of HAI burden
  - Development of network-level benchmarks to assess performance
  - Capacity to evaluate interventions across facilities
  - Establishment of a cadre of committed and motivated facilities to act as “change agents”
  
- **There are challenges to establishing and maintaining networks**
  - Difficult to ensure constant surveillance practice as networks grow
  - Constant need for training and mentorship (staff turnover, etc.)
  - Resource limitations

# Establishing an HAI surveillance network in India

- ❑ **Resource-appropriate protocols developed, with ongoing training and support**
- ❑ **Diverse group of motivated facilities participating (geographically, public vs. private, specialty vs. community)**
- ❑ **Baseline level of microbiology capacity**
- ❑ **System for centralized data entry, analysis, and feedback**

# HAI surveillance – ground rules for facilities

## □ Know the protocol

- Case definitions and reporting rules, reporting requirements, etc.

## □ Consistently apply the case definition criteria

- Report events meeting criteria; exclude those that don't
- Failure to do so will result in poor data quality and decreased usefulness of data

## □ Don't be afraid to ask questions

## □ Discuss concerns about the criteria and protocol with central network team – don't change things on your own

## **Surveillance case definitions vs. clinical diagnoses**

- **Surveillance case definitions may not always align with clinical diagnoses**
  - Surveillance case definitions are used to identify trends in a population
  - Clinical diagnoses are used to identify and treat disease in an individual patient

## Consider this scenario:

- A patient was admitted to the ICU on 15 June after suffering a stroke. A central line was placed on 17 June. The patient develops a mild fever on 22 June and blood specimens are collected. One of two blood specimens grows *Staphylococcus aureus*. The patient had no evidence of infection at other body sites and is afebrile after 22 June. He was discharged from the ICU on 10 July.
- This episode meets the BSI case definition and is classified as a CLABSI. You discuss this case with an infectious disease doctor. The doctor states that the patient did not have a true clinical infection and the BSI should not be reported. Do you agree?

## Surveillance case definitions vs. clinical diagnoses

- Despite the doctor's comments, the case should be reported since it meets the BSI surveillance case definition
- Clinical judgment should not be used to “overrule” the reporting of cases that meet the surveillance case definition



# Surveillance case definitions

- Balance in creating a surveillance definition – identifying “true” events vs. ensuring that surveillance is not too labor intensive
  
- Need to ensure that all surveillance sites can implement the protocol
  
- No surveillance definition is perfect!
  - Some clinical infections may not be reported based on rules in the case definition
    - Patients unable to vocalize symptoms of UTI
  - Some events that may not be true clinical infections may meet the case definition
    - 1 out of 4 blood culture bottles positive for *S. aureus*

# HAI Surveillance – Background and Expectations

# Objectives of HAI surveillance

- ❑ **Determine the burden and outcomes of HAIs using standardized metrics**
- ❑ **Identify the most frequent pathogens causing HAIs and their antibiotic susceptibility patterns**
- ❑ **Provide platform for measuring impact of prevention strategies on HAI rates and patient outcomes**
- ❑ **Identify potential risk factors associated with HAIs to target interventions**

## Why standardized surveillance?

- Surveillance protocols describe standard methodology and case definitions to be used across the reporting network
- Benefits of standard protocols:
  - Can combine data across hospitals to calculate overall HAI rates for the network
  - Can compare hospital-specific HAI rates across the reporting network
  - Can compare HAI rates within the same hospital across time periods
- Hospital surveillance teams should regularly review and refer to protocols when performing surveillance!

# HAI surveillance - settings

- **In order to be successful in performing surveillance, participating hospitals should have:**
  - Administrative support for surveillance implementation
  - Infection control personnel and other dedicated staff members with sufficient time and resources
  - Access to a microbiology laboratory with capacity to perform needed diagnostics
  - Data reporting capabilities (e.g., an Internet-connected computer for entering surveillance data)

# HAI surveillance - settings

- **Surveillance will occur in ICU locations, which may include**
  - Adult
  - Pediatric
  - Neonatal
  
- **Why ICUs?**
  - Well-defined patient population at high risk of HAI
  - Case finding relatively straightforward
  - High levels of device utilization
  - Relatively high staffing levels
  
- **Doing standardized surveillance across all units is extremely labor intensive – start small!**

# HAI Surveillance – Roles and Responsibilities

## **Key participants in HAI surveillance networks**

- Central network surveillance team**
- Hospital surveillance coordinator**
- Hospital surveillance team**
- Hospital microbiology lab**
- Clinical staff in units performing surveillance**



# Key participants in HAI surveillance networks

- **Central network surveillance team (AIIMS, New Delhi)**
  - Primary responsibility for overall implementation of surveillance across all hospitals in the network
  - Prepares surveillance protocols, forms, and reporting systems with technical partners
  - Provides training resources
  - Assists hospitals as they implement surveillance
  - Serves as a central resource for addressing questions and issues
  - Receives data from hospitals and maintains data reporting system
  - Creates and shares surveillance data feedback reports with participating hospitals
  - Participates in activities, including on-site visits, that support standardized surveillance implementation across hospitals

# Key participants in HAI surveillance networks

## □ Hospital surveillance coordinator

- Primary responsibility for implementing surveillance at the hospital
- Ensures that surveillance team is working with key hospital stakeholders to identify HAI events and collect denominator data
- Reviews HAI case report forms and denominator data to ensure accuracy
- Reports data to network on a regular basis
- Disseminates surveillance reports to relevant stakeholders
- Facilitates support visits

## □ Hospital surveillance team

- Engages microbiology lab and clinical staff to obtain data on potential HAIs
- Identifies HAIs and completes reporting forms

# Key participants in HAI surveillance networks

## □ Hospital Microbiology lab

- Provides data to hospital surveillance team on a regular basis
  - Access to logbooks
  - Reports from electronic systems, if available
- Ensures that data being provided to surveillance team is complete
  - All positive blood cultures from ICUs participating in BSI surveillance, for example

## □ Clinical staff in units performing surveillance

- Review protocol and be familiar with case definitions
- Should ensure that suspected patients have complete investigations done to confirm that they meet the case definition
  - Patients with symptoms of possible infection who have not had blood cultures drawn, for example
- Assist with collection of denominator data

# HAI Surveillance – Key Terms

## Identifying potential HAI episodes

### □ Consider this patient:

- Admitted to hospital 15 September and sent to the ICU
- Fever 18 September
- Blood cultures collected 19 September, no growth
- Fever 20 September
- Hypotension 21 September
- Fever 24 September
- 2 blood cultures collected 25 September grow *S. epidermidis*
- Blood culture collected 30 September grows *Acinetobacter baumannii*

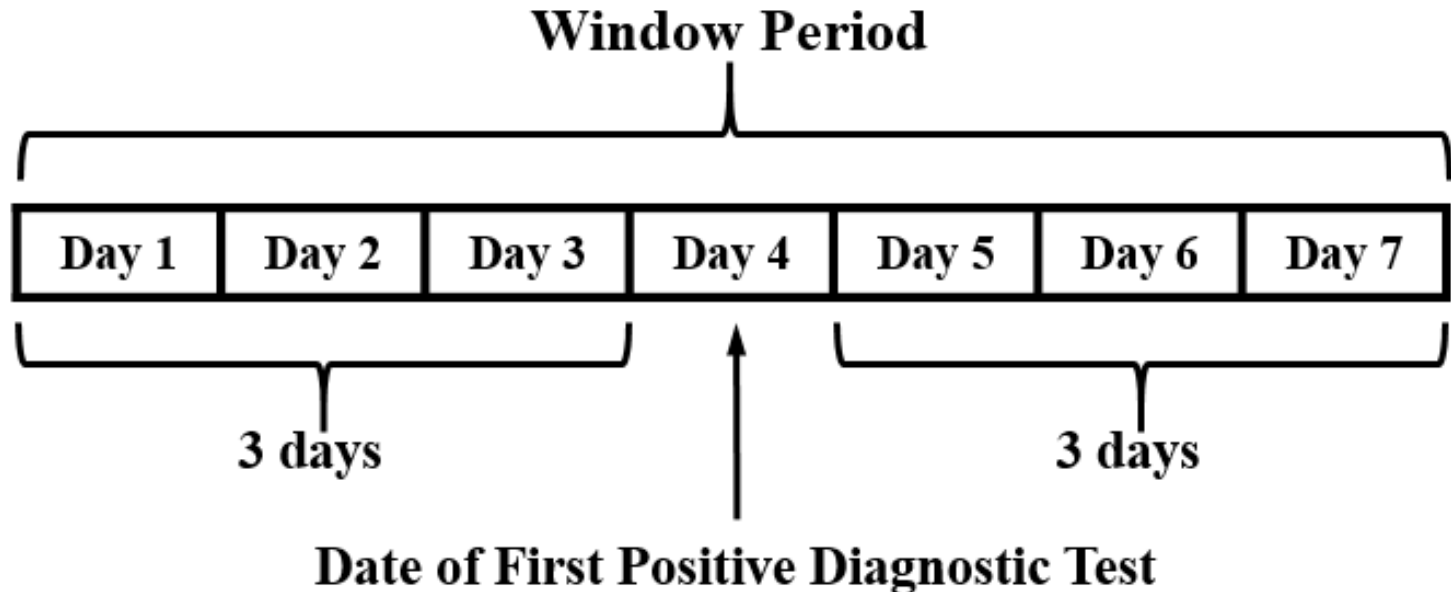
### □ Many symptoms and cultures – how do we organize them to decide when an infection is present?

- HAI surveillance protocols provide rules and processes for finding infections

# Key terms

## □ Window period

- All case definition must be met within a 7 day time frame known as the “window period”
- Includes the date the first positive diagnostic test is collected, the three calendar days before, and the three calendar days after

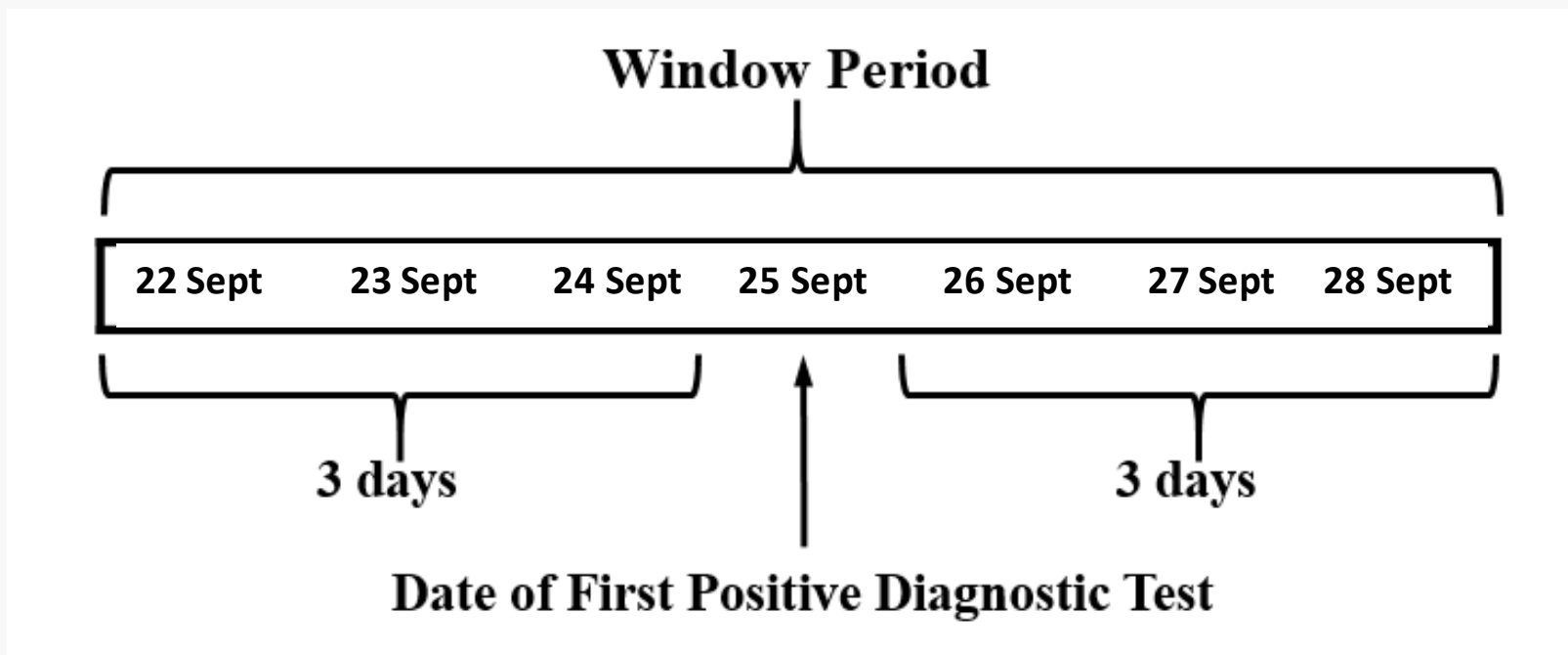


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Fever 20 September  
Hypotension 21 September  
Fever 24 September  
2 blood cultures collected 25 September: *S. epidermidis*  
Blood culture collected 30 September grows *A baumannii*

## Key terms – Window Period

### □ Our patient from the previous example:

- First positive blood culture collected 25 September
- Window period starts on 22 September and ends on 28 September

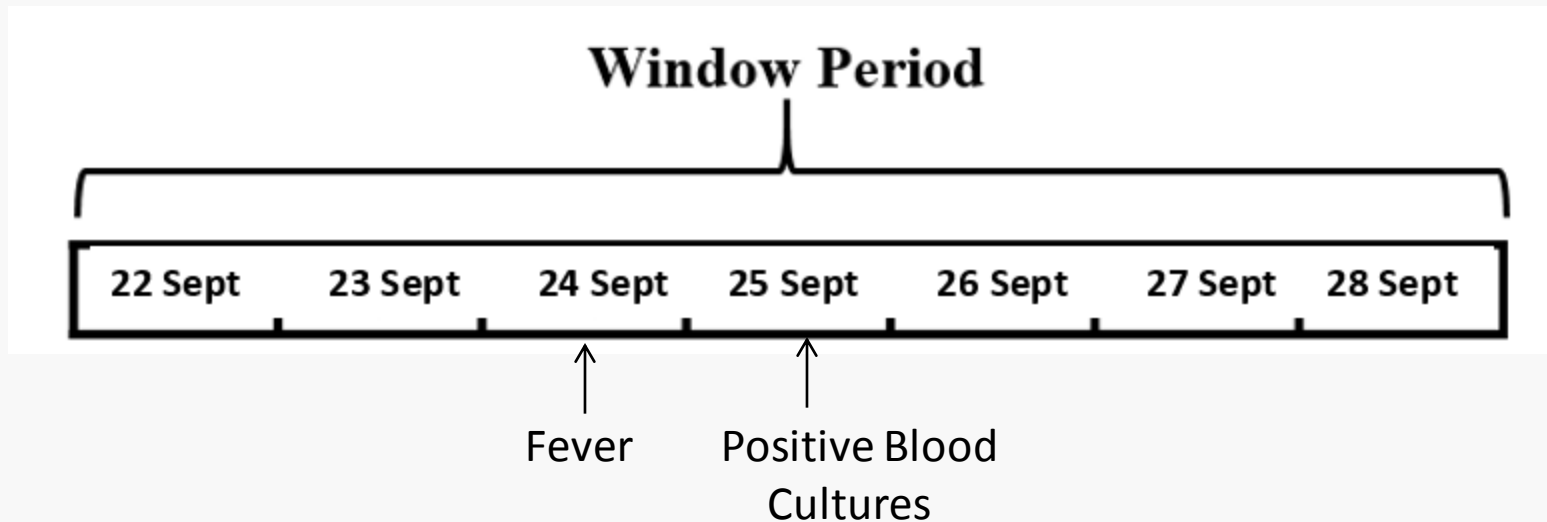


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## Key terms – Window Period

### □ Our patient from the previous example:

- Symptoms used to meet HAI case definition must fall in window period
  - Fever on 18 and 20 September; hypotension on 21 September – all before start of window period, cannot be used
  - Fever on 24 September can be used since it falls in window period





# Key terms

## □ Date of event

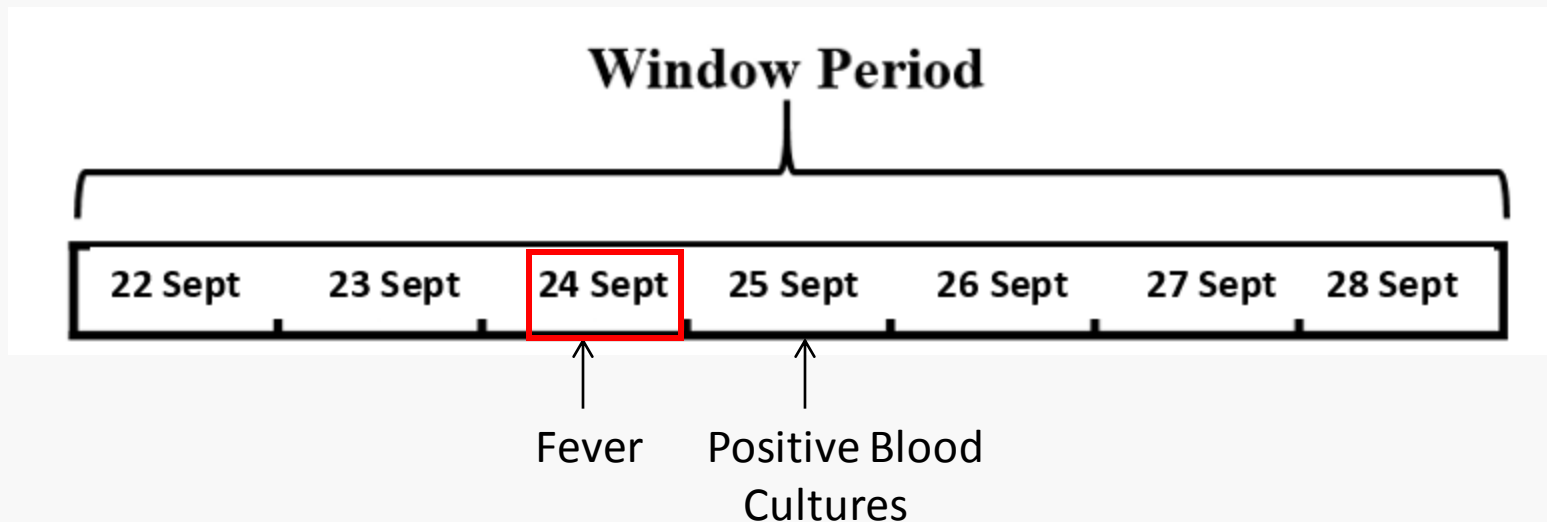
- The date when the first element used to meet the HAI case definition occurs for the first time within the window period
  - This may be a positive diagnostic test or a clinical sign/symptom
- If the first element used to meet the HAI case definition is a laboratory diagnostic test, then the date of specimen collection should be reported as the date of event
  - Do not report date that lab test was performed or date that results of the lab test were confirmed
- If the first element used to meet the HAI case definition is a clinical symptom, then the first date the symptom appeared in the window period should be reported as the date of event

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Fever 24 September  
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Blood culture collected 30 September grows *A baumannii*

## Key terms – **date of event**

### □ Our patient from the previous example:

- This patient meets the BSI case definition
- The first element used to meet the case definition is a fever that occurred on 24 September
- Date of event = 24 September



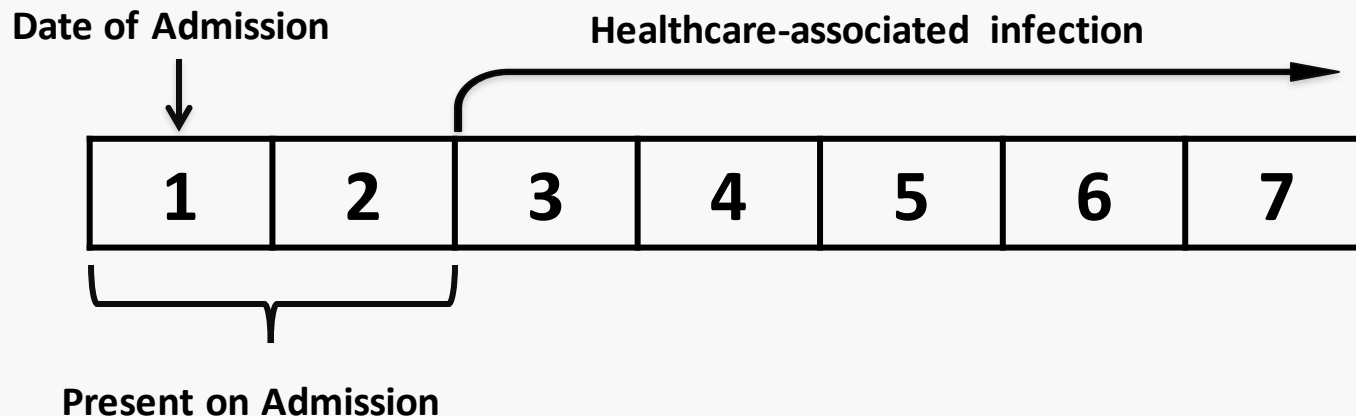
# Key terms

## □ Healthcare-associated infection (HAI)

- Date of event  $>2$  calendar days after date of hospital admission
- Date of hospital admission = Day 1

## □ Present on admission (POA)

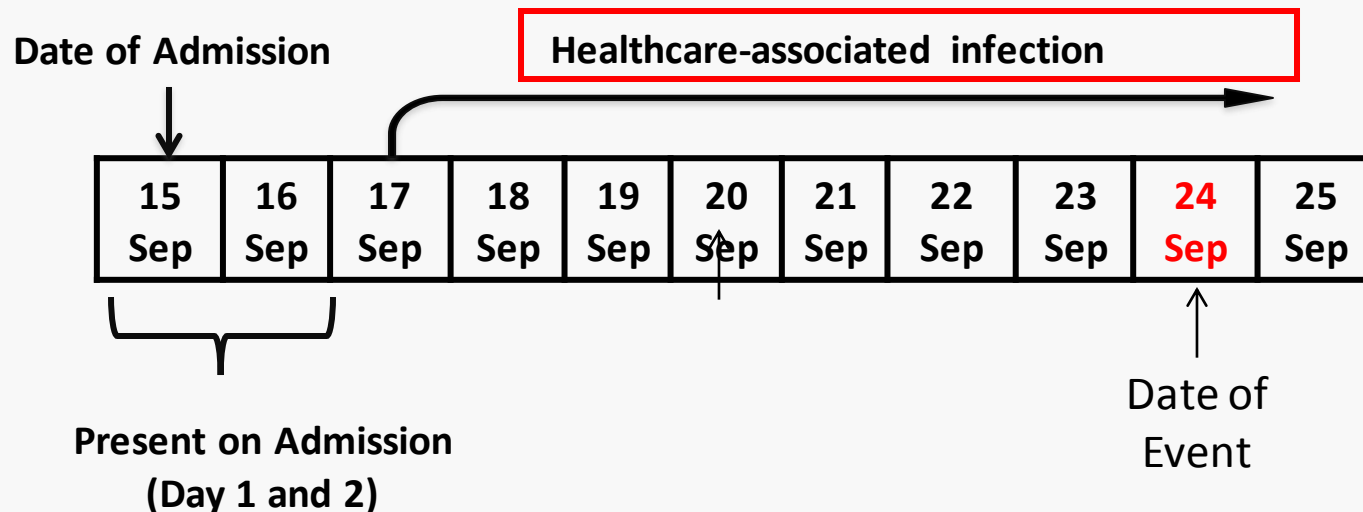
- Date of event occurs  $\leq 2$  calendar days after hospital admission



## Key terms – HAI vs. POA

### □ Our patient from the previous example:

- The patient was admitted to the hospital on 15 September
- The date of event for the BSI is 24 September
- This BSI is classified as a healthcare-associated infection



## Key terms

□ **Surveillance protocol includes a rule to separate HAI events for the same patient**

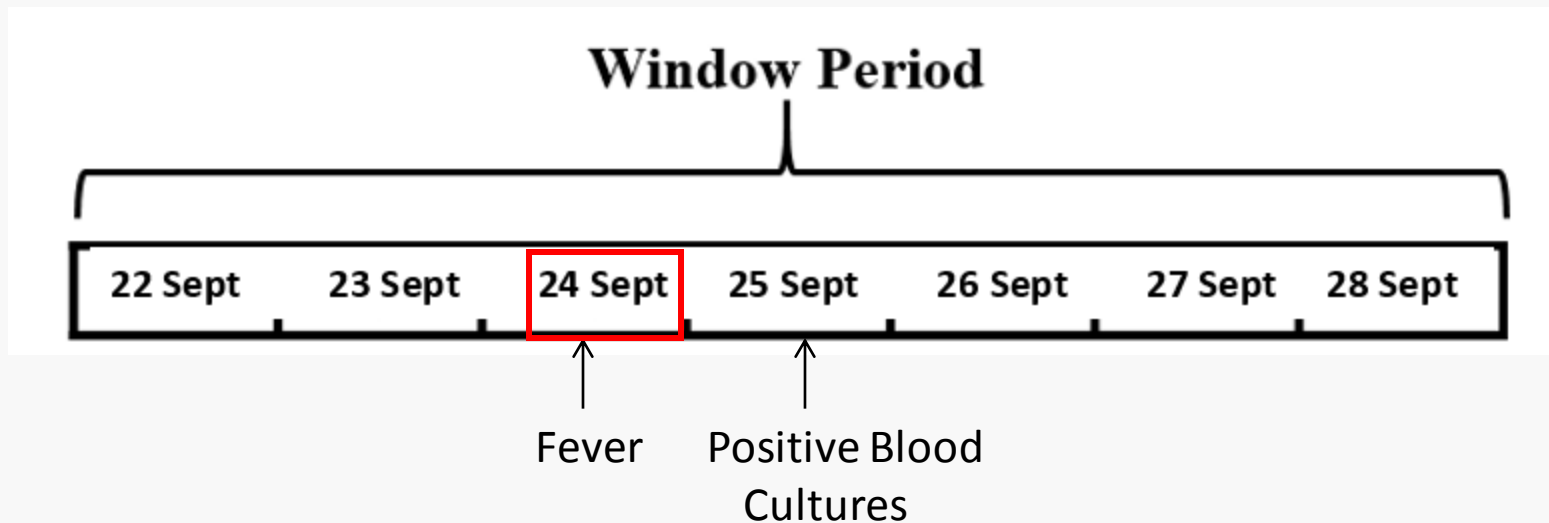
### □ **Event Timeframe**

- 14-day timeframe during which a primary HAI event is considered to be ongoing and no new HAIs of the same type can be reported for the patient
- Date of event = day 1 of the Event Timeframe
- Pathogens identified during the Event Timeframe are added to the case report form of the initial HAI
  - Pathogens from blood cultures collected during a BSI's Event Timeframe
  - Pathogens from urine cultures collected during a UTI's Event Timeframe

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## □ Our patient from the previous example:

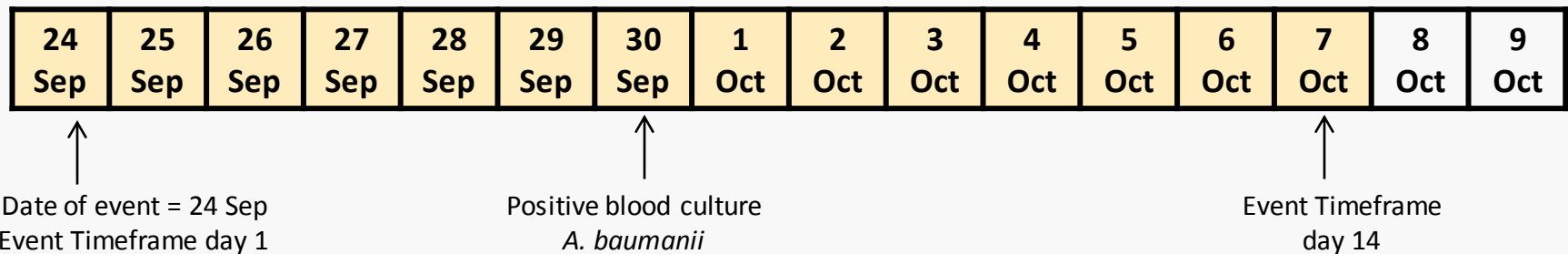
- This patient meets the BSI case definition
- The first element used to meet the case definition is a fever that occurred on 24 September
- Date of event = 24 September



# Key terms – Event Timeframe

## □ Our patient from the previous example:

- BSI date of event was 24 September, which is Day 1 of Event Timeframe
- Event Timeframe = 24 September to 7 October



- No new BSIs for this patient can be reported between 24 Sep and 7 Oct
- Organisms from any positive blood cultures during Event Timeframe are added to the ongoing event's case report form
  - *A. baumannii* from blood collected 30 Sep would not be a new BSI, but is added to the patient's BSI case report form

## **Key terms - summary**

- **All key terms will be reviewed again in BSI and UTI training modules**
- **Review the generic “Surveillance for HAI in Intensive Care Units” module protocol and become familiar with key terms:**
  - Window period
  - Date of event
  - Healthcare-associated infection
  - Present on admission
  - Event Timeframe



# HAI Surveillance – Inclusion Criteria

## **Inclusion Criteria**

- Inclusion criteria have been developed to make sure that only HAIs that can reasonably be attributed to the ICUs participating in surveillance are reported**
  
- Cases meeting ALL of the following must be reported:**
  - Date of event >2 calendar days from surveillance unit admission, with date of surveillance unit admission as Day 1
  - Date of event does not occur within the Event Timeframe of a previously identified HAI
  
- If the case does not meet ALL of the above, it is not reported**

## Inclusion Criteria

- A patient is admitted to the medical ward of your facility on 6 October. She is transferred to your ICU on 10 October. On 11 October, a blood culture is collected that grows *Acinetobacter baumannii*. The patient has a central line.
- Should this episode be reported as a bloodstream infection?

## Inclusion Criteria

- **A patient is admitted to the medical ward of your facility on 6 October. She is transferred to your ICU on 10 October. On 11 October, a blood culture is collected that grows *Acinetobacter baumannii*. The patient has a central line.**
  
- **Should this episode be reported as a bloodstream infection?**
  - NO. The patient was not in the ICU for more than 2 calendar days before the positive culture was collected.
  - This rule prevents ICUs from reporting HAIs that may have been acquired in other units within the hospital, or in other hospitals

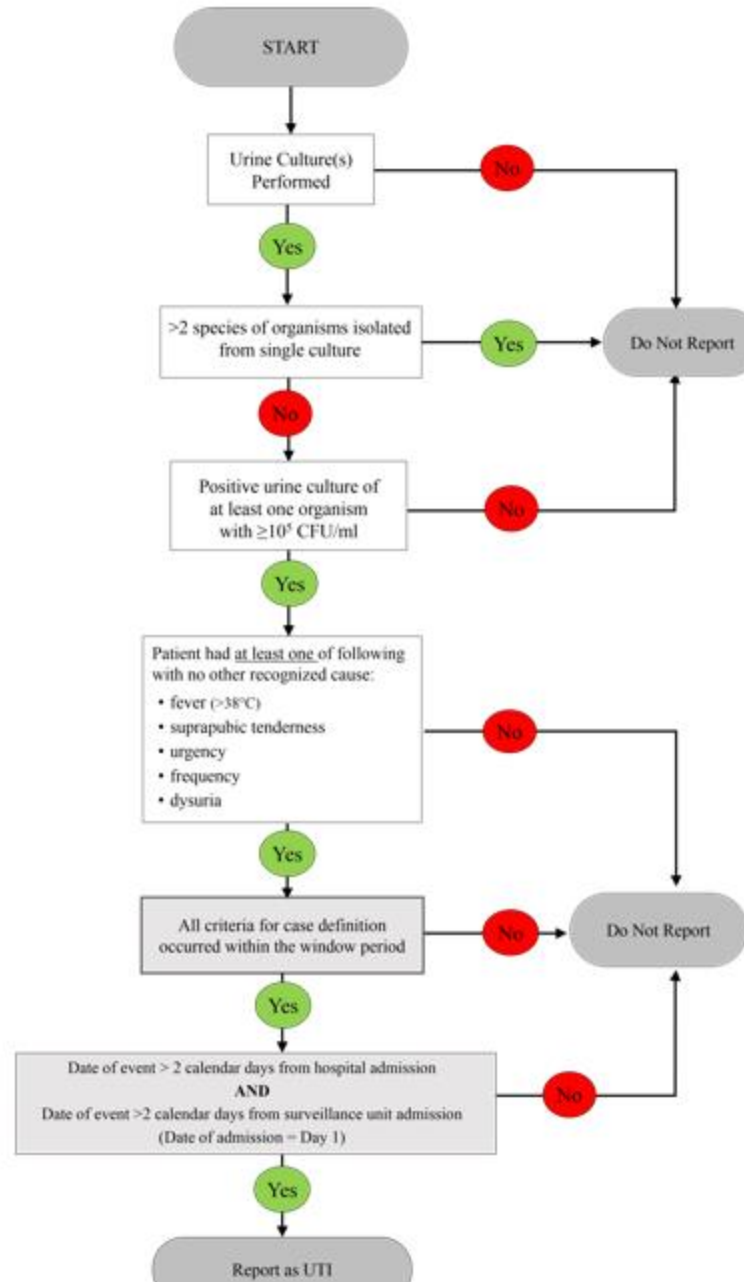
# HAI Surveillance – Case Finding

# Surveillance methodology

- **HAI surveillance requires active, patient-based, prospective identification of cases**
  - **Active** – surveillance team goes to laboratory and ICUs to review laboratory logs and medical charts
  - **Patient-based** – surveillance is done at patient level; patients are followed over time to find clinical signs/symptoms and positive lab tests
  - **Prospective** – surveillance is done in “real time” while patients are hospitalized (to the degree possible) and is not solely based on retrospective review of laboratory and medical records
  
- **Case finding methodology is included as Appendix 1 of the generic “Surveillance for HAIs in ICUs” module protocol**
  - To be discussed in more detail during BSI/UTI training modules

# Case Finding – Flowcharts

## Appendix 1 – UTI Case Finding Flowchart



# Case Finding – Worksheets

## Urinary Tract Infection (UTI) – Case Investigation Worksheet and Table

For all positive urine cultures:

1. Record collection date of urine culture: \_\_\_\_/\_\_\_\_/\_\_\_\_. Continue to Question 2.
2. Does the urine culture have at least one organism with  $\geq 10^5$  CFU/mL?  
 Yes. If selected, continue to Question 3.  
 No. If selected, the case definition is not met. **Do not report this episode.**
3. Does the urine culture have more than 2 species isolated from it?  
 Yes. If selected, the case definition is not met. **Do not report this episode.**  
 No. If selected, continue to Question 4.
4. Did the patient have at least one of the following signs or symptoms during the window period?  
 Yes. If selected, record the signs/symptoms on the case investigation table and continue to Question 5.  
 No. If selected, the case definition is not met. **Do not report this episode.**

UTI Signs & Symptoms
<ul style="list-style-type: none"><li>• Fever (<math>&gt;38^{\circ}\text{C}</math>)</li><li>• Suprapubic tenderness</li><li>• Urinary urgency</li><li>• Urinary frequency</li><li>• Dysuria</li></ul>



5. Determine the date of event (the date the first case definition criteria – urine culture collection or sign/symptom – occurred in the window period). Indicate on case investigation table and continue to Question 6.
6. Are ALL of the following inclusion criteria are true?  
 Yes. **This episode should be reported.** Start a UTI case report form for the patient. Continue to Question 7.





# Case Reporting

- **Once an HAI is identified, a standard case report form (CRF) is completed**
  - Separate CRFs created for BSI, UTI, VAP, SSI; included in protocols along with tables of instructions
  - CRFs will remain “open” for some time:
    - Collection of additional culture information during Event Timeframe and Secondary BSI Attribution Period
    - Collection of hospitalization outcome

## Case Reporting – Multiple HAI types

- The same patient may develop a BSI, UTI & VAP/ SSI during their ICU stay
  
- If a patient meets definitions for one/ two/ all fill all CRFs

# HAI Surveillance – Review

# HAI Surveillance – Review

## □ Key terms:

- Window period – date of first positive diagnostic test +/- 3 calendar days
  - All elements of HAI case definition must be met during the window period
  
- Date of event - date that the first element used to meet the HAI case definition appears for the first time
  - This could be the date of collection for first positive diagnostic test or the date of first clinical sign/symptom

# HAI Surveillance – Review

## □ Key terms:

- Healthcare-associated infection – date of event  $>2$  calendar days after date of hospital admission (where date of admission = day 1)
- Present on admission - date of event occurs  $\leq 2$  calendar days after hospital admission
- Event timeframe – 14 day period (date of event = day 1) when an HAI is considered to be ongoing
  - No new HAIs of the same type can be reported for the patient during these 14 days

# HAI Surveillance – Review

- **Infections meeting ALL of the following inclusion criteria must be reported as part of this surveillance:**
  - Date of event >2 calendar days from hospital admission, with date of hospital admission as Day 1
  - Date of event >2 calendar days from surveillance unit admission, with date of surveillance unit as Day 1
  - Date of event does not occur within the Event Timeframe of a previously identified HAI