Surveillance in low to middle income countries

Outcome vs Process

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Outline

• Setting the scene
• Types and methods of surveillance
• Surveillance priorities in low to middle income countries
• Compare outcome vs process surveillance
• Conclusions
‘If you cannot measure it, you cannot improve it’

Lord Kelvin, 1824-1907
Why surveillance is important?

If you don't look for it, you will not find!

I don't have a problem with HCAIs in my hospital!
Types of surveillance
Process vs outcome surveillance

Surveillance

Expensive & Time consuming

- Trained Personnel
  - Infection Control Doctor/ Hospital Epidemiologist
  - Infection Control Nurse/ Practitioner
  - Medical Microbiologist
- Admin & clerical staff
- IT Support (hardware & software)
- Availability of good quality microbiology Lab.
- Support of:
  - Clinical Team
  - Hospital Administrator
Surveillance: Practical points

• Get support of senior managers both clinical and non-clinical

• Methods of surveillance must take into consideration:
  – Availability of local resources
  – Laboratory facilities/support/resource impact
  – Clinical work load

• Case definitions must be:
  – Simple and agreed with the clinical team

• Be realistic and prioritize
  – Identify *preventable* healthcare associated infections
  – Target preventable infections in *high priority areas* based on local epidemiology
  – Require *minimum resources* with *maximum benefit*
## Prioritizing action

<table>
<thead>
<tr>
<th>High severity</th>
<th>Low severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>High frequency</td>
<td>Low frequency</td>
</tr>
<tr>
<td>(Blood stream infections)</td>
<td>(Infections from linen)</td>
</tr>
</tbody>
</table>

**Severity**
- Low
- Intermediate
- High

**Frequency**
- Low
- High
Outcome surveillance
Objectives of outcome surveillance

• Identify outbreaks and investigate problems
• Establish base line rate of infection
• Identify areas of priority to allocate and divert resources
• Used as a measure to assess the impact of IPC intervention
• Compare infection rates between/within hospital hospitals
• Satisfying mandatory requirements & standards
• Research
‘Tip of the iceberg’
Active vs passive surveillance

PASSIVE SURVEILLANCE
dependents on a third party to fill out a form or chart and send it in to the IPC team for analysis.

ACTIVE SURVEILLANCE
Process for actively seeking out HCAI cases
*The harder you look, the more you find!*

## Types of Surveillance

<table>
<thead>
<tr>
<th>Type of Surveillance</th>
<th>Methods</th>
<th>Overall reduction in infection rate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td><strong>Target whole hospital/ward</strong>&lt;br&gt;Routine collection, tabulation, analysis and dissemination of all information on the occurrence of nosocomial infections in a specified ward and/or hospital.</td>
<td><strong>11-48%</strong></td>
</tr>
<tr>
<td>(Not recommended)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Target-oriented</strong></td>
<td><strong>Target specific infections, units or groups of patients</strong>&lt;br&gt;Site Directed e.g. Blood Stream Infections, Surgical Site Infections&lt;br&gt;Unit Directed e.g. adult or neonatal Intensive Care Unit&lt;br&gt;Procedure Directed e.g. IV catheter-related infections.</td>
<td><strong>14 -71%</strong></td>
</tr>
<tr>
<td>(Recommended)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Harbarth S *et al.* *JHI* 2003;54:258-266
Incidence vs prevalence surveillance

The prevalence rate is the proportion of patients in the population who have an active infection either during a specified period of time (period prevalence) or at a specified point in time (point prevalence).

The incidence rate is the number of new cases that appear in the population at risk over a given time period.
Converting prevalence to incidence

• Convert prevalence survey into incidence data using Rhame and Sudderth equation
• It provides estimates of incidence rates with confidence bounds

\[
\text{Incidence} = P \left[ \frac{\text{LA}}{\text{LN} - \text{INT}} \right]
\]

- **P**: Prevalence of nosocomial infections (the total number of persons known to have at least one nosocomial infection at the time of the survey)
- **LA**: Mean length of hospitalization for all patients
- **LN**: Mean length of hospitalization of patients who acquire one or more nosocomial infections
- **INT**: Mean interval between admission and onset of the first nosocomial infection for those patients who acquire one or more nosocomial infection

Freeman J. *American Journal of Epidemiology* 1980;112(6); 707-723
Healthcare-associated Infections: Definitions

- **CDC/NHSN surveillance definition** of health care-associated infection and criteria for specific types of infections in the acute care setting (Revised Jan 2014)

- **ECDC surveillance definition HELICS**: Hospitals in Europe Link for Infection Control through Surveillance - a European network for HAI surveillance
### Simplified definitions of HCAIs

**Surgical Site Infection**
Any purulent discharge, abscess, or spreading cellulitis at the surgical site during the month after the operation.

**Urinary Tract Infection**
Positive urine culture (1 or 2 species) with at least $10^5$ bacteria/ml, with or without clinical symptoms.

**Respiratory Tract Infection**
Respiratory symptoms with at least two of the following:
- signs appearing during hospitalisation.
- cough, Purulent sputum, New infiltrate on chest.
- radiograph consistent with infection.

**Vascular Catheter Infection**
Inflammation, lymphangitis or purulent discharge at the insertion site of the catheter.

**Septicaemia**
Fever or rigours and at least 1 positive blood culture.

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*from WHO: Prevention of Hospital; acquired infection 2nd edition, 2002*
Problem with definitions…1

- There are *no internationally agreed definitions* on outcome surveillance
- *Discrepancy* between ‘*epidemiological*’ vs ‘*clinical diagnosis*’ of infection
- **CDC Ventilator Associated Pneumonia (VAP)** rates compared with American College of Chest Physicians rates amongst 2,060 patients ventilated and identified 12 cases of VAP using CDC criteria, whereas **ACCP criteria** identified 83 cases (1.2 vs 8.5 cases per 1000 ventilator days respectively).

Problem with definitions…2

• Definitions are complex and require subjective judgement for interpretation
• It is essential the personnel who are responsible for collection of data require substantive training and practice to develop proficiency to help reduce subjectivity and help promote consistency
• Need for an independent validation

Oh JY et al. ICHE. 2012; 33(5):439-445
Follow up of patients

• Due to shorter stays in hospital with higher throughput of patients, most HCAIs will not be identified during the hospital stay and will appear after the patient is discharged.

• It has been estimated that between 14 to 70% of surgical site infections (SSIs) occur after discharge.

• 72% of SSIs following coronary artery by pass were identified after discharge.

Avato JL. Infect Control Hosp Epidemiol. 2002;23:364-7
Collection of outcome surveillance data only in hospital are true indicator of HCAIs?

"Oh, sure they're nice, but are they real?"
Process surveillance
Process surveillance

• Introduction of various HCAI ‘Care Bundles,’ emphasis is placed on the controlling and monitoring processes and this change in approach has achieved a significant and sustained reduction in HCAIs.
What is a Bundle?

‘A grouping of best practices with respect to a disease process that individually improve care, but when applied together result in substantially greater improvement’.

Institute of Healthcare Improvement
CVC Care Bundle: Monitoring processes

Figure 1. The difference between process and outcome surveillance

Assumption vs Assurance

A mismatch between intention and action!

People do what you inspect, not necessarily what you expect!

If you can control the processes then you can control the outcome!
Process vs outcome surveillance
## Process vs outcome surveillance…1

<table>
<thead>
<tr>
<th></th>
<th>Process Surveillance</th>
<th>Outcome Surveillance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective</strong></td>
<td>Prevent infection by implementing and monitoring good IPC practices</td>
<td>Count infections by applying agreed definitions for HCAIs</td>
</tr>
<tr>
<td><strong>Require support of good quality microbiology laboratory</strong></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Education &amp; training</strong></td>
<td>Require to implement and monitor standardize IPC practices</td>
<td>To interpret &amp; apply definition consistently</td>
</tr>
</tbody>
</table>
### Process vs outcome surveillance...2

<table>
<thead>
<tr>
<th></th>
<th>Process Surveillance</th>
<th>Outcome Surveillance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Embed good IPC practices in the unit/hospital</strong></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Identify break in good IPC practices</strong></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Clinical judgement</strong></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Compliance is monitored against best IPC practices e.g. by using check list or HCAI ‘Care bundles’</td>
<td></td>
<td>Clinical judgement is required which is subjective to interpret case definitions of HCAIs</td>
</tr>
<tr>
<td><strong>Risk adjustment of data</strong></td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>
### Process vs Outcome Surveillance

| Data is affected by: Patient characteristics, case ascertainment, definitions, & risk factors | Process Surveillance | Yes |
| Application of Statistical test | No | Yes |
| Rate affected by early discharge of patients | No | Yes |
| Aspect of quality of care | All Patients | Selected patients |
| Aspect of quality of care is measured by implementation of good IPC practice on all patients | | Aspect of care is measured by rate of HCAIs on selected patients in the unit/group |
Conclusions

• Surveillance is an essential component for provision of an effective IPC programme

• Definitions of surveillance must be practical & applicable to the local health care facility/country depending on the availability of resources

• Prioritise and target surveillance in high risk units/areas

• Be aware of the limitations & pitfalls of performing outcome surveillance only

Outcome surveillance **must** be complimented by Process surveillance to embed good IPC practices to reduce HCAIs
Thank you