

# Surveillance in countries with limited resources

**Dr Nizam Damani**

Craigavon Area Hospital, Portadown, N Ireland

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## Abstract

Basic surveillance is an essential component of all infection control programme with the aim to identify outbreaks and to establish baseline rate of infections in a healthcare facilities. The surveillance data can be used to identify preventable infections so that resources are targeted in high priority areas requiring minimum resources. Different methods of surveillance exist and the type of surveillance method depends on the local factors, i.e. the type and size of hospital, case mix and availability of resources. Targeted surveillance aimed at high risk areas, procedure directed or specific type of infections associated with high morbidity or mortality are more cost effective and are manageable in various healthcare settings worldwide.

## Review

*“There may be infection control without surveillance, but those who practice without measurement will be like the crew of an orbiting ship traveling through space without instruments, unable to identify their current bearings, the probability of hazards, their direction or their rate of travel.”* **Richard Wenzel**

Surveillance has been described as systematic collection, analysis, and interpretation of data on specific events (infections) and disease, followed by dissemination of that information to those who can improve the outcomes. There are two types of surveillance:

### 1. Outcome surveillance

The aim is to ‘count’ the number of healthcare associated infections e.g., central line infection in ICU or surgical site infection in orthopaedic surgery.

### 2. Process surveillance or audit:

The aim is to ‘observe/monitor’ practice against a set standard. The practice can be monitored on a regular basis till the practice meets the recommended standard to complete the ‘audit loop’.

Basic surveillance is an essential component of all Infection Control Programmes with an aim to identify outbreaks and to establish endemic/base rate of infection rates. The data can be used to identify preventable infections so that resources are targeted in high priority areas requiring minimum resources. In addition, surveillance data can be used to compare infection rates between healthcare facilities, convince clinical teams to adopt recommended practices and help evaluate infection control measures.

## Corresponding author

Dr Nizam Damani, Infection Control Doctor, Craigavon Area Hospital, Portadown, N Ireland

However, surveillance is an expensive and time consuming business. It requires trained infection control personnel, IT support (both hard and software), Admin clerical Staff for input of data, statistician and good microbiology laboratory support. These resources are not always available in most countries. Therefore, before embarking on any type of surveillance, it is essential that clear objectives must be set at the very outset. Trained infection control personnel in

developing countries are a scarce resource and their job is to *prevent* and *control* infection; their time and expertise must not be disproportionately utilized in *counting* infection only.

The SENIC study has highlighted that 6 % of the infection can be prevented using minimal infection control efforts;<sup>1</sup> 32% could be prevented by a well organised & highly effective infection control programme. Ayliffe

**Table 1: Advantages and disadvantages of surveillance strategies for surveillance of healthcare-associated infections<sup>3</sup>**

| <b>Strategy</b>                           | <b>Advantages</b>   | <b>Disadvantages</b>   |
|---|---|--|
| Hospital – wide<br>Surveillance Incidence | Provides data on all organisms/ infection sites and units<br>Identifies clusters<br>Establishes baseline rates.<br>Recognises outbreaks early<br>Identifies risk factors  | Expensive and labour intensive<br>Large amounts of data collected and little time to analyse<br>No defined prevention objectives difficult to develop interventions.<br>Not all infections are preventable |
| Prevalence                                | Inexpensive<br>Time-efficient; can be done periodically   | Overestimates rates<br>Can't compare with incidence rates / national benchmarks  |
| Targeted Surveillance<br>Site specific    | Flexible, can be mixed with other strategies.<br>No baseline rates at other sites<br>Can include post-discharge component<br>Simplifies surveillance effort   | No defined prevention strategies or objective<br>May miss clusters at other sites.<br>Denominator data may be inadequate.<br>Easily adaptable to interventions   |
| Unit specific                             | Focuses on patients at greater risk<br>Requires fewer personnel.<br>Simplifies surveillance effort  | May miss clusters in non-surveyed units.   |
| Rotating                                  | Less expensive.<br>Less time consuming and labour intensive   | May miss clusters during non-surveyed periods  |
| Outbreak                                  | Valuable when used with all types of surveillance.<br>Thresholds are institution specific   | Can't compare data with national benchmarks<br>No baseline rates provided  |
| Limited periodic                          | Liberates ICP to perform other activities, including interventions,<br>Increases efficiency of surveillance   | May miss clusters  |
| Objective/ priority based                 | Adaptable to hospitals with special populations and resources.<br>Focus on specific problems at the institution identifies risk factors.<br>Easily adaptable to interventions.<br>Can include post-discharge. component | No baseline infection rates.<br>May miss clusters or outbreaks   |

has highlighted that even though infection rates can be drastically reduced in most hospitals in developing countries,<sup>2</sup> the rates cannot be reduced below 5% unless excessive costs are incurred and he described it as an 'irreducible minimum'. Therefore it is essential that the surveillance in developing countries must be targeted at the preventable healthcare infection in the high risk area/unit and reducing to as low as possible.

Different methods of surveillance exist and their advantages and disadvantages are summarized in Table I. The type of surveillance method depends on the local factors, i.e. the type and size of hospital, case mix, availability of resources etc. In a nutshell, hospital-wide surveillance is expensive and should not be performed. Targeted surveillance aimed at high risk areas (e.g., ICU, NNU), type of infection (e.g., Bloodstream & Surgical site infections) or procedure directed (e.g. IV catheter-related infections) is cost effective, manageable and should be used in larger healthcare facilities. Irrespective of the methods used, it is essential that data generated from the surveillance is appropriately risk-adjusted for the generation of meaningful infection rates, especially when the information is released beyond the institution.

Incidence surveillance is time consuming and expensive and if this is not possible due to resource limitation, prevalence surveillance can be done and the data collected in the prevalence survey can be

converted into incidence.<sup>4</sup> This method will provide estimates of incidence rates of nosocomial infection with confidence bounds. The variables required to convert prevalence to incidence include.

Definitions of surveillance must be practical taking into consideration the availability of trained personnel, laboratory facilities and patient work load. It is essential that definition of surveillance must be agreed with the clinical team before and should not be altered once the surveillance has started.

Various definitions of healthcare associated infections have been published<sup>5,6,7</sup> but the definition used by the National Nosocomial Infection Surveillance (NNIS) System has been most commonly used. However, most of these definitions are complex, assume availability of trained infection control personnel and require good laboratory support. Therefore, adaptation of these definitions is not suitable for all healthcare facilities in countries with limited resources. In limited resource setting, simple clinical definitions requiring minimal laboratory support should be used (see Table II).

Comparison of infection rates between establishments and the publication of such comparisons is a contentious issue and needs careful consideration and sensitive handling. This is mainly because the surveillance data may not be comparable, and the range of institutions involved will introduce confounding factors inherent in

**Table II: Simplified definition of healthcare associated infections<sup>8</sup>**

| <b>Infection</b>            | <b>Definition</b>   |
|-----------------------------|---|
| Surgical Site Infection     | Any Purulent discharge, abscess, or spreading cellulites at the surgical site during the month after the operation.   |
| Urinary Tract Infection     | Positive urine culture (1 or 2 species) with at least 10 bacteria/ml with or without clinical symptoms.   |
| Respiratory Tract Infection | Respiratory symptoms with at least two of the following <ul style="list-style-type: none"> <li>• Signs appearing during hospitalisation</li> <li>• Cough, Purulent sputum, New Infiltrate on chest</li> <li>• Radiograph consistent with infection</li> </ul> |
| 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.   |

all surveillance systems. Problems of data interpretation can be overcome when surveillance systems are set up with clearly defined surveillance objectives included in the expected outputs of surveillance. Unfortunately, at this time, surveillance objectives rarely underpin surveillance methods.

### References and further reading

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