

Outcome Surveillance

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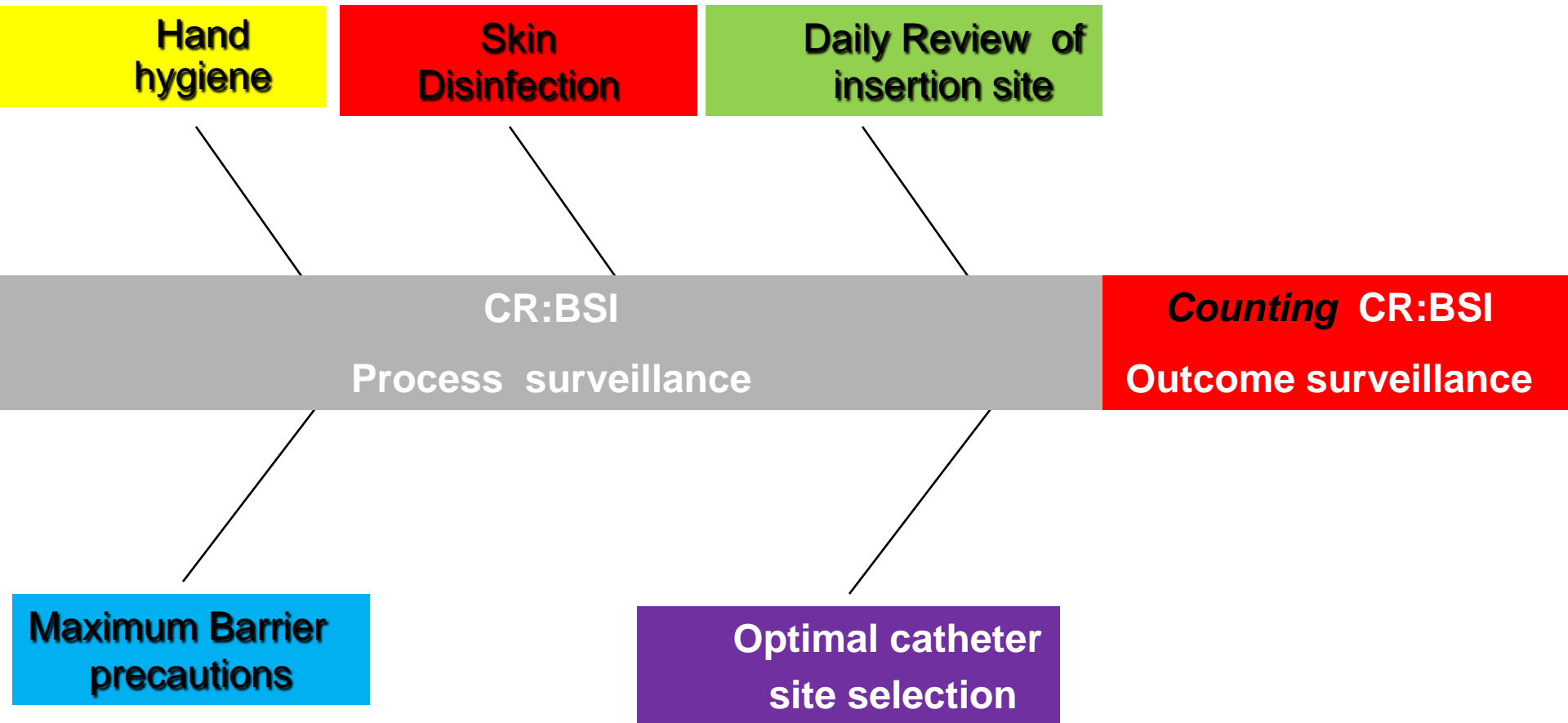
Surveillance : Definition

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.

Why surveillance is important ?

*You can't improve what you
can't measure...*

Catheter related : Blood Stream infections



Outcome vs Process Surveillance

	Healthcare	Airline industry
<p>Counting <u>OUTCOME</u> (Surveillance)</p> <p>Help to identify the area & magnitude of the problem</p>	<p>Counting total no. of Health-care associated infections/deaths</p>	<p>Counting total no. of aeroplane crashes in mid air</p>
<p>Monitoring compliance with the <u>PROCESS</u> (Audit)</p> <p>Help to identify problems with compliance with recommended practice</p>	<p>Monitoring compliance with evidence based Infection control practices to <i>prevent</i> Health-care associated infections/deaths</p>	<p>Rigorous monitoring of the process checks to prevent aeroplane crashes</p>

Surveillance : Objectives

- Identify outbreaks
- Establish base line rate of infection
- Identify areas of priority to allocate & divert resources
- Convince Clinical Team to adopt recommended preventative practices
- Used as a measure to monitor impact of infection control intervention
- Compare infection rates between hospitals

The ultimate *aim* of Surveillance is to *reduce* infections rate.

Surveillance

Expensive & Time consuming

- Trained Personnel
 - Infection Control Doctor/ Hospital Epidemiologist
 - Infection Control Nurse/ Practitioner
 - Medical Microbiologist
- Good quality microbiology laboratory
- Admin & clerical staff
- IT Support (hardware & soft ware)
- Support of :
 - Clinical Team
 - Hospital Administrator

Surveillance

	Infection rate	Preventable infections
Developed countries	10 %	15- 30 % [*]
Developing countries	25-65 % ^{**}	≥ 40 % ^{***}

^{*}UK Audit Commission, 2001 : ^{**}Wenzel R, 2002 : ^{***} Wenzel R. *Eur J Clin Microbiol* 1987;6(3):341-343

The Study on the Efficacy of Nosocomial Infection Control (SENIC Study)

- 6 % of infection can be prevented by minimal infection control efforts.
- 32% could be prevented by well organised & highly effective infection control programme.

Haley RW. *Am J Epidemiol* 1985;121:182-205.

Surveillance

- Identify *preventable* healthcare associated infections
- Target preventable infections in *high priority areas*
- Require *minimum resources* with *maximum benefit*

Not all healthcare-associated infections are preventable due to the inherent risks of underlying disease & medical interventions

Lab based surveillance system

- Laboratory reports do not always indicate true infection
- Negative reports do not always mean infection is absent
- Microbiology lab not good quality *or* underused
- Poor sensitivity ; identify only 20% of infections (mainly Urinary Tract & Blood Stream Infections)

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. American Journal of Infection Control 2008;36;309-32.
- **HELICS**: **H**ospitals in **E**urope **L**ink for **I**nfection **C**ontrol through **S**urveillance -a European network for HAI surveillance

Some Surveillance Systems

- ICARE (CDC & Emory University)
- Dialysis Surveillance Network (CDC)
- SCOPE Project (non-CDC US Hospitals)
- Emerging Pathogens Initiative (US VA Hospitals)
- English Nosocomial Infection National Surveillance Scheme (1996)
- Belgium National Programme for the Surveillance of Hospital Infections (1991)
- France: Réseau d'Alerte, d'Investigation et de Surveillance des Infections Nosocomiales (1992)
- Germany: Krankenhaus Infektions Surveillance System (1997)
- Finnish Hospital Infection Program (1997)
- The Netherlands: Preventie van Ziekenhuisinfecties door Surveillance (1996)
- Australia: Hospital Infection Standardised Surveillance Program (1998)
- ProMED: International Society of Infectious Diseases
- Hospitals in Europe Link for Infection Control Through Surveillance (HELICS) (1994)
- N Ireland Healthcare associated infection surveillance centre, Belfast, HISC
- Scottish Surveillance of Healthcare associated infection (SSHAIP)
- Welsh Healthcare associated infection Programme (WHIP)
- Canadian Nosocomial Infection Surveillance Program (CNISP) (1995)

Simplified definitions of nosocomial Infection

www.who.int



INFECTION	DEFINITION
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: <ul style="list-style-type: none">• 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.

Surveillance : Practical aspect

- Before you start
 - Concentrate on hospital-acquired infections only
 - Write case definitions
 - Practical & workable take into consideration:
 - Availability of resources
 - Patient work load
 - Laboratory facilities/support/resource impact
 - Agree with the clinical team

Total/hospital wide surveillance studies

Reduction in infection rate : 11-48%

Reference	Setting	Study design	Intervention	% reduction
Greco <i>et al.</i> , 1991	12 hospitals	Before & after intervention study	Surveillance and multi-modal modification of patient care practices	19%
Raine, 1991	Hospital-wide study	Retrospective Cohort Study	Multi-modal infection control programme with surveillance	48%
Evaldson , 1992	Obstetrics	Prospective cohort study	Surveillance, feedback, quality improvement programme	33%
Malone & Lasson, 1996	Hospital-wide study	Retrospective study and prospective follow-up	Hospital-wide introduction of barrier precautions and body substance isolation	33%
Hacek <i>et al.</i> , 1999	Hospital-wide study	Cohort study with longitudinal assessment	Enhanced ICP with rapid assessment and weekly feedback with discussion	11%
Pittet <i>et al.</i> , 2000	Hospital-wide study	Seven observational studies	Hand hygiene campaign (posters, alcohol-based handrubs) surveillance, active MRSA control program	41%
Anderson <i>et al.</i> , 2000	14 hospitals	Repeated point-prevalence studies	General infection control and surveillance	23%
Delgado , 2001	General surgery	Surveillance study	Infection control programme and surveillance	24%

Target-oriented surveillance studies

Reduction in infection rate : 14-71%

Reference	Setting	Targeted area	Study design	Intervention	Effects
McConkey <i>et al.</i> , 1999	Cardiac surgery	Surgical Site Infection	Prospective cohort study	Surveillance and feedback, multi-modal intervention	34%
Kelleghan <i>et al.</i> ..., 1993	ICU	VAP	Cohort study with longitudinal assessment	Multidisciplinary team approach :guidelines, education	57%
Berg <i>et al.</i> , 1995	ICU	VAP	Prospective study	Multi-modal educational programme	52%
Joiner <i>et al.</i> , 1996	ICU	VAP	Prospective study	Introduction of a quality assurance process	38%
Kaye <i>et al.</i> , 2000	ICU	VAP	Cohort study with longitudinal assessment	Multidisciplinary team evaluating patient care processes and implementing multiple interventions	70%
Civetta <i>et al.</i> , 1996	ICU	CVC – BSI	Sequential prospective study	Continuous quality management approach	43%
Cohran <i>et al.</i> , 1996	Hospital –wide	CVC – BSI	Cohort study with longitudinal assessment	Surveillance and education programme	14%
Maas <i>et al.</i> , 1998	Neonatal ICU	CVC – BSI	Before – after comparison	Surveillance and feedback, education programme	71%
Bishop-Kurylo, 1998	Neonatal ICU	CVC – BSI	Cohort study with longitudinal assessment	Multidisciplinary team approach :continuous quality improvement	37%
Bijima <i>et al.</i> , 1999	Surgical ICU	CVC – BSI	Cohort study with longitudinal assessment	Five measures (hand hygiene, technical changes, surveillance)	38%
Eggiman <i>et al.</i> , 2000	ICU	CVC – BSI	Cohort study with longitudinal assessment	Educational campaign for vascular-access insertion and on device use and care	65%
Yoo <i>et al.</i> , 2001	ICU	CVC – BSI	Cohort study with longitudinal assessment	Surveillance and active infection control interventions	69%
Coopersmith <i>et al.</i> , 2002	Surgical ICU	CVC – BSI	Cohort study with longitudinal assessment	Educational programme with feedback	66%
Pumigan <i>et al.</i> , 1998	Cardiac ICU	Urinary Tract Infections	Cohort study with longitudinal assessment	Multidisciplinary team approach (new guidelines, education)	66%
Goetz <i>et al.</i> , 1999	Hospital-wide	Urinary Tract Infections	Cohort study with longitudinal assessment	Educational programme with feedback	46%

VAP: Ventilated Associated Pneumonias: CVC-BSI Central Venous Catheter –Blood Stream Infections

Harbarth S *et al.* *JHI* 2003;54:258-266

Types of Surveillance

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

Targeted surveillance

- Blood Stream Infections (device-associated)
 - Overall reduction : ↓ 56-71 %
- Surgical Site Infections
 - Overall reduction : ↓ 34 %

Harbarth S *et al.* *JHI* 2003;54:258-266

- Nosocomial bacteraemia (extrinsic contamination of IV fluids)

Ponce-de-Leon-Rosales S, 2003

Surveillance

After the surveillance

- Validate your data
- Analyze it
- Present your data in a simplified form
- Feed back your data in timely manner to the Clinical Team

Review

- Review methods of surveillance on a yearly basis

Incidence or Prevalence studies ?

- Incidence studies

- The incidence rate is the number of new cases that appear in the population at risk during the specified time period
- *True incidence surveillance is very expensive* of staff time

- Prevalence studies

- 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*)
- *More practical and less resource intensive* than incidence surveillance
- Useful in countries with limited resources
- Limitations:
 - overestimate the frequency of infections
 - rates are not as precise as incidence rates

Converting prevalence to incidence

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

$$\text{Incidence} = P [LA/(LN-INT)]$$

P : Prevalence of nosocomial infections (the total number of persons known to have at least one nosocomial infection at the time of the survey)

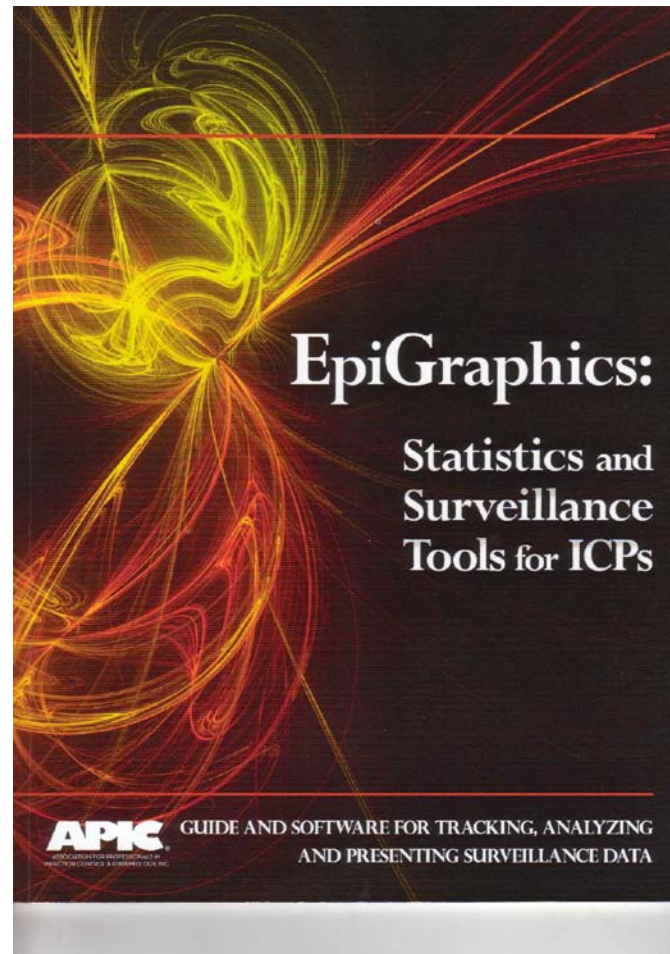
LA : Mean length of hospitalization for all patients

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

Infection Control Surveillance Software



Surveillance : Conclusions

- Surveillance is an essential component for provision of an effective infection programme
- Definitions of Surveillance must be practical & applicable to the local circumstances
- Target surveillance:
 - hospital-acquired infections only
 - infections with high mortality *or* morbidity
 - patients with specific risk factors
 - in high risk units/areas
- More resources must be directed on *Controlling* & less on *Counting* cross infection !
- Outcome surveillance *must be* complimented by process surveillance to ensure compliance with good infection control practices

Thank you