

AN INTRODUCTION TO EPIDEMIOLOGY & INFECTION CONTROL PRACTICE:

PART 111: Brief Overview Of Surveillance For Nosocomial Infection

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A brief overview of the basic concepts of epidemiology methodology were covered in parts 1 & 2 of this series. These included validity, reliability, causation and study design. Surveillance is an integral component of an effective Infection Control programme. This paper will discuss some of the recent efforts internationally, and in Australia to undertake surveillance for two distinct and important types of nosocomial infection: surgical site infection (SSI) and intravascular device related bacteraemia.

What is Surveillance?

Surveillance has been defined by Haley et al (1992) as "a systematic, active, ongoing observation of the occurrence and distribution of disease within a population and of the events or conditions that increase or decrease such disease occurrence." In practical terms, surveillance can include hospital wide or specific infections, on either a continuous or periodic basis. In the past surveillance of SSI by Australian hospitals has generally been ongoing and has included all surgical procedures. Rarely can the busy Infection Control Practitioner collect and analyse the effects of risk factors such as skill of the surgeon, patient age, sex, immunosuppression and duration of surgery on the infection rate. Infection control practitioners rarely have the resources to adjust their infection rates for Accreditation

purposes for the effects of casemix.

Some of the larger surveillance systems reported in the literature are listed below, many of these studies have attempted to define appropriate risk factors for SSI. Risk factors that have proven to be significant include:

- An operation involving the abdomen.
- Operation of duration longer than two hours.
- Operation classification - clean, clean-contaminated, contaminated and dirty.
- Patient having 3 or more underlying diagnoses at the time of discharge.
- A measure of patient susceptibility to infection.
- A marker for host susceptibility (ASA score).
- Use of a 75th percentile for measuring duration of operation.

Surgical Site Surveillance: There have been numerous attempts to undertake SSI surveillance, some recent examples of these are:

U.S.A:

- Study on the Efficacy of Nosocomial Infection Control (SENIC) study (Haley et al, 1980),
- National Nosocomial Infections Surveillance System (NNIS), (Centers For Disease Control, 1994),
- Five year prospective study of 23,649 surgical wounds (Cruse & Foord, 1973)

EUROPE:

- United Kingdom: National Survey of Infection in Hospitals (Meers et al, 1980)
- Belgium: National Prevalence Survey of Nosocomial Infections in Belgium, 1984 (Mertens)

AUSTRALIA:

- Prevalence of nosocomial and community-acquired infections in Australian hospitals (McLaws et al, 1988)

It must be remembered that these studies, which have identified the above risk factors, have used a variety of definitions for determining cases of surgical site infection as well as wound class. More countries are adopting the Centers for Disease Control (CDC) definitions in preference to English and European definitions. However, most SSI surveillance in Australia uses the Australian Council on Healthcare

Standards (ACHS) definitions. While these definitions are simple to comply with and reliable, their usefulness is limited. This limitation is caused by the potential of the ACHS system to underestimate cases of infection, as unlike the NNIS definition of SSI purulence is the only criteria required to differentiate between a non-infected wound and an infected wound. The CDC definitions as outlined in Appendix 1 offer a comprehensive method of identifying SSI and categorising its level of severity ie. Deep/ superficial etc.

Many SSI rates reported by the above listed surveillance systems fail to include those SSI which become apparent only after a patient is discharged. This is proving to be increasingly important as many admissions are short-stay admissions and the incubation period for many SSI may be longer than the period of hospitalisation. Therefore, it will be important to examine the feasibility of incorporating some form of post-discharge surveillance for surgical patients. The logistics and resources needed to perform post-discharge surveillance may be problematic; depending on the patient mix, the nature of the surgery performed and the local arrangements for post operative patient follow up. Be that as it may, the reporting of SSI rates should clearly indicate that post discharge surveillance has not been included.

Intravenous Device Related Bacteraemia. Numerous independent studies have been undertaken to determine the relationships between use of intravascular devices (IVD) and nosocomial bacteraemia. Work since 1990 has included:

USA

- The National Nosocomial Infection Surveillance System (1994)

EUROPE

- Belgium - The National Prevalence Survey of Nosocomial Infection in Belgium; 1984. (Mertens, R. et al, 1994)
- United Kingdom: National Survey of Infection In Hospitals (Meers et al, 1980)

AUSTRALIA

- Collignon - The Australian Study on Intravascular Catheter Associated

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Sepsis (1994)

- ACHS - Clinical Indicators for Bacteraemia - User Manual Vers 3. (1995)
- Gosbell et al (1995) - Prospective survey of infection associated with central venous catheters:

As with SSI surveillance, methods for identifying at-risk populations and cases of related bacteraemia differ widely between the above listed reporting systems. These differences include:

- the identification of the appropriate "at-risk" group ie. the "denominator"
- the degree of variation in susceptibility of patients at risk of acquiring infection
- the difficulty in monitoring patient movement during hospitalisation in order to identify a case ie. the numerator
- methods of identification of valid cases - (usually limited to laboratory based identification)
- the accuracy of blood cultures taken
- indifference of clinicians to ownership of the IV related problem
- inability to perform post discharge surveillance

Current methods of continuous surveillance for nosocomial bacteraemia in Australia are based largely on ACHS criteria. As with other methodologies for surveillance of hospital acquired infection, ACHS has suggested the use of a readily available denominator ie. either the total number of admissions or discharges in the study period or the total number of blood cultures performed in the equivalent period. These definitions allow for ease of access to data, but do not necessarily provide a truly representative of the at-risk population. When you attempt to determine rates of IV related bacteraemia you should remember that for a rate to truly reflect quality of care it must reflect the population at risk. Identifying this population is extremely difficult and use unless you can obtain full cooperation from staff caring for the at-risk population you will have to provide your Infection Control Committee with rates based on less than perfect methodology. Such rates may be useful if calculated reliably but will not necessarily reflect quality of care.

Software for Surveillance. Various software packages have been used for storing, managing and performing analysis on large quantities of data. Examples of commercially available IBM compatible software packages for nosocomial surveillance have included:

- AICE (Infection Control & Prevention Analysts, 1994).
- O-Logic (Epi-Systematics Inc, 1994),
- WHOCARE (World Health Organisation, 1993)
- IDEAS (Centers For Disease Control, 1994).

After field testing and onsite visits, the NSW Nosocomial Infection Outcome Indicator Group determined that none of the currently available computer programs for surveillance of hospital acquired infection provide the combination of easy data entry and analytical power. However, each has its merits.

IDEAS is an excellent program, but can not be obtained outside the USA. The data entry screen of the O-Logic package is not streamlined, which slows the data entry process. It also requires the user to set the boundaries for acceptable infection rates, that is, the upper- and lower 95% confidence limits. This can be particularly difficult when the user is establishing their system and there are no other hospital data to use as the baseline ie. the non-preventable infection rate. The strength of the AICE package is its ease of data entry; however, the analytical package can not be easily tailored to the users' requirements in comparison to O-Logic. All of these packages are very much focused on international models for their definitions and risk factors. These programs currently lack the ability to interface with existing hospital information systems. Future efforts in surveillance systems should concentrate on "downloading" clinical and epidemiological information relating to patient populations.

Summary

Areas For Improvement – A significant degree of work has already been conducted in surveying surgical site infection and nosocomial bacteraemia throughout the world. While many systems appear to be effective at a local level, interhospital and/or interdepartmental comparison is limited by the following:

- Lack of standardised definitions
- Lack of uniform surveillance methodology including post-discharge surveillance
- Limited risk stratification of patient risk factors
- Lack of consensus on the most appropriate computer based surveillance system.

Each of these issues have been addressed by the New South Wales Nosocomial Infection Outcome

Indicator Project team in their initial work and where possible, strategies for overcoming the limitations of current surveillance have been trialled and evaluated with a view to broader implementation. The preliminary findings and lessons from the NSW Nosocomial Infection Outcome Indicator Project team will be published in the near future.

The next part of this series will critically examine the NNIS system and its ability to be applied to the Australian clinical setting.

Appendix 1:

CDC Definitions for Surgical Site Infection

Clinical Signs & Symptoms of Infection:

A SSI infection occurs when there is a localised or systemic adverse reaction to a surgical intervention with no evidence to suggest that the infection was present or incubating at the time of admission. The presence and classification of a SSI should include a combination of clinical data and laboratory and other test results

The following need to be considered in classifying a SSI:

- Clinical evidence may be obtained from direct observation of the surgical site or review of the patient records
- Laboratory results will include cultures of wounds or incisions which have been collected and processed aseptically
- Other diagnostic tests may include routine x-ray, ultrasound, CT or MRI scans
- A diagnosis of surgical site infection based on direct observation during a surgical operation, endoscopic examination, or other diagnostic studies is an acceptable criterion for SSI unless there is compelling evidence to the contrary.

Infection occurs within 30 days after the operative procedure if no implant is left in place or within one year if implant is in place and the infection appears to be related to the operative procedure.

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Woe and Glory of an Infection Control Nurse

Bronwen Mander, Clinical Consultant - Infection Control Western Hospital, Footscray, Victoria

I saw a white coat flash behind the screen
I thought at first that I could be mean
I would throw back the curtains and catch in the act
A perfect procedure but for hygiene so slack

I peaked through the gap as quick as could be
The coat was unwilling, back turned towards me
Shrugging the shoulders so that I could not see
I knew hands were rubbing in fervent glee

I hedged and I crouched, I listened and looked
Befuddled I was as a new headless chook
At last, wait no more, no more I could rest
As the coat lunged toward the poor patient's chest

"You'll not touch that patient," I cried and declared
As I pushed through the curtain with fear and despair

What do you think? I stopped with a crunch
The sight I could see was almost too much

"My word! I thought that one's life was forsaken
But my misgivings were surely mistaken
By doing that thing, so unmentionable thing
I believe you deserve the status of King

For the life of another, one who shows care
Do not be embarrassed, but that care
please share

Saving the patient from death and from pain
My actions or policies would never restrain
In fact, maybe this is the sign of the trends
In amongst carers, you and your friends
That act of chlorhexing your hands like that!
Can only be declared as a fanfaronade act."

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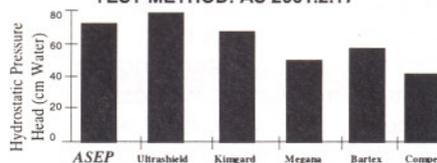
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