Uniform national numerator definitions for infection control clinical indicators: surgical site infection and health-care related bloodstream infection

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Introduction

The concept of national surveillance of health-care-related infection is not new – programs have been implemented in the USA and a number of European countries over the past two decades. Proposals for a similar program in Australia have been hampered by a lack of government support. However, recent interest in adverse health-care related outcomes, both federally and in many of the states, has encouraged moves toward a national surveillance strategy.

Another barrier to national surveillance has been the absence of consensus regarding both definitions and terminology related to applicable indicators for infection control. Australian Council for Healthcare Standards (ACHS) definitions are widely used within Australia, but changes in health-care delivery have rendered them less useful. Surveillance systems exist in the US (National Nosocomial Infections Surveillance (NNIS)) and UK (Public Health Laboratory Service (PHLS)); however, the definitions and terminologies differ, with neither necessarily directly applicable to the Australian situation.

The following numerator definitions for the two most widely utilised clinical indicators for health-care related infection are proposed as acceptable minimum national standards. While they do set minimum data collection benchmarks, they are not intended to preclude institutions from collecting other information they consider relevant to individual programs. The definitions utilise, as their core, the consensus decisions of our overseas colleagues but have been modified for ease of application, validity and reproducibility.

The expert working group recognises that the modifications suggested will lead to a loss of strict comparability between the original, overseas definitions and the proposed Australian definitions. Nevertheless, it strongly believes it preferable to achieve uniform data collection nationwide, as the first step in developing acceptable national thresholds of infection rates.

Two numerator standards have been developed: surgical site infection, and health-care related bloodstream infection.

Surgical site infection

The following definition is modified from that of the NNIS in the US and the PHLS recommendations in the UK, to improve ease of application. It should be noted that the coalescence of NNIS and PHLS categories within the Australian definitions does not preclude individual organisations from utilising the three levels of surgical site infection – superficial incisional, deep incisional, and organ/ space – for their own use.

Definition

Superficial surgical site infection
(skin or subcutaneous tissue)

Infection must occur within thirty (30) days of the operation.

Superficial surgical site infection is defined as:

- purulence (or laboratory confirmation; eg. two (2) + or more polymorphs),

OR

- attending consultant diagnosis by two (2) signs and symptoms, as follows:
  - pain;
  - tenderness;
  - localised swelling;

- redness, or
- heat,

OR

- one (1) of the following signs and symptoms:
  - pain;
  - tenderness;
  - localised swelling;
  - redness, or
  - heat,

AND

- the surgeon reopens the wound.

(**Note**: stitch abscesses excluded.)

Deep surgical site infection (fascial/muscle/organ space)

Infection occurring within thirty (30) days of the operation if no implant is left in place, or within one (1) year if an implant is in place and infection appears to be related to the operation.

Deep surgical site infection is defined as:

- purulence from drain in stab wound into organ/space,

OR

- organisms isolated from an aseptically obtained culture of fluid from deep tissue or organ space,

OR

- if a deep incision spontaneously dehisces or surgeon opens **AND** the patient exhibits one of the following signs or symptoms:
  - fever > 38° C;
  - localised pain or tenderness,

OR

- abscess or evidence of abscess on direct examination during re-operation, histopathology or radiological examination.

Post-discharge surveillance

Post-discharge surveillance is supported in principle. The outcomes of a validation study now being undertaken in Queensland should provide the expert working group with relevant information, so it can issue a recommendation in this regard in the future.

Health-care related bloodstream infection

This definition is modified from the PHLS recommendations, to improve validity and reproducibility within certain subspeciality services such as neonatal, haematology and oncology. The terminology has been carefully selected so the numerator can remain applicable as the continuum of care changes. The expert working group recognises that to maintain the validity of this indicator, laboratory surveillance without clinical correlation is often inappropriate; this view is incorporated into the recommended standard.

Diagnosis of bloodstream infection

A bloodstream infection must meet one (1) of the following criteria.

Criterion 1 (recognised pathogens)

Isolation of one (1) or more recognised bacterial or fungal pathogens from one (1) or more blood cultures (eg *Staphylococcus aureus, Streptococcus pneumoniae, Escherichia coli, Klebsiella* spp., *Proteus* spp., *Salmonella* spp., *Candida albicans*).

Criterion 2 (potential contaminants)

The patient has at least one (1) of the following signs and symptoms within twenty four (24) hours of a positive blood culture being collected:

- fever (> 38° C);
- chills;
- rigors;
- hypotension (systolic blood pressure ≤ 90 mm Hg),

AND

there is isolation of a potential contaminant* from:

(a) two (2) or more blood culture sets drawn on separate occasions within a five (5) day period (the organism must be identical,

OR

(b) a single blood culture set drawn from a patient with an intravascular device in situ (within forty eight (48) hours of the episode), where:

- **EITHER** there was a resolution of clinical signs and symptoms after removal of the device or following appropriate antimicrobial therapy,
- **OR** an identical organism in significant quantity was isolated from the device or part thereof; eg. catheter tip

Potential contaminants* include the following.

- Diphtheroids (corynebacterium spp., etc.).
- Coagulase-negative staphylococci.
- Micrococci.
- Propionibacteria.
- *Bacillus* spp.
- Alpha haemolytic streptococci.

- Environmental Gram-negative rods.
- Non-pathogenic *Neisseria.*

Notes for criterion 2

- Isolates that take longer than forty eight (48) hours' incubation to signal are excluded.
- Mixed isolates are excluded.
- Mixed isolates with an accepted pathogen – disregard the potential contaminant* organism.

Site of episode

***A** Hospital inpatient-associated*

- ***Criterion 1:*** significant blood stream infection that occurs > forty eight (48) hours after admission (or > forty eight (48) hours after time of birth, if a neonate) and not present or incubating at the time of admission,

OR

- ***Criterion 2:*** blood stream infection occurring in patients:
  - readmitted within ten (10) days of discharge,
  - **OR** within thirty (30) days of an inpatient surgical procedure, with a bloodstream infection related to an infection at a surgical site.

***B** Non-inpatient medically associated*

Significant blood stream infection in a non-inpatient (ie. a day-only or outpatient, or situations not specified under 'inpatient') that:

- relates to the presence of an indwelling medical device,

OR

- occurs within thirty (30) days of a surgical procedure, where the bloodstream infection is related to surgical site infection,

OR

- occurs within forty eight (48) hours of any other type of medical procedure (eg. home haemodialysis, prostate biopsy/cystoscopy in urologist's rooms).

***C** Community-associated*

- Event is not medical- or procedure-related,

AND

- does not manifest more than forty eight (48) hours after admission.

Defining the primary site or focus of infection

Bloodstream infection will be allocated to a primary site or focus, based on organ system (eg. respiratory, gastrointestinal tract, urinary tract or intravascular access device).

While device type/procedure should be specified in all bloodstream infections, the specified criteria by which to diagnose an intravascular device-associated infection are as follows:

- no other apparent primary focus for infection,

AND

- intravascular access device is present within 48 hours of the event,

AND

- **EITHER** isolation of identical organism from appropriate quantitative culture of the device or part thereof (eg. catheter tip),
- **OR** resolution of clinical signs and symptoms of infection after removal of the device and/or following appropriate antibiotic therapy,
- **OR** isolation of identical organism(s) from the exit site in the setting of purulent discharge or painful erythema at the exit site or along the tunnel, if such exists.

Repeat episodes of bloodstream infection

Significant bloodstream infection due to the same organism(s) that recurs within 14 days of the original event is disregarded.

Conclusion

The expert working group will in the future propose draft recommendations in relation to relevant denominator definitions and terminology and, ultimately, acceptable threshold rates of infection.

After open review by interested professionals, the expert working group will incorporate into the proposed standards those comments and criticisms held by the majority and deemed applicable, in order to improve practical application, validity and reproducibility.

Bibliography

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