

2.1 Percentage of patients undergoing specified surgical procedures that receive an appropriate prophylactic antibiotic regimen

Purpose

This indicator addresses the effectiveness of processes for preventing hospital-acquired infections.

Background and evidence

Surgical site infections are the second most common type of adverse event occurring in hospitalised patients.¹ It is estimated that surgical site infections cost up to \$268 million per year² and occur in up to 10% of patients undergoing clean surgery dependent on complexity of surgery, patient risk and surgical skills.³ The use of antibiotics in preventing surgical site infection has been consistently demonstrated,⁴ yet gaps in prophylactic surgical antibiotics continue to occur in Australia and internationally.⁴⁻⁶ Inappropriate antibiotic use ranges from 30% to 90%, especially with respect to timing and duration of antibiotic therapy.⁷

Key definitions

Specified surgical procedures refers to the following procedure types that have been identified by *Therapeutic Guidelines: Antibiotic*⁷ as requiring antibiotic prophylaxis:

Surgical area	Specified surgical procedures
Abdominal surgery	Colorectal surgery Appendicectomy Open or laparoscopic cholecystectomy Hernia repair with prosthetic material
Cardiac Surgery	Valve replacement Coronary artery bypass graft Cardiac transplantation Insertion of a permanent pacemaker
Obstetrics and gynaecology	Caesarean section
Orthopaedic surgery	Hip replacement Knee replacement Internal fixation of fractures
Urology	Prostatectomy
Vascular surgery	Abdominal aortic aneurysm repair Femoral – popliteal bypass
Other	Lower limb amputation

Continued next page

2.1 Percentage of patients undergoing specified surgical procedures that receive an appropriate prophylactic antibiotic regimen

An appropriate prophylactic antibiotic regimen refers to:⁷

- Correct antibiotic choice: This includes correct medication choice, route of administration and dosing schedule
- Correct timing: This generally means up to 60 minutes prior to skin incision and as a single dose. A second dose may be necessary if: there is a delay in starting the operation; if cephalothin, cephazolin, dicloxacillin or flucloxacillin are used and the operation is prolonged (longer than 3 hours); or in other circumstances specified in guidelines
- Correct duration: Antibiotic prophylaxis is ceased within 24 hours of completion of surgery (or within 48 hours for vascular surgery).

The current version of *Therapeutic Guidelines: Antibiotic*⁷ should be used as a basis to guide clinical practice.² However, local hospital practice may be audited against a more restrictive guideline if desired.

Data collection for local monitoring

Recommended sample selection: A random sample over a one month period of patients undergoing each specified surgical procedure. Procedures should be chosen on the basis of relevance to the hospital. Data for each procedure should be handled separately in order to facilitate targeted action. Random means each patient has an equal chance of inclusion in the audit. Adult, paediatric and neonatal patients should be included.

Recommended sample size: Based on international work⁸ the following sample sizes are recommended:

Average no. of patients undergoing specified surgical procedure / month (calculate separately for each procedure)	Minimum sample size required / month for each specified procedure
160 or more	16 patients per procedure
60-159	10% of patients per procedure
6-59	6 patients per procedure
Less than 6	All patients undergoing specified procedure

Recommended methodology: Review of medical records to assess whether there is evidence of correct antibiotic choice, correct antibiotic timing and correct antibiotic duration. Appropriate antibiotic prophylaxis is considered to have taken place when all three of these areas are concordant with *Therapeutic guidelines: Antibiotic*⁷ or a more restrictive guideline.

2.1 Percentage of patients undergoing specified surgical procedures that receive an appropriate prophylactic antibiotic regimen

Data collection for inter-hospital comparison

This indicator may be suitable for inter-hospital comparison. In this case, definitions, sampling methods and guidelines for audit and reporting need to be agreed in advance in consultation with the coordinating agency.

Indicator calculation

$$\frac{\text{Numerator}}{\text{Denominator}} \times 100\%$$

Calculate the indicator separately for each procedure type

Numerator = Number of patients undergoing specified surgical procedures that receive an appropriate prophylactic antibiotic regimen

Denominator = Number of patients who had a specified surgical procedure in sample

Limitations and Interpretation

The list of specified surgical procedures is not exhaustive. If desired, other procedures requiring prophylactic antibiotics can be audited using this methodology.

For individual patients there may be clinical reasons why a different antibiotic regimen was chosen. Determining such circumstances retrospectively is complicated and requires retrospective clinical judgement. Since this is likely to apply for only a small number of patients, these instances are ignored. Where there is concern about results, it may be appropriate to look more closely at these details.

This indicator does not examine situations where antibiotics were given unnecessarily in procedures that typically do not require antibiotic prophylaxis. Such use may contribute to emergence of multi-resistant organisms and should not be neglected.^{7,9}

2.1 Percentage of patients undergoing specified surgical procedures that receive an appropriate prophylactic antibiotic regimen

Further information

The *Medication Safety Self Assessment for Australian Hospitals¹⁰ (MSSA)* can help identify potential strategies for improvement with this and other indicators. The MSSA encourages development of robust systems for safe prescribing, dispensing, administration and monitoring of medications. The MSSA is available at www.cec.health.nsw.gov.au

References

1. Safer Systems Saving lives: Preventing Surgical Site Infections Toolkit: Version 4. www.health.vic.gov.au/sssl/downloads/prev_surgical.pdf (accessed July 12, 2007). Victoria: State of Victoria, Department of Human Services, 2005.
2. National Strategy to Address Health Care Associated Infections, Fourth Report to the Australian Health Ministers Conference: Australian Council for Safety and Quality in Health Care, 2003.
3. Spelman D. Hospital-acquired infections. *Medical Journal of Australia* 2002; 176:286-91.
4. Bratzler D, Houck P, Richards C, et al. Use of antimicrobial prophylaxis for major surgery: baseline results from the national surgical infection project. *Archives of Surgery* 2005; 140:174-182.
5. Bennett NJ, Bull AL, Dunt DR, Russo PL, Spelman DW, Richards MJ. Surgical antibiotic prophylaxis in smaller hospitals. *ANZ Journal of Surgery* 2006; 76:676-678.
6. McGrath DR, Leong DC, Gibberd R, Armstrong B, Spigelman AD. Surgeon and hospital volume and the management of colorectal cancer patients in Australia.[see comment]. *ANZ Journal of Surgery* 2005; 75:901-10.
7. Expert writing group. *Therapeutic Guidelines: Antibiotic*, 2006.
8. *Specifications Manual for National Hospital Quality Measures (Specifications Manual) version 2.3*: Centers for Medicare & Medicaid Services (CMS) and The Joint Commission, 2007.
9. *Australian Medicines Handbook: Australian Medicines Handbook Pty Ltd*, 2007.
10. *Medication Safety Self Assessment for Australian Hospitals: Institute for Safe Medication Practices (Adapted for Australian use by the NSW Therapeutic Advisory Group and the Clinical Excellence Commission)*, 2007.