Clinical, microbiological, and economic benefit of a change in antibiotic prophylaxis for cardiac surgery

Spelman D, Harrington G, Russo P, Wesselingh S

Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
Two antibiotic prophylactics for cardiac surgery, cephazolin and a combination of intravenous vancomycin and oral rifampicin, were examined.

Type of intervention
Secondary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients who underwent CABG surgery at the Alfred Hospital from February 1999 to January 2001. No inclusion or exclusion criteria were reported.

Setting
The practice setting was tertiary care. The economic study was carried out at the Alfred Hospital, Victoria, Australia.

Dates to which data relate
The effectiveness evidence was collected from February 1999 to January 2001. The dates during which the information on resources and prices was collected were not reported.

Source of effectiveness data
The effectiveness data were derived from a single study.

Link between effectiveness and cost data
The costing was undertaken on a different patient sample to that used in the effectiveness study. Further details can be found in Maki et al. (see Other Publications of Related Interest).

Study sample
The sample size was not determined in the planning phase of the study, nor were power calculations carried out retrospectively. The study sample was made up of an unselected group of consecutive patients. It would appear that the study sample was appropriate for the clinical study question. The intervention prophylaxis regimen was administered to 599 patients and the comparator regimen to 515 patients. There was no evidence that any patients were excluded from the study.
Study design
This was a before-and-after study involving one group of patients. The study was carried out in a single centre. The follow-up period was not reported. It would appear that there was no loss to follow-up.

Analysis of effectiveness
All the patients in the study were accounted for in the analysis. The primary health outcome used was the deep sternal wound infection rate. The authors reported that the two patient groups were similar in terms of their age, gender and prognostic features. There was no evidence of confounding variables.

Effectiveness results
The rate of deep sternal wound infection was 4.2% in the intervention group and 0.6% (95% confidence interval: 0.1 - 1.7) in the comparator group, (p<0.001).

For deep sternal SSI, the absolute risk reduction was 0.36, the relative risk reduction was 86%, and the number-needed-to-treat was 28.

Clinical conclusions
There was a reduction in the SSI rate following the change in antibiotic prophylaxis.

Measure of benefits used in the economic analysis
No summary measure of health benefit was used in the analysis. In effect, a cost-consequences analysis was performed.

Direct costs
Although not explicitly stated, it appears that only hospital costs have been included in the analysis. The methods used to derive the costs and the quantities of resources used were not detailed in this paper. The authors reported that they used the value for the excess cost attributable to a deep sternal SSI that was generated from a case-control cost analysis study (Maki et al., see Other Publications of Related Interest).

Statistical analysis of costs
No statistical analysis of the costs was reported.

Indirect Costs
The indirect costs were not reported.

Currency
Australian dollars (Aus$). No conversions were undertaken.

Sensitivity analysis
No sensitivity analysis was reported.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

Cost results
The authors used the value of $31,597 as an estimate of the excess cost per deep sternal wound infection for both prophylaxis regimens. They calculated that the excess total cost of infections for the intervention was $789,925. The gross cost-savings resulting from the use of the comparator regimen was $600,343. As they calculated the cost of the prophylaxis initiative was $23,688, the net savings were estimated to be $576,655. No other costs were reported.

Synthesis of costs and benefits
The costs and benefits were not combined as a cost-consequences analysis was carried out.

Authors’ conclusions
Following the introduction of a combination of intravenous vancomycin and oral rifampicin as the prophylaxis regimen for patients undergoing coronary artery bypass graft (CABG) surgery, there was a significant decrease, (p<0.001), in the surgical-site infection (SSI) rate. An estimated Aus$576,655 was saved between the two 12-month periods under comparison.

CRD COMMENTARY - Selection of comparators
A justification was given for the choice of the comparator. Vancomycin has been shown to be associated with a low surgical wound infection rate and a short length of stay, while rifampicin is active against most MRSA isolates. You should decide if this is a widely used health technology in your own setting.

Validity of estimate of measure of effectiveness
The basis of the analysis was a before-and-after study, which was appropriate for the study question. The study sample was representative of the study population. The patient groups were shown to be comparable at analysis and the analysis of effectiveness appears to have been handled credibly.

Validity of estimate of measure of benefit
No summary measure of health benefit was used in the analysis. The study was, in effect, a cost-consequences analysis.

Validity of estimate of costs
The cost perspective was not reported in this paper. For details see Maki et al. (see Other Publications of Related Interest). No further details of the costs were provided.

Other issues
The authors did not compare their findings with those from other studies. In addition, the issue of generalisability to other settings was not addressed. The authors reported deep sternal wound infections and deep infections for the intervention group, but only deep sternal wound infections for the comparator group. The authors’ conclusions reflected the scope of the analysis. The authors acknowledged that the main limitation of their study was the lack of a control arm.

Implications of the study
The authors suggested that further studies are required to clarify whether the observed decrease in SSI under the new prophylaxis regimen is due to vancomycin, rifampicin or the combination. They also suggested that studies should be carried out to determine whether the second dose of vancomycin is beneficial.

Source of funding
None stated.
Bibliographic details
Spelman D, Harrington G, Russo P, Wesselingh S. Clinical, microbiological, and economic benefit of a change in antibiotic prophylaxis for cardiac surgery. Infection Control and Hospital Epidemiology 2002; 23(7): 402-404

PubMedID
12138981

DOI
10.1086/502074

Other publications of related interest


Indexing Status
Subject indexing assigned by NLM

MeSH
Administration, Oral; Anti-Bacterial Agents /administration & dosage; Antibiotic Prophylaxis; Coronary Artery Bypass /adverse effects /economics; Cost-Benefit Analysis; Drug Therapy, Combination /administration & dosage; Female; Humans; Injections, Intravenous; Male; Middle Aged; Rifampin /administration & dosage; Surgical Wound Infection /economics /prevention & control; Vancomycin /administration & dosage

AccessionNumber
22002001273

Date bibliographic record published
31/12/2004

Date abstract record published
31/12/2004