Implementation of a short course of prophylactic antibiotic treatment for prevention of postoperative infections in clean orthopaedic surgeries

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.

CRD summary
This study evaluated the efficacy and costs of 24 hours of perioperative antibiotics, to prevent surgical site infection, during open reduction and internal fixation of closed limb fractures. The authors concluded that a short course of antibiotics could be effective and cost-effective, in developing countries, but the trial was small and larger studies were needed. The reporting was limited, and the results may not generalise to other settings, but the conclusions were appropriate and sufficiently cautious.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
This study evaluated the efficacy and costs of 24 hours of perioperative antibiotics, to prevent surgical site infection (SSI), during open reduction and internal fixation of closed limb fractures.

Interventions
Patients were allocated to 24 hours of intravenous antibiotics or the usual longer course of antibiotics. The short course consisted of three doses of 1g of intravenous cefuroxime, 12 hours apart, with the first dose given 15 to 20 minutes before tourniquet inflation for surgery. Usual care was five days of intravenous antibiotics, consisting of cefuroxime 1g twice daily, with amikacin 15mg per kg in two doses, followed by oral cefuroxime 500mg twice daily, until the sutures were removed. The same surgical techniques were used for both options.

Location/setting
India/in-patient care.

Methods
Analytical approach:
The economic evaluation was based on a randomised controlled trial, conducted between April 2009 and December 2010. The analytic perspective was not explicitly stated.

Effectiveness data:
The effectiveness data were from a randomised controlled trial of 197 patients, who were matched and randomly allocated in blocks of 10, by the treatment team, to one of the two options. The assessor was blind to patient allocation, and followed-up all patients. There were 100 patients who received short treatment, and 97 received usual care. The main measure of clinical effectiveness was the rate of SSI. Wounds were clinically observed at 24 and 72 hours after surgery, when dressings were changed. Daily, patients were monitored for local pain and discomfort, and their temperature was recorded. Clinical follow-up was between 10 and 14 days, when the sutures were removed. If a SSI was found, the patient was thoroughly examined to check their health and confirm the type of infection.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
No summary benefit measure was used; the clinical outcome was the rate of SSI.
Cost data:
The costs were the approximate average drug costs and hospital stay costs, for patients in each group. They were reported in Indian rupees (INR).

Analysis of uncertainty:
No formal analysis of uncertainty was reported.

Results
In the trial, only four patients developed a SSI; two received short treatment, and two received usual care. The percentage of patients with an infection was two for each group, which was within the normal range for hospital orthopaedic trauma surgery (0.7% to 4.06%).

Three of the four patients had methicillin-resistant Staphylococcus aureus (MRSA), and all four were treated effectively before discharge.

The cost of 24 hours of antibiotics was INR 150, and the cost of antibiotics for usual care was INR 1,900.

Authors’ conclusions
The authors concluded that a short course of perioperative antimicrobial prophylaxis could be effective and cost-effective for the prevention of infections, in developing countries, but the trial was small and larger studies were needed.

CRD commentary
Interventions:
The interventions seem appropriate and were well described, which should allow the evaluation their relevance for other settings. The authors acknowledged that antibiotic use varied between physicians, and between settings, making this an important consideration.

Effectiveness/benefits:
The effectiveness data were clearly reported. The inclusion and exclusion criteria for the trial were clearly reported. The authors indicated that there was a wide confidence interval for the effectiveness data, but the interval was not reported. They acknowledged that there was no long-term follow-up, so later infections could have been missed. All patients with a chronic illness were excluded from the trial, making it unlikely to be representative of clinical practice.

Costs:
The source for the costs was not entirely clear, but it appears that the costs were from the hospital where the trial was conducted. They included the hospital stay and drug use. The resource use and unit prices were not reported, so it is not clear how applicable these costs were to other Indian hospitals, or other settings. The price year was not reported. No discounting was necessary, given the short analysis period (the hospital stay).

Analysis and results:
The results of the study were clearly presented, but limited. No confidence intervals, probabilities, or other measures of uncertainty were reported. The authors thoroughly discussed the external validity of their results, comparing them with those of similar studies in other settings, which had similar SSI rates. They acknowledged some limitations, such as the poor evidence on effectiveness. Other sources should be consulted to evaluate the efficacy of a short course of antimicrobials. It seems that the costs were significantly less for the short treatment than for usual care, in India, but this might not be the case in other settings.

Concluding remarks:
The reporting was limited, and the results may not generalise to other settings, but the conclusions were appropriate and sufficiently cautious.

Funding
Funded by a grant from the Indian Council of Medical Research.
Bibliographic details

PubMedID
23481059

Original Paper URL
http://www.ijmr.org.in/text.asp?2013/137/1/111/108281

Indexing Status
Subject indexing assigned by NLM

MeSH
Adolescent; Adult; Aged; Anti-Bacterial Agents /administration & dosage; Antibiotic Prophylaxis; Female; Fractures, Closed /drug therapy /microbiology; Humans; India; Male; Methicillin-Resistant Staphylococcus aureus /drug effects /pathogenicity; Middle Aged; Orthopedics /methods; Postoperative Period; Surgical Wound Infection /drug therapy /microbiology

AccessionNumber
22013013719

Date bibliographic record published
07/05/2013

Date abstract record published
14/06/2013