Central venous catheters coated with minocycline and rifampin for the prevention of catheter-related colonization and bloodstream infections: a randomized, double-blind trial


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
Central venous catheters either pretreated with tridodecylmethyl-ammonium chloride and then coated with minocycline and rifampin or untreated and uncoated, in the treatment of critically and chronically ill patients.

Type of intervention
Treatment; secondary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
Hospitalised patients 18 years of age or older requiring a triple-lumen polyurethane central venous catheter at a new insertion site. Patients who were pregnant, allergic to rifampin or tetracycline, who had dermatitis or a burn over the insertion site, or with an anticipated duration of catheterization less than three days, were excluded from the study.

Setting
Hospital. The economic study was carried out in Texas, USA.

Dates to which data relate
The effectiveness data were collected during the period from 1 September 1994 through 27 March 1995. The resource utilisation and cost data were based on two studies published in 1994 and a personal communication of unspecified date. The price year adopted in the study was not explicitly specified.

Source of effectiveness data
The evidence for the final outcomes was derived from a single study.

Link between effectiveness and cost data
The costing was not undertaken on the same patient sample as that used in the effectiveness study.

Study sample
Power calculations were not used to determine the sample size. The study sample comprised 281 hospitalised patients requiring 298 catheters. The coated group consisted of 147 randomly allocated catheters, whereas the uncoated group included 151 randomly assigned catheters. The overall rate of exclusion was 10.7%. The coated group had an exclusion rate of 11.5% versus 9.9% in the uncoated group.
Study design
The study was a double-blind, randomised controlled trial carried out in five university-based hospitals. The duration of the follow-up was until catheter removal (median duration of catheterization was six days for both groups) or 28 days, whichever occurred first. No loss to follow up was reported.

Analysis of effectiveness
The analysis of the clinical outcome was based on intention to treat. The main health outcome measures were catheter-related colonization and bloodstream infections. Furthermore, the adverse effects associated with microbial-coated catheter and the emergence of antimicrobial resistance were also measured. The groups were shown to be comparable in terms of age, sex, underlying disease, degree of immunosuppression, therapeutic interventions, and risk factor for catheter infections. A multivariate logistic regression was utilized to simultaneously modify the effects of multiple variables and their interactions on colonization.

Effectiveness results
The rate of catheter-related colonization was 8% in the coated group against 26% in the uncoated group (P<0.001). Bloodstream infection occurred in 0% of patients in the coated group versus 5% in the uncoated group, (P<0.01). No adverse effects or antimicrobial resistance were reported for the coated catheters. The multivariate regression analysis revealed that coating catheters with minocycline and rifampine acted as an independent factor in preventing catheter-related colonization (P<0.05).

Clinical conclusions
The study revealed that coated catheters were effective in preventing catheter-related, gram-positive colonization and bacteremia for a relatively short period (1 to 28 days).

Measure of benefits used in the economic analysis
Bloodstream infection was regarded as the main benefit measure.

Direct costs
Quantities were not reported separately from costs. The cost items were not reported separately (except for the added cost of coated catheters). The average cost of catheter-related bloodstream infection for a surviving patient was reported. The perspective adopted in the cost analysis was not reported. The source of cost data were two published studied and a personal communication. The date to which the price data referred was not specified.

Indirect Costs
Not considered.

Currency
US dollars ($).

Sensitivity analysis
No sensitivity analysis was performed.

Estimated benefits used in the economic analysis
Bloodstream infection occurred in 0% of patients in the coated group versus 5% in the uncoated group, (P<0.01).
Cost results
The average cost of catheter-related bloodstream infection was estimated to be $738.35 for the control group. The cost of coated catheters was $14 more than uncoated ones. As a result, the cost saving due to the use of coated catheter was $724.35 per survived patient.

Synthesis of costs and benefits
A synthesis was not performed since the use of the coated catheters was the dominant strategy.

Authors' conclusions
Central venous catheters coated with minocycline and rifampin can significantly reduce the risk for catheter-related colonization and bloodstream infections. The use of these catheters may save hospital costs.

CRD COMMENTARY - Selection of comparators
The reason for the choice of the comparator is clear. You, as a database user, should consider whether this is a widely use approach in your own setting.

Validity of estimate of measure of benefit
The internal validity of the benefit results is likely to be assured given the double-blind randomised design adopted in the study.

Validity of estimate of costs
Resource utilisation was not reported separately from the costs. Adequate details of methods of cost estimation were not given. As a comprehensive list of cost items included in the economic study was not given, it is impossible to judge whether any potentially important cost items may have been omitted (apparently it was assumed that all other costs were common to both strategies). The fact that costing was not performed on the same patient sample as that used in the effectiveness study may weaken the internal validity of the cost results.

Other issues
The issue of generalisability to other settings or countries was not addressed. Comparisons with relevant studies were made.

Implications of the study
The authors implied that "additional randomised studies are required to compare the efficacy of various types of antimicrobial-coated polyurethane catheters used for the short term and silicone catheters used for the long term”.

Source of funding
Supported in part by a grant from The University Cancer Foundation, The University of Texas M D Anderson Cancer Center, Houston Texas. Catheters were supplied at no charge by Cook Critical Care, Bloomington, Indiana.

Bibliographic details

PubMedID
Original Paper URL
http://www.acponline.org/journals/annals/15aug97/cvcmino.htm

Other publications of related interest

Indexing Status
Subject indexing assigned by NLM

MeSH
Adolescent; Adult; Aged; Aged, 80 and over; Anti-Bacterial Agents /economics /therapeutic use; Antibiotics, Antitubercular /economics /therapeutic use; Catheterization, Central Venous /adverse effects /economics; Catheters, Indwelling /adverse effects /economics /microbiology; Cost-Benefit Analysis; DNA, Bacterial /analysis; DNA, Viral /analysis; Double-Blind Method; Electrophoresis, Gel, Pulsed-Field; Female; Humans; Male; Middle Aged; Minocycline /economics /therapeutic use; Rifampin /economics /therapeutic use; Risk; Sepsis /economics /etiology /prevention & control; Treatment Outcome

AccessionNumber
21998008124

Date bibliographic record published
31/03/1999

Date abstract record published
31/03/1999