Effectiveness of a multifaceted infection control policy in reducing vancomycin usage and vancomycin-resistant enterococci at a tertiary care cancer centre


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
A multifaceted infection control policy was under evaluation. The programme was implemented to control vancomycin-resistant enterococci (VRE), the third most common cause of nosocomial infections. The multifaceted infection control policy comprised several infection control measures. Such measures included:

- hand washing,
- contact isolation of patients with VRE,
- disposable, dedicated-use equipment when possible,
- thorough cleaning of non-disposable equipment with a germicidal solution,
- cohorting of patients with VRE with nursing personnel or respiratory technicians, and
- terminal environmental cleaning of rooms upon discharge of patients.

In addition, the infection control staff closely monitored the isolation practices, and educated staff and visitors on the importance of isolation precautions. The control programme also included the use of a vancomycin order form. A weekly VRE surveillance was implemented for all high-risk patients.

Type of intervention
Other: Managed care policy.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised men or women patients in whom neutropenic fever had developed, or who were found to be colonised or infected with VRE. Specific inclusion and exclusion criteria were not reported.

Setting
The setting was tertiary care (medical intensive care units and surgical intensive care units). The economic analysis was carried out at the University of Texas MD Anderson Cancer Centre, Houston (TX), USA.

Dates to which data relate
The effectiveness and resource data were collected from the fiscal period 1996-97 to fiscal period 1998-99. The price year was not reported.
Source of effectiveness data
The effectiveness data were derived from a single study.

Link between effectiveness and cost data
The costing was carried out prospectively on the same sample of patients as that used in the effectiveness study.

Study sample
Power calculations were not reported. Eligible patients were identified at the study institution. Seventy-three patients (39 on leukaemia and 34 on bone marrow transplant services) were screened (using rectal swabs) to determine the prevalence of VRE colonisation or infection. However, the sample of patients used to estimate the primary health outcomes was not described.

Study design
The study was a comparative study with a historical control. The study was conducted in a single centre. The duration of follow-up consisted of two periods (before and after) of one year each.

Analysis of effectiveness
There was no indication that any study patients were excluded from the analysis. The primary health outcomes used in the study were the incidence of VRE and the number of VRE bloodstream infections for the two fiscal periods. The demographics and clinical characteristics of the study sample were not reported.

Effectiveness results
Of the 73 patients included in the study, five (7%) were found to be positive. Of these, four (10%) were among the leukaemia patients and one (3%) was among the bone marrow transplant patients.

The number of total VRE infections declined from 0.437/1,000 patient-days in 1996-97 to 0.29/1,000 patient-days in 1998-99 (relative risk ratio 1.91, 95% confidence interval, CI: 1.20 - 3.06; p=0.008).

The number of VRE bloodstream infections declined from 0.338/1,000 patient-days in 1996-97 to 0.181/1,000 patient-days in 1998-99 (relative risk ratio 1.86, 95% CI: 1.10 - 3.16; p=0.027).

Clinical conclusions
The study showed that the multifaceted infection control programme might help to limit the spread of VRE in an endemic setting.

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

Direct costs
The perspective adopted was not reported. The direct costs included were for vancomycin use only. The authors did not provide any additional details of the cost analysis. The unit costs and the quantities of resources used were not presented separately. The price year was not reported. Only the decrease in the use of empirical intravenous vancomycin was reported. The resource use data were derived from actual data coming from the sample of patients involved in the effectiveness study. Discounting was not reported.
Statistical analysis of costs
A statistical analysis of the costs was carried out using Student's t-test.

Indirect Costs
The indirect costs were not considered.

Currency
US dollars ($).

Sensitivity analysis
Sensitivity analyses were not performed.

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

Cost results
The use of empirical intravenous vancomycin decreased from 416 g/1,000 patient-days in 1996-97 to 208 g/1,000 patient-days in 1998-99, (p<0.001).

The cost of vancomycin decreased from $2,561/1,000 patient-days in 1996-97 to $1,195/1,000 patient-days in 1998-99, (p<0.001). The decrease was greater than 50%.

Synthesis of costs and benefits
A synthesis of costs and benefits was not relevant as a cost-consequences analysis was carried out.

Authors' conclusions
The multifaceted infection control policy, which incorporated the use of a vancomycin order form, can effectively decrease the use of empirical vancomycin. In addition, it can play a role in limiting the spread of vancomycin-resistant enterococci (VRE) in an endemic setting.

CRD COMMENTARY - Selection of comparators
The choice of the comparator was explicitly justified. It represented the standard approach for the control of infections in the authors' setting before the implementation of the multifaceted infection control policy. However, the standard approach was not described in detail and was likely to have been specific to the authors' setting.

Validity of estimate of measure of effectiveness
A comparative study with a historical control was performed, which was appropriate for the study question. Power calculations were not carried out and the size of the sample used to estimate the primary health outcomes was not reported. Therefore, it is not possible to know whether the sample size could have been a contributing factor in the absence of statistical differences in the outcome measures. No patient demographics or characteristics were reported. The authors acknowledged three major limitations in the effectiveness analysis. First, the data came from a single specialised centre, which may limit the generalisability of the results to other settings. Second, because the study was conducted over two distinct periods of time, there might be some underlying changes that could have influenced the results. Third, the study did not measure the compliance rate of the various infection control measures. Consequently, it was not possible to judge the effectiveness and the role of each measure in containing the spread of VRE.
Validity of estimate of measure of benefit
No summary benefit measure was used in the analysis because a cost-consequences analysis was carried out.

Validity of estimate of costs
Since the perspective of the study was not stated, it was not possible to assess whether all the relevant categories of costs were included in the analysis. However, it would appear that the relevant cost of implementing specific preventive measures was not included in the cost analysis, although this could dramatically increase the costs associated with the multifaceted infection control programme. Consequently, the authors' cost analysis underestimated the costs associated with control policy. Details on the quantities of resources used were reported, but not the unit costs, their source, and the price year. This may limit the transferability of the economic analysis to other settings. The cost estimates were derived from a single centre and were therefore likely to be specific to the study setting. An adjustment for inflation was not reported, even though the costs were incurred during an overall period of more than 2 years. Sensitivity analyses were not performed on the costs. Statistical tests of the costs were performed when the cost estimates were compared.

Other issues
The authors compared their results with other published studies, showing consistent effectiveness results. They also addressed the issue of the generalisability of the study results to other settings. The results were not reported selectively and the effectiveness conclusions reflected the scope of the study. Sensitivity analyses, to account for variability in the cost or effectiveness data, were not performed. In addition, effectiveness and cost analyses showed several limitations. Therefore, caution should be exercised when extrapolating the study results to different contexts.

Implications of the study
The multifaceted infection control policy incorporating a vancomycin order form can effectively decrease the use of empirical vancomycin. It can also play a role in limiting the spread of vancomycin-resistant enterococci in an endemic setting.

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