Health economics assessment study of teicoplanin versus vancomycin in Gram-positive infections

Portoles A, Palau E, Puerro M, Vargas E, Picazo J J

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
The study examined two treatments, teicoplanin and vancomycin, for Gram-positive infections.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients with suspected or reported Gram-positive infections.

Setting
The setting was a hospital. The economic study was carried out in Spain.

Dates to which data relate
The clinical and economic data were gathered in 1996 and 1997. 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
The authors stated that the sample size was sufficient for the detection of differences in the analysis of adverse reactions. Study participants were identified at the authors’ institution from 1996 to 1997 from among those receiving vancomycin or teicoplanin for a minimum of 4 days. Given the higher frequency of vancomycin prescription, patients in the vancomycin group were selected at random from those who had been prescribed the antibiotic, using a computer-generated table of random numbers. The overall study sample comprised 201 patients. There were 100 patients in the teicoplanin group (50 women) and 101 patients (61 women) in the vancomycin group. The mean age of the patients was 64.17 (+/- 17.98) years in the teicoplanin group and 61.03 (+/- 17.46) years in the vancomycin group.

Study design
The authors stated that this was a prospective cohort study that was carried out at the Hospital Clinico San Carlos in Madrid, Spain. Patients were allocated to the study group on the basis of the drug received and were followed until discharged. The mean follow-up time was 31.8 (+/- 33.98) days for teicoplanin and 34.87 (+/- 41.92) days for vancomycin. No patient was lost to the follow-up assessment. Blinding was not performed.

**Analysis of effectiveness**

All patients included in the initial study sample were considered in the analysis of effectiveness. The outcome measures used were:

- the frequency of adverse drug reactions,
- the duration of treatment,
- changes in intravenous route during therapy,
- the frequency of serum level monitoring,
- the number of haemodialysis procedures,
- the duration of follow-up (from the beginning of treatment until discharge), and
- the duration of hospital admission.

The study groups were comparable at baseline in terms of the demographics and most clinical characteristics. However, risk factors for renal toxicity, reasons for end of treatment, and the Winston clinical situation scale were significantly different between groups. A logistic regression model and a multiple regression model were used to adjust study results for the different characteristics in the two study groups.

**Effectiveness results**

There were 11 adverse drug reactions in the teicoplanin group and 24 in the vancomycin group. All were cases of phlebitis. However, the difference between the groups did not reach statistical significance, (p=0.062).

Similar results in terms of renal toxicity were observed in the two groups, but a logistic regression analysis showed that the number of patients with analytic criterion of nephrotoxicity was significantly higher in the vancomycin group. No cases of diarrhoea or "red man" syndrome were observed.

The mean duration of treatment was 13.94 (+/- 10.82) days (median 11.00; interquartile difference, IQD: 7 to 16) in the teicoplanin group and 14.72 (+/- 9.52) days (median 12.00; IQD: 8 to 19) in the vancomycin group. The difference between the groups was not statistically significant.

None of the other end points differed statistically between groups.

**Clinical conclusions**

The effectiveness analysis showed that the two treatments were similarly tolerated. No statistically significant differences in length of stay or duration of treatment were observed, although a higher number of adverse drug reactions was found with vancomycin. Also, a higher proportion of patients with nephrotoxicity was observed in the vancomycin group in the adjusted analysis.

**Measure of benefits used in the economic analysis**

The health outcomes were left disaggregated and no summary benefit measure was used in the economic analysis. In effect, a cost-consequences analysis was carried out.
**Direct costs**
The analysis of the costs was carried out from the perspective of the health system. The items included were glycopeptide drugs and their administration (including time and personnel), monitoring procedures, consultations in outpatient administration, adverse events such as change in intravenous route and haemodialysis procedures, and hospital stay. The unit costs and the quantities of resources used were not presented separately, although some details on unit costs were given. Resource use was estimated using data derived from the sample of patients included in the effectiveness study. The costs were presumably estimated from hospital sources. Discounting was not relevant as the costs per patient were incurred during a short timeframe. The price year was not reported.

**Statistical analysis of costs**
A statistical analysis was carried out to assess whether the cost-differences were statistically significant.

**Indirect Costs**
The indirect costs were not considered in the economic analysis.

**Currency**
Euros (EUR).

**Sensitivity analysis**
Two alternative scenarios were considered in the sensitivity analysis. The first scenario used high personnel costs in the analysis, while the second scenario considered a reduction in the price of teicoplanin. A lower admission time was also simulated.

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

**Cost results**
The total acquisition and administration costs per patient were EUR 647.62 (+/- 572.75) in the teicoplanin group and EUR 378.11 (+/- 225.90) in the vancomycin group, (p=0.000).

The total admission and dialysis costs per patient were EUR 3,784.41 (+/- 2,920.75) in the teicoplanin group and EUR 3,986.33 (+/- 2,588.87) in the vancomycin group, (p=0.605).

The total costs per patient were EUR 4,432.04 (+/- 3,383.46) in the teicoplanin group and EUR 4,364.44 (+/- 2,734.24) in the vancomycin group, (p=0.876). Thus, the higher acquisition cost for teicoplanin was almost completely offset by the reduction in hospitalisation costs.

The changes investigated in the sensitivity analysis did not alter the results of the cost analysis.

**Synthesis of costs and benefits**
A synthesis of the costs and benefits was not relevant given that a cost-consequences analysis was carried out.

**Authors' conclusions**
Teicoplanin offered a better safety profile in comparison with vancomycin for the treatment of Gram-positive infections, but there were no differences in other clinical and economic outcomes.
CRD COMMENTARY - Selection of comparators
The authors justified the choice of the comparators, which were the only available treatments in the group of glycopeptides for the treatment of Gram-positive infections. A comprehensive description of the advantages and risks associated with the two treatments was provided. You should decide whether they are valid comparators in your own setting.

Validity of estimate of measure of effectiveness
The effectiveness data came from a cohort study. The use of a blinded randomised trial would have been more appropriate to reduce the potential impact of selection bias and confounding factors. However, the authors noted that the observational nature of the study reflected a real-world setting. The study groups were not perfectly matched at baseline, thus the authors carried out a logistic regression analysis and a multiple regression model to take baseline differences between the groups into account. The authors stated that the sample size was sufficiently large to detect statistically significant differences in adverse drug reactions between the groups. It was not stated whether some patients were excluded for any reason from the study sample. The authors pointed out that, in order not to affect prescription patterns, patients were identified from among those who had already received treatment. The evidence came from a single institution, thus caution will be required if extrapolating the results of the analysis to other centres. The length of follow-up appears to have been appropriate. No sensitivity analysis was performed on the clinical outcomes.

Validity of estimate of measure of benefit
No summary benefit measure was used in the analysis because a cost-consequences analysis was conducted. Please refer to the comments in the 'Validity of estimate of measure of effectiveness' field (above).

Validity of estimate of costs
The analysis of the costs was consistent with the perspective adopted. The unit costs and quantities of resources used were provided for most items, which enhances the possibility of replicating the analysis in other settings. The source of the data was stated. Appropriate statistical analyses were carried to assess the significance of cost-differences, but the cost estimates were specific to the study setting. Sensitivity analyses were carried out for only two key cost items. The price year was not reported, which will make deflation exercises in other settings difficult.

Other issues
The authors compared their findings with those from a published analysis and highlighted the advantages of their study, such as the prospective design, large sample size and evaluation of drug safety. The issue of the generalisability of the study results to other settings was not explicitly addressed, and few sensitivity analyses were carried out. In general, the external validity of the study appears to have been low. The study referred to the population of patients with Gram-positive infections and this was reflected in the authors' conclusions.

Implications of the study
The study results suggest that teicoplanin is as efficient as vancomycin for the treatment of Gram-positive infections, but that it may be associated with a better tolerability profile.

Source of funding
Financed by Marion-Merrel Dow Laboratories, S.A.

Bibliographic details
**Other publications of related interest**


**Indexing Status**

Subject indexing assigned by NLM

**MeSH**

Adult; Aged; Aged, 80 and over; Anti-Bacterial Agents /adverse effects /economics /therapeutic use; Cost-Benefit Analysis; Drug Administration Routes; Drug Costs /statistics & numerical data; Drug Monitoring /economics; Drug Utilization /statistics & numerical data; Female; Follow-Up Studies; Gram-Positive Bacterial Infections /drug therapy /economics; Hospital Costs /statistics & numerical data; Hospitals, Urban /economics /statistics & numerical data; Humans; Length of Stay /economics; Male; Middle Aged; Phlebitis /chemically induced /epidemiology; Prospective Studies; Renal Dialysis /economics; Spain /epidemiology; Teicoplanin /adverse effects /economics /therapeutic use; Vancomycin /adverse effects /economics /therapeutic use

**AccessionNumber**

22006001441

**Date bibliographic record published**

31/01/2007

**Date abstract record published**

31/01/2007