
Medical and economic benefit of a comprehensive infection control program that includes routine determination of microbial clonality

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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 health technology studied was a programme for the prevention and control of nosocomial infection. The programme consisted of the introduction of a new molecular typing laboratory within the Clinical Microbiology Division, aimed at providing rapid, systematic determination of clonality and immediate reporting of results to the infection control professionals for appropriate actions. In addition, weekly planning meetings were also introduced. These involved representatives from the Infection Control Department, the Diagnostic Medical Microbiology Division, the Infectious Diseases Division, and the Pharmacy Department.

Type of intervention

Infection control programme.

Economic study type

Cost-effectiveness analysis.

Study population

The study population appears to have comprised all patients hospitalised and at risk of nosocomial infection.

Setting

The setting was a hospital. The economic study was carried out at the Northwestern Memorial Hospital, Chicago (IL), USA.

Dates to which data relate

The effectiveness evidence and resource use data were gathered from September 1992 to August 1996. The price year was not reported.

Source of effectiveness data

The effectiveness evidence was derived from a single study.

Link between effectiveness and cost data

The costing was undertaken prospectively on the same patient sample as that used in the effectiveness analysis from September 1994 to August 1996 (post-intervention period). However, the costing was also undertaken retrospectively on the patient sample studied from September 1992 to August 1994 (pre-intervention period).

Study sample

Power calculations were not performed to determine the sample size. The total number of patients participating in the

study was not reported. There was no evidence to suggest that the initial study sample was appropriate to the study question.

Study design

This was a case-control study that used a before-and-after design. The assessment of the outcomes was performed under the direction of the medical director. Three full-time nurse infection control professionals collected the infection data. The methods used to collect and evaluate the data did not change over the study periods. The study was carried out in a single centre. No follow-up period was considered in the study.

Analysis of effectiveness

The primary health outcomes used in the effectiveness analysis were the infection rate at the hospital, the number of nosocomial infections per 1000 patient-days, and the reduction in the absolute number of infections. It was not reported whether statistical analyses were conducted to ensure the comparability of groups and reduce the role of confounding factors.

Effectiveness results

The mean nosocomial infection rate was 3.34% (standard error, SE, 0.11%) in the pre-intervention period and 2.57% (SE 0.08%) in the post-intervention period.

The mean nosocomial infection rate per 1000 patient-days was 6.49 (SE 0.22) in the pre-intervention period and 5.79 (SE 0.24) in the post-intervention period.

Compared with the period September 1993 to August 1994, the number of infection episodes was reduced by 301 in the period September 1994 to August 1995 and by 344 in the period September 1995 to August 1996.

Clinical conclusions

The infection control programme was effective in reducing the infection rates in the hospital. Overall, the nosocomial infections decreased by more than 10%, and the proportion of patients with nosocomial infection decreased by 23% during the post-intervention period.

Measure of benefits used in the economic analysis

No summary benefit measure was used in the economic analysis. A cost-consequence analysis was therefore conducted.

Direct costs

Discounting was irrelevant due to the short timeframe of the analysis. The health services costs included in the cost analysis were for equipment acquisition, space remodelling, annual reagents and supplies, and salaries plus benefits for the two technologists. The unit costs and quantities were not reported. The US weighted mean of 4 days, used as the excess duration of stay due to nosocomial infection, was considered as a proxy for cost-savings per patient related to the programme. The cost/resource boundary adopted was that of the hospital. The costs and the quantities were estimated using actual data derived from the hospital database. The resource use data were gathered from September 1992 to August 1996. The price year was not reported.

Statistical analysis of costs

The costs were treated in a deterministic way. Statistical analyses were conducted to match the data derived from the two study periods.

Indirect Costs

The indirect costs were not included.

Currency

US dollars (\$).

Sensitivity analysis

No sensitivity analysis was conducted.

Estimated benefits used in the economic analysis

See the 'Effectiveness Results' section.

Cost results

Compared with the period September 1993 to August 1994, the cost of nosocomial infections was reduced by \$1,768,800 in the period September 1994 to August 1995 and by \$2,599,300 in the period September 1995 to August 1996.

The cost of implementing the infection control programme was modest. For the Clinical Microbiology Department, the costs to open the typing laboratory amounted to \$180,050 or \$90,025 per year, amortised over the first 2 years.

The annual cost of the supplies was \$18,500, and the annual personnel cost was \$87,000.

Overall, the yearly expenditure for implementing the new infection reduction programme was approximately \$195,525 for the laboratory section, plus the time of the joint-meeting participants.

Synthesis of costs and benefits

Not applicable.

Authors' conclusions

The approach used at the institution was "technically possible, medically useful, and economically justified". The authors reported that the nosocomial infection rate had remained relatively flat for several years before the introduction of the programme, and pointed out the dramatic change in the trend of infection rates, which was associated with the implementation of the anti-infection intervention.

CRD COMMENTARY - Selection of comparators

No infection control programme was considered as the relevant comparator, because it represented the common practice at the authors' institution before the introduction of the intervention. You should consider whether any infection control programme is currently implemented in your own setting.

Validity of estimate of measure of effectiveness

The effectiveness analysis used results from a before-and-after study, which appears to have been appropriate to the study question. However, it may be associated with bias and confounding variables due to differences that may have occurred over time. The authors highlighted that there were no major changes in the way patients affected by nosocomial infection were treated during the two study periods. Although the authors' institution was a large hospital, therefore resulting in a large sample size, no statistical analyses were conducted on the patient groups to limit the impact of bias and confounding variables.

Validity of estimate of measure of benefit

No summary benefit measure was used to combine the costs and the benefits. The analysis conducted was therefore a cost-consequences analysis. It would have been useful to have adopted a measure reflecting the impact of the intervention on patient health, such as life-years gained, especially due to the risk of mortality associated with nosocomial infections.

Validity of estimate of costs

The costs were treated deterministically. The unit costs and quantities of resources used were not reported. It appears that all the categories of cost relevant to the perspective adopted have been included in the analysis. The price year was not reported.

Other issues

The issue of the external validity of the study was not specifically addressed. In addition, since statistical analyses were not conducted, the generalisability of the results to other settings may be limited. The authors made some comparisons of their findings with those from other studies.

Implications of the study

A couple of issues were implied by the analysis. First, the key feature of the programme was the rapidity and ease of the typing system, therefore the choice of the equipment can be crucial. Second, cost-savings due to the infection control programme could be even greater if the published average nosocomial infection rate in the USA were used in place of that measured at the authors' institution.

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