Clinical effectiveness and cost benefit of universal versus targeted methicillin-resistant Staphylococcus aureus screening upon admission in hospitals

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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.

CRD summary
The study examined clinical/economic impacts of universal versus targeted screening for methicillin-resistant Staphylococcus aureus (MRSA) to prevent hospital-acquired MRSA infections. Universal screening did not significantly reduce the rate of hospital-acquired MRSA compared with targeted screening and was more expensive because of higher care costs. The study adopted a transparent framework that considered various methodological issues. Cost-effectiveness ratios were not derived and the issue of uncertainty was not investigated. Caution is required when interpreting the conclusions.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The study examined the clinical and economic impact of universal versus targeted screening for methicillin-resistant Staphylococcus aureus (MRSA) to prevent hospital-acquired MRSA infections.

Interventions
MRSA screening was carried out using polymerase chain reaction (PCR) test from nasal swabs performed within 24 hours after admission. Patients who tested positive for MRSA underwent infection control measures that including contact isolation, perioperative decolonisation and antibiotic prophylaxis, when appropriate. Targeted screening was performed on high-risk patients who met any of the following criteria: positive history of MRSA infection or colonisation; prior hospitalisation within six months; admission to the intensive care unit; patients from long-term care facilities and correctional institutes; patients receiving dialysis; and selected orthopaedic and cardiothoracic surgery patients. Universal screening was conducted on all admitted adult patients.

Location/setting
USA/hospital.

Methods
Analytical approach:
The analysis was based on a single study with a short-term horizon (hospitalisation). The perspective of the study was not stated explicitly.

Effectiveness data:
Clinical evidence came from a prospective cohort study at two hospitals over two time periods. In the control period (April to December 2009) both hospitals conducted targeted screening for MRSA (3,894 patients for the control hospital and 5,803 for the intervention hospital). During the intervention period (January to May 2010) the intervention hospital performed universal screening (3,255 patients) and the control hospital continued targeted admission screening (2,037 patients). Patients were followed until discharge. The primary endpoint of the analysis was the rate of hospital-acquired MRSA infections.

Monetary benefit and utility valuations:
Not considered.
Measure of benefit:
No summary benefit measure was used. The rate of MRSA infections was the key outcome.

Cost data:
The economic analysis calculated the ratio between the reduction in cost associated with hospital-acquired MRSA infections and the additional costs of screening. The cost of infections was estimated with a patient-level regression analysis and a set of patient controls. It was derived from a sample of adult patients screened for MRSA at 13 hospitals. Other costs came from the participating hospitals and earlier studies. Costs were in US dollars ($). The price year was 2009.

Analysis of uncertainty:
Not investigated.

Results
During the baseline period, the rates of hospital-acquired MRSA infection were 0.1% at the control hospital and 0.27% at the intervention hospital (p=0.06). Over the intervention period, this rate fell at the intervention hospital to 0.15% but the difference with the control hospital remained non-significant (p=0.23).

The incremental cost-saving of universal versus targeted screening was $15.44 per hospitalised patient. As the incremental cost of screening (universal over targeted) was $31.19 per hospitalised patient, the ratio was estimated to have been $0.50, suggesting that for every additional dollar spent on universal versus targeted screening only $0.50 could be recovered in avoided costs of hospital-acquired MRSA infection.

Authors’ conclusions
The authors concluded that universal screening increased the rate of detection of MRSA upon admission but did not significantly reduce the rate of hospital-acquired MRSA compared with targeted screening. Universal screening was more expensive because of the higher costs of care.

CRD commentary
Interventions:
The selection of comparators appeared appropriate and was described clearly. No screening was not considered as a possible option.

Effectiveness/benefits:
A prospective study was used appropriately to examine the clinical impact of the two screening strategies. Allocation of patients to intervention groups was based on the admission hospital. Key characteristics of the two participating hospitals (number of admissions, case mix and patient demographics) were reported. Study groups appeared generally comparable at baseline. The authors stated that the potential impact of common trends over time was taken into account by means of a difference-in-differences analysis. The study involved a lot of patients and this should have ensured an adequate sample size. Appropriate statistical analyses were carried out. These issues tended to enhance the robustness of the clinical analysis. An accurate definition of the primary outcome measure was given. The number of hospital-acquired MRSA infections was a disease-specific and intermediate measure of the impact of the screening programme on patients’ health. A more comprehensive and generalisable benefit measure such as life-years or quality-adjusted life-years (QALYs) would have been more appropriate.

Costs:
Although not stated explicitly, the cost categories and sources used suggested that the perspective was that of a hospital. Little information was given on unit costs and resource quantities. Most cost data were taken from the hospital cost accounting system. The authors stated that these provided a lower value for MRSA infection than other studies that used hospital charges instead of costs. The authors stated that private rooms were used in both hospitals so the cost of moving MRSA cases to other rooms was not included in this study. No details on other published sources of data were given. The price year was reported appropriately.

Analysis and results:
The study results were presented clearly. A cost-effectiveness ratio was not calculated because of the cost-consequences
framework of the analysis. The issue of uncertainty was not investigated. The authors acknowledged some limitations of their analysis (such as the short time frame) and stated that the benefits of universal screening might have been underestimated. The main issue of this study appeared to be the lack of a real estimation of a cost-effectiveness ratio. Study findings were specific to the authors’ institutions and would be difficult to transfer to other settings.

Concluding remarks:
The study adopted a transparent framework that considered various methodological issues. Cost-effectiveness ratios were not estimated and the issue of uncertainty was not investigated. Caution is required when interpreting the authors’ conclusions.

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