Doing it right the first time: quality improvement and the contaminant blood culture
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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
A blood culture team of phlebotomists dedicated to reducing the rate of contaminant blood cultures.

Type of intervention
Screening.

Economic study type
Cost-effectiveness analysis.

Study population
Adult patients requiring blood culture for suspected bacteremia.

Setting
Acute-care community hospital. The study and the economic analysis were carried out in the New York Hospital Medical Centre of Queens, USA.

Dates to which data relate
Blood culture data were collected for 3 months prior to the introduction of the BCT on unit A and for 2 months prior to the introduction of the BCT on unit B. Following the introduction of the BCT, data were collected for 6 months for unit A and 3 months for unit B. The BCT was then withdrawn from unit A and commercial prep kits were made available to the house staff, who were instructed to use them according to the specifications. Subsequently, data were collected for 3 months from unit A. All data were collected in 1994. The price date was not stated.

Source of effectiveness data
Single study.

Link between effectiveness and cost data
Costing was undertaken alongside the same patient sample as that used in the effectiveness study. It is not clear whether costing was undertaken prospectively or retrospectively.

Study sample
No power calculations were used to determine sample size. No consents were obtained, and patients were not informed that this study was taking place.

Study design
The study took place in 2 independent units of a single hospital.

**Analysis of effectiveness**

The analysis of the study was based on intention to treat. The main health outcome was a reduction in the rate of contaminant blood cultures. These blood cultures were evaluated using BACTFC NR-660 and were judged to be contaminated if microorganisms derived from common skin flora were found. All patients were adults who required blood cultures for suspected bacteremia and who were located in a medical or surgical unit.

**Effectiveness results**

At baseline, that is for house staff without prep kits, in unit A the rate of blood culture contamination was 8.4% compared to 4.8% in unit B and 4.7% in the hospital as a whole. After the introduction of a BCT with prep kits, the rate of contamination decreased significantly for unit A (1.2%, P<0.001) and unit B (1%, P<0.001). Finally the BCT was withdrawn and the house staff used prep kits instead. There was a significant increase in the contamination rate to 4.8% compared to that observed with the BCT of 1.2% (P<0.001). The performance of the house staff on unit A did exhibit a trend toward improvement with the use of the commercial prep kits compared to that at the baseline (4.8% vs. 8.4%), but this was not statistically significant (P=0.173).

**Modelling**

None.

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

The main outcome measure was a reduction in the rate of contaminant blood cultures and this was evaluated by clinicians.

**Direct costs**

Costs were not discounted. Costs and quantities were reported separately. Hospital costs and diagnosis-related group (DRG) charges were provided as well as the cost of the BCT. The health service's perspective was adopted. No date for price data was given.

**Statistical analysis of costs**

The Mantel-Haenszel chi-square test was performed and P values were used.

**Indirect Costs**

Not stated.

**Currency**

US dollar ($).

**Sensitivity analysis**

Sensitivity analysis was not conducted.

**Estimated benefits used in the economic analysis**

Through the introduction of a BCT using commercial prep kits, a significant reduction was achieved in the rate of contaminant blood cultures (p<0.001) compared to results obtained by house staff.
Cost results
Each contaminant blood culture cost the institution $2,500. The introduction of the BCT in unit A resulted in the elimination of an estimated 34 contaminant cultures, a cost saving of $85,000. As the cost of the BCT, with 3 full-time equivalent salaries and benefits, for 6 months was $45,000, the actual cost saving generated was $40,000.

Synthesis of costs and benefits
In the institution, in one year, over 14,000 blood cultures were collected. It was estimated that through a reduction in the institutional contamination rate from 4.7% to 1.2%, around 480 contaminant cultures would be eliminated with a potential saving of $1.2 million (1994).

Authors’ conclusions
The BCT using commercial prep kits produced a significant reduction in the rate of contaminated blood cultures (p<0.001) in 2 patient care units compared to results achieved by house staff. Cost savings from reducing false-positive blood cultures outweigh the cost of the BCT.

CRD COMMENTARY - Selection of comparators
The rate of contaminant blood cultures obtained by a BCT was compared to that obtained by the house staff.

Validity of estimate of measure of benefit
The main outcome was a reduction in the rate of contaminant blood cultures. The blood culture was evaluated by using BACTFC NR-660. It seems likely that the measures of benefit were internally valid.

Validity of estimate of costs
Costs were based on assumptions, which were not validated. Some, but not all, quantities were reported separately from prices and as a result the estimates were not clear.

Other issues
Study results suggest that substantial benefits may be gained through the introduction of a BCT. However, more detailed cost analysis could have been presented. The issue of generalisability to other settings was not addressed.

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