Reducing the rate of nosocomially transmitted respiratory syncytial virus

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 multidisciplinary control programme to reduce the rate of nosocomially-transmitted respiratory syncytial virus (RSV) among hospitalised children was examined. The plan included paediatric droplet precautions, which meant that anyone who entered the patient’s room had to wear gloves, and masks and gowns were required for close contact. The plan had two stages.

Stage 1 began when the first case of RSV was admitted during the fall season. A communication was sent to the personnel (medical and nursing staff) of all paediatric and obstetric units. In addition, for any child aged younger than 2 years admitted with bronchiolitis or pneumonia and with known human immunodeficiency virus (HIV) infection, a nasopharyngeal aspirate (NPA) was sent for RSV culture and antigen detection.

Stage 2 began when the fifth hospitalised patient from the community was identified. All children aged younger than 2 years with any respiratory symptoms were placed on paediatric droplet precautions and tests for RSV. The personnel were notified that the disease was in progress.

In the fall of 1995, the age for an NPA to be sent for RSV culture was raised to 3 years.

Type of intervention
Health care management.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised hospitalised children aged younger than 3 years, presenting with bronchiolitis or pneumonia and with known HIV infection.

Setting
The setting was secondary care. The economic study was carried out at the Johns Hopkins Hospital Children's Center in Baltimore (MD), USA.

Dates to which data relate
Since the control programme was implemented in the fall of 1991, the effectiveness and resource use data were gathered from 1989 to 1991 in the control group (pre-intervention period) and from 1991 to 1997 in the intervention group (post-intervention period). 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 performed retrospectively on the same sample of patients as that used in the effectiveness study.

Study sample
Power calculations to determine the sample size were not performed. All children aged younger than 2 year who were admitted to the study hospital and identified in stages 1 and 2 of the control programme were included in the study sample. From the fall of 1995, the age ceiling was raised to 3 years. The number of eligible children included in the two study samples was not reported.

Study design
This was a comparative study with a historical control group. Patient allocation to the study groups was based on the study period (before and after fall 1991). The study was carried out in a single centre, the Johns Hopkins Hospital Children's Center. The number of RSV and nosocomially caused cases were recorded. A blind assessment of the outcome was not carried out.

Analysis of effectiveness
It was not stated whether all of the patients included in the initial study sample were taken into account when estimating the effectiveness. The primary health outcomes used in the analysis were the overall number of RSV cases and the percentage of nosocomial infections as opposed to community-acquired infections. A nosocomial RSV case was defined as a positive RSV antigen or culture obtained from a patient at least 4 days after admission. The authors did not discuss the comparability of the two study groups. Statistical tests were carried out to compare the 2 years before the programme was introduced and the 2 years. A chi-squared test was also performed to analyse the trend in the six seasons following the fall of 1991.

Effectiveness results

The total number of nosocomial RSV cases was 9 (12.2%) for the 1989 to 1990 season, 17 (20.2%) for 1990 to 1991, 11 (7.4%) for 1991 to 1992, 9 (6.9%) for 1992 to 1993, 13 (9.6%) for 1993 to 1994, 4 (1.7%) for 1994 to 1995, 13 (7.3%) for 1995 to 1996, and 2 (1.8%) for 1996 to 1997.

The statistical tests showed that the average proportion of nosocomially-transmitted cases of RSV was 16.5% (95% confidence interval, CI: 10.7 - 22.2) in the 2 years before the programme was implemented and 7.2% (95% CI: 4.1 - 10.2) in the 2 years after its introduction, (p=0.002).

A statistical test showed that the reduction in the rate of nosocomially-transmitted RSV cases was sustained over the 6-year post-intervention period, (p>0.0001).

Clinical conclusions
The effectiveness analysis showed that the control programme reduced the proportion of RSV cases that were nosocomially transmitted.

Measure of benefits used in the economic analysis
No summary benefit measure was used. A cost-consequences analysis was therefore conducted.

Direct costs
Discounting was not performed since costs were incurred during a short time. The economic analysis focused only on
daily charges on the infant unit, which were estimated to be $1,600 for each day of hospitalisation. The effectiveness analysis showed that the control programme prevented 14 cases of the estimated 150 nosocomial patients included in each season. The average length of stay was obtained using data from the patients' charts. The price year was not reported. The perspective adopted in the study was not stated.

**Statistical analysis of costs**
The costs were treated deterministically.

**Indirect Costs**
The indirect costs were not included in the economic evaluation.

**Currency**
US dollars ($).

**Sensitivity analysis**
Sensitivity analyses were not conducted.

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

**Cost results**
The control programme led to a saving of about $84,000 per year in terms of hospital costs.

**Synthesis of costs and benefits**
Not relevant as a cost-consequences analysis was carried out.

**Authors’ conclusions**
The introduction of a multidisciplinary control programme to reduce the rate of nosocomial RSV transmission was effective in comparison with the lack of such a programme. In addition, the programme led to a substantial cost-saving.

**CRD COMMENTARY - Selection of comparators**
The rationale for the choice of the comparator was clear. The authors compared the new control programme with the standard approach used before the new intervention. The general characteristics of the earlier intervention were described. You should decide whether it represents a valid comparator in your own setting.

**Validity of estimate of measure of effectiveness**
The analysis of effectiveness used a prospective comparative study with a historical control group, which was appropriate to evaluate the impact of the new intervention in comparison with previous patterns. However, such a study design entails the risk that factors other than the study intervention may affect the outcomes. Thus, time-related bias and confounding cannot be ruled out. In particular, the authors noted that it was possible that the new procedures may have increased the detection rates of RSV cases, which would have increased the denominator of the effect measure. The study sample appears to have been representative of the study population. However, the actual number of children included in the initial study sample was not reported. The authors did not discuss whether the samples of children included in the two groups were comparable at baseline. These issues tend to limit the internal validity of the effectiveness study.
Validity of estimate of measure of benefit
No summary benefit measure was used in the economic analysis. The analysis was therefore categorised as a cost-consequences study.

Validity of estimate of costs
The perspective adopted in the study was not stated and only the daily cost of hospitalisation was included in the economic analysis. Resource use data were derived from the charts of the patients involved in the effectiveness study. The unit costs were analysed separately from the quantities of resources used, but the price year was not mentioned. This makes reflation exercises in other settings difficult. Charges rather than true costs appear to have been used and a cost-to-charge ratio was not applied. Overall, the analysis of the costs represented a secondary aim of the study.

Other issues
The authors did not compare their findings with those from other studies. They also did not address the issue of the generalisability of the study results to other settings and no sensitivity analysis was carried out. Thus, the external validity of the analysis was fairly weak. The conclusions of the study were consistent with the initial hypothesis.

Implications of the study
The study results suggest that a control programme to reduce the nosocomial transmission of RSV infection is very effective and may result in cost-savings for the hospitals.

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None stated.

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Other publications of related interest

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