Comparing nursing costs for preterm infants receiving conventional vs developmental care.

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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
Developmental care for very low birth weight (VLBW) infants.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population was pre-term infants with VLBW (weighing less than 1,500 grams).

Setting
The setting was secondary care. The study was carried out in the Mount Sinai Hospital (MSH), Toronto, Canada.

Dates to which data relate
The dates to which the effectiveness and the resource data related were not specified. The price year was not specified.

Source of effectiveness data
The evidence for the final outcomes was derived from a single study.

Link between effectiveness and cost data
The costing was undertaken retrospectively on the same patient sample as that used in the effectiveness study.

Study sample
The study sample comprised 124 infants with a birth weight between 750 and 1,500 grams, born in the hospital where the study was performed. Infants who had chromosomal or other major genetic anomalies or congenital infections were excluded from the study. In the case of multiple births, only the first was included in the study. 61 infants received conventional care and 63 infants received developmental care. Data for the conventional care infants were collected over an eight-month period before the implementation of developmental care. The method of sample selection was not described and no power calculations were reported.

Study design
The study was a non-randomised trial with historical controls carried out in a single centre. The duration of follow-up of the cohorts was the first 35 days of hospitalisation. Due to the nature of the study design, there was no random
allocation of patients to the treatments or blinding in the assessment of outcomes.

**Analysis of effectiveness**

It was not stated in the paper whether the clinical study was based on intention to treat or on treatment completers only. As a measure of health outcome the authors calculated a psychological stability index (PSI) which is a proxy of the infant's severity of illness. Infants’ PSI was calculated over time: within 72 hours after the infant's birth and on hospital days 7, 14, 21, 28 and 35. The groups were shown to be comparable at birth in terms of gestational age, weight, head circumference and PSI.

**Effectiveness results**

Although the authors reported that, on average, infants in the conventional group were unstable when compared to those in the developmental group, the study results showed no statistically significant difference between the two groups.

The difference in the mean scores on PSI between the conventional care group and the developmental care group were:

- 0.78, (p=0.44) at admission (higher scores on the PSI reflect greater infant instability);
- on the 7th day 1.25, (p=0.22);
- on the 14th day 1.52, (p=0.13);
- on the 21st day 0.43 (p=0.67);
- on the 28th day 1.42 (p=0.16);
- and on the 35th day -0.30, (p=0.77).

**Clinical conclusions**

The authors concluded that, although both the developmental and conventional care groups had similar PSI when measured at birth, the developmental care group (according to their PSIs) was more stable later during the first 35 days of hospitalisation. However, the results reported in the study showed no statistically significant difference between the two groups in terms of PSI.

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

No summary measure of benefit was used.

**Direct costs**

Costs were not discounted, which was appropriate given the short timeframe of the study (less than one year). Quantities and costs were reported separately. Quantities measured were the number of days in acute and transitional neonatal intensive care units (NICU). Costs measured were direct nursing costs and indirect nursing costs defined as costs of support staff (unit secretaries and nursing unit administrator). The quantity/cost boundary adopted was that of the hospital, although it should be noted that no costs other than nursing costs were included in the analysis. The estimation of quantities was based on actual data. The estimation of costs was based on actual data, obtained using an automated system documenting the nurse workload (MEDICUS System Corporation, 1990) and a costing system (Transition Systems Inc., 1985) which enabled the authors to receive detailed patient specific nursing workload and costs. Quantities and cost estimates were based on direct measurements. The date to which the quantity and cost information refers was not mentioned in the study. The price year was not specified. The study did not report any difference between average and marginal costs.

**Statistical analysis of costs**
Costs were not treated in a stochastic way and statistical analysis was not used in measuring costs.

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

**Currency**
The currency was in dollars and it is assumed that, as the study was conducted in Canada, these were Canadian dollars (Can$).

**Sensitivity analysis**
Sensitivity analyses were not carried out.

**Estimated benefits used in the economic analysis**
See effectiveness results above.

**Cost results**
The average total costs of nursing care for infants during the first 35 days of hospitalisation were Can$22,853 for the developmental care group and Can$27,193 for the conventional care group. The difference in cost was Can$4,340.

**Synthesis of costs and benefits**
A synthesis of costs and benefits was not performed.

**Authors’ conclusions**
The authors concluded that developmental care for VLBW infants was more effective and less costly compared to the conventional care, making developmental care a dominating strategy.

**CRD COMMENTARY - Selection of comparators**
The choice of comparator, namely conventional care, was justified, as it was the standard practice before developmental care was implemented in the hospital. You as a database user should consider whether this represents current practice in your own setting.

**Validity of estimate of measure of benefit**
The analysis was based on a non-randomised trial with historical controls and this study design was appropriate for the study question, since the new intervention, developmental care, had already been implemented in the hospital. A study with concurrent controls would, therefore, not have been feasible. The study sample, namely very low birth weight infants, was representative of the study population. The patient groups were shown to be comparable at analysis. However, caution should be exercised with non-randomised studies with historical controls due to the potential bias and presence of confounding factors that may influence the results. In this study, these weaknesses to the design were not controlled in the analysis. Another problem with the effectiveness analysis was that the authors concluded that developmental care was the superior intervention, despite no statistical difference between the two interventions. Finally, the authors noted that the measure of effectiveness, PSI, might become less meaningful as infants become more stable over the course of hospitalisation, so this instrument may not be the most appropriate for this study.

**Validity of estimate of costs**
Although no cost perspective was clearly chosen, even from the restricted perspective of the hospital, relevant
categories of costs were missing from the analysis, since this study only considered nursing costs and omitted all other costs such as diagnostic and treatment costs. Within the category of nursing costs, relevant costs were included. However, the restriction of costs to nursing costs is likely to affect the authors’ conclusions. Discounting was appropriately not conducted due to the short timeframe of the study. The strengths of the cost analysis were that the costs and quantities were reported separately, resource use data were taken from actual patient data, prices were taken from actual salary data and charges were not used to proxy prices. However, weaknesses in the cost analysis were that no sensitivity analyses were conducted on prices or quantities, no statistical analyses of prices and quantities were performed, the short timeframe of the study might not allow for future health care costs to be taken into account, and the price year was not reported.

Other issues
Appropriate comparisons of the results of the study with findings from other studies were not made and the issue of generalisability to other settings was not addressed. There seems to be some confusion with the concepts of cost-minimisation and cost-benefit analysis. Although a cost-minimisation study was appropriate in this instance because there was no significant difference in the effectiveness of the two interventions, the authors reported in the text that developmental care was superior to standard care, a conclusion that would call for a cost-effectiveness analysis, not a cost-minimisation study. Because of this, there appears to be some selectivity in the presentation of the results. The use of cost-benefit analysis was not appropriate for the analyses conducted in the study.

Implications of the study
On the basis of the study, the authors recommend the widespread adoption of developmental care compared to conventional care.

Source of funding
None stated.

Bibliographic details

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MeSH
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