Economic evaluation of nurse led intermediate care versus standard acute care for post-acute medical patients: cost minimisation analysis of data from a randomised controlled trial

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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 study examined nurse-led intermediate care (10 beds and 22 nursing staff) for post-acute medical patients. No formal medical input was provided.

Type of intervention
Treatment and rehabilitation.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised stable post-acute medical patients not ready for discharge. Full details of the medical conditions associated with the study are provided in the parent clinical study (Steiner et al., see Other Publications of Related Interest).

Setting
The setting was tertiary care. The economic study was conducted in a large urban teaching hospital and community hospitals in Southampton, UK.

Dates to which data relate

Source of effectiveness data
The effectiveness data were derived from a single study.

Link between effectiveness and cost data
Data on resource use were collected retrospectively for the same sample used in the effectiveness analysis.

Study sample
Power calculations were reported in the parent study (Steiner et al., see Other Publications of Related Interest). These showed that 240 were needed to detect the required differences in the outcomes. Of the 240 patients recruited, 2 refused consent for economic data. Thus, 238 patients made up the final sample. The patients were recruited over the study period until the target sample size was achieved. Diagnosis was determined using ICD codes.
Study design
This was a randomised controlled trial (RCT) that was conducted at several centres associated with the teaching hospital that formed the principal study location. The patients, once randomised, could decline the intervention. The length of follow-up was 6 months. Randomisation was achieved by computerised selection and stratified by referring ward. Telephone interviews with patients or their proxies (some patients were cognitively impaired) were conducted after 6 months. Further details of the loss to follow-up are provided in the parent clinical study (Steiner et al., see Other Publications of Related Interest).

Analysis of effectiveness
The analysis was conducted on an intention to treat basis. The outcomes considered were length of stay (LOS), physical functioning (assessed using the Barthel index), and destination after discharge. A random sample of 10% was used to test for inter-rater reliability (shown to be 100%).

Effectiveness results
The LOS was significantly longer in the nurse-led group (mean 41.1, standard deviation, SD=32 versus mean 39.5, SD=31). Other outcomes were shown in the parent study (Steiner et al., see Other Publications of Related Interest) not to be significantly different.

Clinical conclusions
Nurse-led care is associated with a longer period of hospital stay. Other clinical outcomes did not differ in comparison with standard care.

Measure of benefits used in the economic analysis
The authors showed that the clinical effectiveness was not significantly different, and therefore conducted a cost-minimisation analysis. The only significant difference, as reported in the 'Effectiveness Results' section (above), was that the LOS was longer for the nurse-led group. This was used as an economic input to the present study.

Direct costs
The unit costs for each resource were provided. The costs and the quantities were not reported separately. The time horizon was 6 months and, as such, discounting was appropriately not carried out. The cost data came from the literature, interviews with staff in trust directorates and accounting departments. When attributed cost data could not be isolated, aggregated cost estimates were obtained from the relevant trust. Data on the LOS were obtained from the hospital's Patient Administration System database. Data on the use of physiotherapy and radiology were collected from departmental databases. Outpatient attendances were sourced from the unit costs of community care (PSSRU). The costing also included short-term care such as emergency department visits, day surgery outpatient clinics, and so on. Other NHS resources included community hospitals, general practitioner (GP) or community nurses, and institutional care. General practice staff collected data at the end of 6 months using a questionnaire. Interviews with patients provided details of change in residence. The cost data were analysed over two periods, the admission period (period 1) and the readmission period (period 2). The authors stated that the indirect costs included the use of pathology, occupational therapy, clerical support, and hotel and laundry services. However, these were not indirect costs and should be attributable to direct medical or non-medical costs. The price year was 1988-9.

Statistical analysis of costs
Summary statistics (mean, median, SD) were produced for each cost variable. Two-sample t-tests were used to compare means with 95% confidence intervals (CIs). The groups were compared using a regression analysis that controlled for referring ward and gender. The results of the two analyses were reported to be virtually identical, thus the regression results were not reported in the paper.
**Indirect Costs**

Although the authors specified some indirect cost items, these did not include productivity losses and, therefore, are not reported here (see comments in the 'Direct Costs' field above).

**Currency**

UK pounds sterling (£), US dollars ($), and Euros (Euro). The conversion rate was 1 = $1.9 = Euro 1.5.

**Sensitivity analysis**

A one-way sensitivity analysis was performed on the inpatient and total costs (from the perspective of secondary care). The cost per occupied bed day for the nurse-led group was varied. The ranges were based on observed variability within the directorate. The values used were 15% lower, 20% lower, and 25% lower. A value of 60% lower was also used, which was equivalent to a GP-led community hospital.

**Estimated benefits used in the economic analysis**

Not applicable since a cost-minimisation analysis was undertaken.

**Cost results**

For the nurse-led group, the initial admission costs were 7,892 (difference +3,082, CI: 1,161 - 5,002), the readmission period costs were 1,444 (difference -435, CI: -1,406 - 536), and the total 6-month costs were 10,529 (difference +2,710, CI: 518 - 4,903).

For the standard care group, the initial admission costs were 4,810, the readmission period costs were 1,879, and the total 6-month costs were 7,819. Incremental costs were calculated (as shown above for the nurse-led group).

**Synthesis of costs and benefits**

Not carried out since a cost-minimisation analysis was performed. The sensitivity analyses showed nurse-led care maintained its higher cost, although the differences were not significant.

**Authors’ conclusions**

Acute hospitals may not be cost-effective settings for nurse-led intermediate care, suggesting that this model of care should not be implemented unless clinical or organisational benefits justify the increased investment.

**CRD COMMENTARY - Selection of comparators**

The rationale for the choice of the comparator (standard care in medical wards) was clear. You should decide if this represents a valid comparator in your own setting.

**Validity of estimate of measure of effectiveness**

The authors used one parent clinical study that showed no difference in clinical outcomes (except for length of hospital stay). This was an RCT, which means that most biases and confounding factors should have had minimal impact on the results. However, other studies cited had demonstrated improved health outcomes for nurse-led care. The validity of the analysis would have been improved had a synthesis of these clinical studies been undertaken. The parent study used may be subject to a dilution of the effect on account of to the design (consent after randomisation instead of the more common approach of consent prior to randomisation). However, the authors stated that the study they chose was more robust than other studies that had assessed nurse-led care in this patient domain.

**Validity of estimate of measure of benefit**
The authors demonstrated no clinical differences between the intervention and its comparator. As such, a cost-minimisation analysis was performed and this was appropriate for the chosen clinical study. However, the assumption of equivalent outcome is open to question because of the consent design of the chosen RCT, and the fact that other clinical studies were available but were not used. The authors did, however, justify their choice of clinical study.

Validity of estimate of costs
The authors indicated that higher costs for the intervention were due to the small size of units (10 beds versus 20 - 30 for a general ward), higher grade staff, and higher overhead costs because of the distant locations. It should be noted that some of the costs were incorrectly classified as indirect costs when they were, in fact, direct medical or direct non-medical costs. The authors noted difficulties and inconsistencies in obtaining the cost data, implying that the data might not be accurate. However, sensitivity analyses on the costs were performed to assess the impact of variation. The authors used a parametric test to analyse the costs, but did not confirm whether the cost data were normally distributed. It is unlikely that the sample size was large enough to detect significant differences in the cost data. Discounting was appropriately not conducted because of the short period of analysis (6 months). The costs and the quantities were reported separately, and the price year was given. Sensitivity analyses were performed on the principal cost driver, and the sources of the unit costs were clearly specified. These features tend to enhance the generalisability of the cost results.

Other issues
The authors made appropriate comparisons with other relevant studies. However, the issue of the generalisability of the results was not specifically discussed, although the sensitivity analyses performed helps in this regard. It is possible to speculate that, had other clinical studies been included in the analysis, the conclusions might have changed as an incremental cost-effectiveness analysis may have been more appropriate (nurse-led care may be more effective and more costly). The authors noted the preference, despite evidence for cost-effectiveness, of some trusts for retaining this method of managing patients, especially in times of high demand for beds.

Implications of the study
The findings suggested that nurse-led care should not be implemented in clinical practice. The cost-effectiveness of nurse-led care could be improved by increasing the bed numbers in units, or setting boundaries for LOS (favoured by the UK government). Implementing the intervention in community hospitals may be more appropriate.

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