Economic evaluation of a nursing-led inpatient unit: the impact of findings on management decisions of service utility and sustainability


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 a nurse-led inpatient unit (NLIU) that was designed to substitute for a period of care in acute hospital wards, and also to improve patient outcome prior to discharge into the community. Patient care on the NLIU was managed by one of three nurse practitioners (F grade) who were responsible for the planning and delivery of nursing care, discharge planning and coordination, and leadership of the multidisciplinary team, including referral for medical input when required. Routine medical input was provided on the nurses’ request by a primary care doctor employed for 8 hours a week in two to three sessions. Emergency or specialist medical review was provided by the usual hospital service, and the patient was transferred back to an acute ward if necessary.

Type of intervention
Rehabilitation.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients requiring nursing care for rehabilitation purposes. The patients were medically stable, with no significant change in medical management anticipated, and had "active" nursing needs with potential for improvement. Patients with an anticipated length of stay lower than 4 days were excluded from the analysis.

Setting
The setting was a hospital. The economic study was carried out in the UK.

Dates to which data relate
The effectiveness and resource use data were derived from a study published in 2001. The prices used referred to 1997/98 values.

Source of effectiveness data
The effectiveness evidence was derived from a single study.

Link between effectiveness and cost data
Most of the costing was carried out prospectively on the same sample of patients as that used in the effectiveness study.

Study sample
Power calculations were not reported. Of the 585 patients initially identified, 350 were suitable for nursing-led care.
during the 20-month study. Of these, 176 gave consent for participation in the study. However, one control patient withdrew, thus 175 patients were actually enrolled. There were 89 patients (36% men) in the NLIU group and 86 patients (29% men) in the control group. The mean age of the patients was 78 years in the NLIU group and 79 years in the control group.

Study design
This was a prospective, randomised, clinical trial. Randomisation was based on sequentially-numbered sealed envelopes containing computer-generated random allocations. The study was presumably carried out at a 19-bed unit in a single hospital. The patients were followed until hospital discharge. The nurse-to-patient ratios and the proportions of qualified staff were comparable between the intervention and the control groups. The rate of follow-up was 90% in the intervention group and 91% in the control group.

Analysis of effectiveness
The analysis of the clinical study was conducted on an intention to treat basis. The primary outcome measure used was the Barthel Index, a widely used functional status measure with scores ranging from 0 (maximum dependence) to 20 (independent). The secondary outcome measures were mortality, discharge destination and readmission. The study groups were comparable at baseline in terms of their demographic and clinical characteristics.

Effectiveness results
The mean change (improvement) in Barthel Index was 3.6 in the treatment group and 2.6 in the control group. This difference did not reach statistical significance.

No statistically significant difference in mortality, discharge destination or readmission was observed.

Clinical conclusions
The effectiveness analysis showed that the NLIU was similar to standard treatment, although there was a trend toward better functional outcomes among NLIU patients.

Measure of benefits used in the economic analysis
The summary benefit measure used was the Barthel Index. This was derived directly from the effectiveness analysis.

Direct costs
The analysis of the costs was carried out from the perspective of the NHS. It included hospital stay, investigations and laboratory tests, personnel (e.g. nurses, physiotherapists, occupational therapists, social workers) and post-discharge accommodation. The unit costs were presented separately from the quantities of resources used. The costs were estimated from the finance department of the acute trust and from national pay scales, which represent typical NHS sources of costs. Three approaches were used to estimate the cost of an inpatient day. The first approach used a bottom-up method with data from the nursing activity analysis. The second approach used the same method as the first, but reduced the cost of nursing by discounting the effect of unproductive time. The third approach, a top-down method, used the cost per bed day from the year-end accounts for each ward. Resource consumption was estimated using medical records. For example, length of stay and readmission were recorded prospectively, while multidisciplinary inputs were recorded retrospectively in either minutes (for physiotherapists and occupational therapists) or the number of contacts (for nurse specialists and social workers). Details on the assessment and quantification of nursing input were extensive. Discounting was not relevant since the costs per patient were incurred during a short timeframe. All the costs were updated to 1997/98 values, using the Health Service Pay and Prices Index, when it was necessary to inflate previous estimates.

Statistical analysis of costs
Standard statistical analyses were carried out to test the statistical significance of cost-differences.

**Indirect Costs**
The indirect costs were not considered in the cost analysis.

**Currency**
UK pounds sterling ( ).

**Sensitivity analysis**
A sensitivity analysis was carried out to assess the impact of some key variables on the total costs, but not for cost-effectiveness ratios.

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

**Cost results**
When using the first approach to estimate inpatient costs, the mean cost per hospital stay was 5,144 in the intervention group and 4,100 in the control group, \( p=0.150 \).

When using the second approach to estimate inpatient costs, the mean cost per hospital stay was 4,938 in the intervention group and 3,919 in the control group, \( p=0.142 \).

When using the third approach to estimate inpatient costs, the mean cost per hospital stay was 6,017 in the intervention group and 4,410 in the control group, \( p=0.050 \).

The main driver of the cost-difference was the length of stay. In fact, although the cost per day and mean post-discharge costs were lower for the intervention group than for the control group, the higher length of stay led to higher total inpatient costs associated with the NLIU.

The sensitivity analysis showed that the mean treatment group length of stay would have to be reduced by 20.3% for the total costs to be equal between groups.

**Synthesis of costs and benefits**
An incremental cost-effectiveness ratio was calculated to combine the costs and benefits of the NLIU over standard care. The incremental cost per point improvement in the Barthel Index was 1,044 (only the first approach to cost estimation was used).

**Authors' conclusions**
The nurse-led inpatient unit (NLIU) provided safe and effective care for medically stable patients still requiring inpatient hospital treatment without routine medical intervention. However, the NLIU was not cost-saving in comparison with standard care because the length of stay was too long. It is not clear whether it can be considered as a cost-effective strategy.

**CRD COMMENTARY - Selection of comparators**
The selection of the comparator was appropriate as it reflected standard treatment of post-acute care. Both the NLIU and standard care were clearly described. You should decide whether they are valid comparators in your own setting.
Validity of estimate of measure of effectiveness
The effectiveness evidence came from a published clinical trial, thus there was limited information on the design and other characteristics of the study. In general, the use of a randomised trial has a high internal validity, owing to the reduced impact of selection bias and confounding factors. The intention to treat analysis of the clinical study and the baseline comparability of the study groups further enhance the robustness of the effectiveness study.

Validity of estimate of measure of benefit
The summary benefit measure was specific to the disease considered in the study. Thus, it is not comparable with the benefits of health care interventions related to other diseases. The authors did not consider the impact of the intervention on quality of life and focused exclusively on functional aspects of health.

Validity of estimate of costs
The authors stated that a societal perspective would have been more appropriate but that most costs were borne by the NHS, thus the cost/resource boundary of the UK NHS was adopted. The costs included were consistent with the perspective adopted. A detailed breakdown of the cost items was given and extensive information on the unit costs and quantities of resources used was provided, which enhances the possibility of replicating the analysis in other contexts. Further, the authors reported the approaches used to calculate the costs, especially hospital stay. Typical NHS sources were used to derive the costs, and these were consistent with the perspective taken in the analysis. The price year was given, thus aiding reflation exercises in other time periods. The cost estimates were specific to the study setting, but the issue of cost robustness was in part investigated in the sensitivity analysis.

Other issues
The authors compared their results with those from other studies and found some consistency, especially on the lack of cost-savings associated with the NLIU. The issue of the generalisability of the study results to other settings was not addressed and few sensitivity analyses were carried out. In general, the study focused on UK estimates, which limit the external validity of the analysis. The study referred to medically stable patients requiring further care before discharge and this was reflected in the authors’ conclusions.

Implications of the study
The study results did not support the implementation of the NLIU for the management of medically stable patients requiring intermediate hospital care. The authors noted that some potential cost-savings could be achieved in the cost of social services that the patients receive post-discharge. The NLIU used in the current study was revisited after completion of the study and it was discovered that the NLIU had practical difficulties filling beds. Thus, the result was that unsuitable patients were being admitted, leading to a suboptimal use of beds and raising questions about the safety of such patients.

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