The effect of a pediatric asthma management program provided by respiratory therapists on patient outcomes and cost


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 an in-home pediatric asthma disease management programme (ADMP) provided by respiratory therapists. The ADMP consisted of eight home visits for assessment, environmental review and patient education. A detailed description of all aspects of the programme was provided.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised children aged 3 to 18 years with moderate to severe asthma.

Setting
The setting was secondary care. The economic study was carried out in the USA.

Dates to which data relate
The dates during which the effectiveness and resource use data were gathered were not reported. The price year was not given.

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

Link between effectiveness and cost data
The costing appears to have been carried out prospectively on the same sample of patients as that included in the effectiveness study.

Study sample
Power calculations, if performed, were not reported. A group of 25 children was initially identified as potentially eligible for study inclusion, since all were referred to the ADMP because of high use of health care. However, only 18 children (mean age 10.5 +/- 4.3 years) agreed to participate. Twelve of the children were male and six were female.

Study design
This was a within-group comparison study that was carried out at a large urban not-for-profit hospital in the USA. The baseline data were considered representative of the one-year period before the implementation of the ADMP, and the patients were then followed for one year post-intervention. No patient was lost to follow-up. The assessment of the outcomes was not blinded.

Analysis of effectiveness
All of the children included in the initial study sample were accounted for in the analysis of effectiveness. The clinical outcomes examined were:

hospitalisations,
non-intensive care unit (ICU) hospital days,
ICU days,
emergency department (ED) visits,
doctor's office visits, and
school days missed.

Clinical data were derived through interviews with the parents and/or children and a review of hospital records.

Effectiveness results
The mean (median) number of hospitalisations was 1.78 +/- 3 (1) in the pre-intervention group and 0.33 +/- 0.77 (0) in the post-intervention group (change in mean, -82%), (p=0.001).

The mean (median) number of ICU days was 3.67 +/- 6.73 (0) in the pre-intervention group and 0.28 +/- 0.75 (0) in the post-intervention group (change in mean, -92%), (p=0.02).

The mean (median) number of non-ICU days was 6.22 +/- 9.48 (3) in the pre-intervention group and 0.61 +/- 1.24 (0) in the post-intervention group (change in mean, -90%), (p=0.001).

The mean (median) number of hospital days was 3.10 +/- 3.78 (1) in the pre-intervention group and 0.63 +/- 1.22 (0) in the post-intervention group (change in mean, -80%), (p=0.001).

The mean (median) number of ED visits was 4.22 +/- 4.92 (2.5) in the pre-intervention group and 0.61 +/- 1.04 (0) in the post-intervention group (change in mean, -86%), (p=0.001).

The mean (median) number of doctor's office visits was 6.39 +/- 4.62 (6) in the pre-intervention group and 2.17 +/- 1.34 (2) in the post-intervention group (change in mean, -66%), (p=0.001).

The mean (median) number of school days missed was 19.0 +/- 11.98 (20) in the pre-intervention group and 6.69 +/- 7.47 (5) in the post-intervention group (change in mean, -65%), (p=0.002).

Clinical conclusions
The effectiveness analysis showed that the ADMP improved all indicators of health care in comparison with the pre-intervention period.

Measure of benefits used in the economic analysis
The health outcomes were left disaggregated and no summary benefit measure was used in the economic analysis. In effect, a cost-consequences analysis was carried out.
Direct costs
The perspective adopted in the study was unclear, but it might have been that of the institution where the study was carried out. The economic analysis considered the costs of hospitalisations, ICU and non-ICU hospital stay, ED visits and office visits. The unit costs were presented separately from the quantities of resources used for all items. The resource use data were derived from the sample of patients included in the effectiveness study. The costs reflected facility fees only and came from the business office of the hospital. Discounting was not relevant, as the costs were incurred during less than two years, and was not carried out. The price year was not reported.

Statistical analysis of costs
Statistical analyses were carried out to test the significance of the cost results.

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

Currency
US dollars ($).

Sensitivity analysis
Sensitivity analyses were not carried out.

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

Cost results
The mean (median) hospitalisation costs were $7,866.67 +/- 12,626.80 ($2,050) in the pre-intervention group and $805.56 +/- 1,783.41 ($0) in the post-intervention group (change in mean, -90%), (p=0.001).

The mean (median) ICU costs were $3,486.11 +/- 5,467.47 ($0) in the pre-intervention group and $347.22 +/- 939.88 ($0) in the post-intervention group (change in mean, -90%), (p=0.02).

The mean (median) non-ICU hospital costs were $4,930.56 +/- 7,641.70 ($2,250) in the pre-intervention group and $458.33 +/- 932.46 ($0) in the post-intervention group (change in mean, -91%), (p=0.001).

The mean (median) ED costs were $1,477.78 +/- 1,721.17 ($875) in the pre-intervention group and $213.89 +/- 362.92 ($0) in the post-intervention group (change in mean, -86%), (p=0.001).

The mean (median) office visit costs were $319.44 +/- 230.82 ($300) in the pre-intervention group and $102.78 +/- 67.46 ($100) in the post-intervention group (change in mean, -68%), (p=0.001).

Synthesis of costs and benefits
A synthesis of the costs and benefits was not relevant as a cost-consequences analysis was performed.

Authors' conclusions
A paediatric in-home asthma disease management programme (ADMP) provided by respiratory therapists would improve outcomes and reduce costs in patients with moderate to severe asthma. It was also noted that well-qualified respiratory therapists were key to the success of the programme and played an important role in patient education,
monitoring and assessment.

CRD COMMENTARY - Selection of comparators
The choice of the comparator (i.e. care provided before the introduction of the new programme) was appropriate as it reflected the standard treatment pattern for paediatric asthma. You should decide whether this is a valid comparator in your own setting. A detailed description of the ADMP was provided.

Validity of estimate of measure of effectiveness
The effectiveness data came from a within-group comparison study. This has the advantage of applying both the comparator and the new intervention to the same sample of patients, thus a control group is not required, which reduces the potential impact of selection bias and confounding factors. However, the authors noted that time-dependent confounding variables (e.g. variation in medical practice, maturation of patients, or variability in the severity of illness) could not be controlled for because of the design of the study, and this might represent an important limitation of the analysis. Much of the clinical data were estimated from patient or family self-reports, which might be inaccurate.

The evidence came from a single institution. It was unclear whether the study sample was representative of the patient population. No justification for the size of the sample was provided and, owing to the small number of patients included in the analysis, it was unclear whether the results obtained were due to the intervention or to chance. Most of the clinical outcomes were intermediate measures of the impact of the interventions on patient health and were used as resources in the cost analysis. These issues tend to limit the internal validity of the study.

Validity of estimate of measure of benefit
No summary benefit measure was used in the analysis because a cost-consequences analysis was conducted. Please refer to the comments in the 'Validity of estimate of measure of effectiveness' field (above).

Validity of estimate of costs
The perspective of the study was unclear, although it might have been that of the authors' institution. The cost items were those considered in the effectiveness analysis. The unit costs were presented separately from the quantities of resources used, which enhances the possibility of replicating the study in other settings. The source of the costs was stated and costs represented facility fees. The cost estimates were specific to the study setting. The impact of using alternative cost estimates was not investigated. Statistical tests were carried out, but only to assess the significance of the cost comparison. The price year was not reported, which will make reflation exercises in other time periods difficult.

Other issues
The authors stated that the results from other published economic evaluations were conflicting. However, no comparison with the current findings was made. The issue of the generalisability of the study results to other settings was not addressed and sensitivity analyses were not performed, which limits the external validity of the study. The analysis referred to paediatric patients with moderate to severe asthma and this was reflected in the authors’ conclusions.

Implications of the study
The study results support the use of a paediatric in-home ADMP provided by respiratory therapists to those with moderate to severe asthma. The authors stated that they were currently completing a randomised, controlled, three-group comparison (respiratory therapists, nurses and a control group) to evaluate the effectiveness of a similar ADMP in adults and to establish the impact of the type of health care worker on the programme.

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**Other publications of related interest**


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