Protocol therapy for acute asthma: therapeutic benefits and cost savings

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
Protocol therapy for acute episodes of asthma, treated in an emergency department.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Asthmatic patients aged 16 years or older, presenting to the emergency department (ED) with an acute exacerbation.

Setting
The practice setting was a hospital emergency department. The economic study was carried out in Cleveland, Ohio, USA.

Dates to which data relate
The dates of the effectiveness data were not given. The cost data were stated to relate to the same time period as the effectiveness data. The publication date was 1995.

Source of effectiveness data
Evidence for final outcomes was based on a single study.

Link between effectiveness and cost data
Costing was undertaken based on an average of patients in the current study. It was not clearly stated, but it is assumed to have been done retrospectively. The evidence for final outcomes was based on a combination of the single current study and the author’s opinions.

Study sample
In both pre-protocol and ‘admixture’ periods, 28% patients were male, but in the protocol period, 30% patients were male. The mean age of patients in the protocol and admixture groups was 39 (in the pre-protocol group, patients had a mean age of 38). A total of 1513 patients were enrolled: 429 in the pre-protocol period, 526 in the protocol period and 558 in the ‘admixture’ period. No power calculations were carried out. A summary of failures to follow the protocol in the protocol and ‘admixture’ period was not given, although specific aberrations were discussed.
Study design
The study can best be described as a non-randomised trial with historical controls (before and after the institution of the protocol). The protocol consisted of the following. A physician made clinical evaluations before and after initial drug therapy (3 doses of aerosolised albuterol every 20 minutes). The patient was then discharged, admitted to the medical intensive care unit or kept in the emergency department for another hour, for treatment with intravenous drug therapy. Patients were reassessed after 60 minutes and then either discharged or admitted. Staff were briefed on the study and encouraged to follow the protocol on a voluntary basis. Once the study period was in operation, no further attempt to encourage adherence was made. Each subject was followed up retrospectively for 7 days.

Analysis of effectiveness
Although not clearly stated, it appears that the analysis was based on intention to treat. The outcomes assessed were: mean length of stay (LOS) in the ED, percentage of patients staying longer than 3 hours in the ED, number of admissions to general nursing units, number of admissions to medical intensive care units, and the number of return visits to the ED (within 24 hours and within 7 days). There were no significant differences in age, gender, degree of airway obstruction, gas exchange abnormality, or clinical features between the three groups.

Effectiveness results
The average LOS in the ED decreased during the protocol period by 50 minutes (p <0.001), and rose by an average of 16 minutes in the admixture period (p < 0.01). The percentage of patients staying in the ED longer than 3 hours decreased from 34% to 15% (p <0.001) with the protocol, and increased to 47% in the 'admixture' period (p <0.001). Admissions to general nursing units and MICU was 27% and 41% lower with the protocol compared to pre-protocol, respectively (p<0.005 for both). Admissions to general units increased 52% during the 'admixture' period (p<0.05). Admissions to MICU were decreased further during the 'admixture' period, but these data were only shown graphically, and no p-value was given. The number of patients returning to the ED within 7 days reduced from 16% to 7% (p<0.05) with the initiation of the protocol, then rose to 9% (NS) in the 'admixture' time. Those that were within 24 hours dropped from 59% to 33% (p<0.01) after the protocol, and rose to 45% (p,0.05) in the 'admixture' period.

Methods used to derive estimates of effectiveness
For the period of the treatment programme, there was a reduction in the number of urgent hospital admissions, in the length of stay in the emergency department and in the frequency of return visits. The authors appear to have based their assumptions on this evidence.

Estimates of effectiveness and key assumptions
The authors implicitly assumed that the effectiveness of treatment in the protocol period was at least as good as the effectiveness of care in other periods. Treating effectiveness as equivalent, the authors did not attempt a formal quantification, but focused their analysis on costs.

Measure of benefits used in the economic analysis
Benefits were not formally quantified in this analysis, as the intervention was considered to be the dominant strategy.

Direct costs
The cost boundary adopted was that of the hospital. Unit prices were not reported separately from quantities and costs were not discounted. For each period, an average charge per asthma patient was calculated by combining total cost figures for emergency and inpatient care. All charges and fees used in the cost analysis were taken from those in operation during the protocol period. Physician fees were based upon published scales in the Department of Medicine. Ancillary services, including drug therapy, were explicitly excluded from the costing. The dates to which cost and resource use data related were not given.
Statistical analysis of costs
Cost data were treated stochastically in that costs were reported as mean charge per case, with associated P value. Confidence intervals were not given. It is unclear which of the statistical tests listed by the authors was applied to the cost data.

Currency
US dollars ($).

Estimated benefits used in the economic analysis
Benefits were not formally quantified in this analysis, as the intervention was considered to be the dominant strategy.

Cost results
The mean charge per case was $1,147 in the protocol period, $1,841 in the pre-protocol period (P<0.01) and $1,545 in the admixture period (P<0.01). Discount rates were not applied and confidence intervals were not given.

Synthesis of costs and benefits
A synthesis was not undertaken by the authors because the intervention was the dominant strategy.

Authors' conclusions
Asthma therapy protocol use improves outcomes and yields significant financial benefit. It allows the identification of individuals who require urgent hospitalisation and the detection of sub-optimal physician practice.

CRD COMMENTARY - Selection of comparators
A justification was given for the comparators used. The authors aimed to compare the effect of encouraging a systematic approach to care, incorporating verifiable indices, with care in which admission and discharge decisions were based on subjective assessment. You should consider whether these are widely used health technologies in your own setting.

Validity of estimate of measure of benefit
Benefits were not formally quantified in this analysis. The authors only evaluated costs, thereby implicitly assuming that effectiveness in the protocol period was dominant to effectiveness in the other periods, based on reductions in LOS, admission rates, and re-admission rates. If health outcomes had been used to measure effectiveness, then the cost-effectiveness of the protocol could have been assessed. The authors indicated their awareness of the uncertainty of the effectiveness relating to the absence of follow-up.

Validity of estimate of costs
The pattern of care given in the pre-protocol period may have yielded cost savings that would be unattainable in a more efficient setting. The authors stated explicitly that their costing estimates were approximate: all indirect and long-term costs and some direct costs (such as the cost of drug therapy) were omitted. It is unclear whether the costs measured included those for intensive care and return visits. Discounting was not performed and dates for cost data were not given. Unless the emergency department was operating at full capacity, cost savings achieved there may not have represented resource savings. The assumption that all fees and charges were constant over the study period may have been inaccurate. Lastly, the authors did not separately report the unit costs employed in the analysis, making it difficult to assess the reproducibility of savings in other settings.

Other issues
The medical practice and organisational efficiency in other settings may affect the reproducibility of cost savings achieved in this study. The authors chose a before-and-after study design to minimise distraction for the hospital staff and to encourage adherence to the protocol. Unfortunately, this type of study makes it difficult to determine the exact causality of the changes in resource use observed during the protocol period. Given the limitations of the data, it is difficult to know if the authors were justified in their conclusions.

**Implications of the study**
A more rigorous study design, including measurement of actual health outcomes and a more detailed analysis of costs would give a more accurate indication of the cost-effectiveness of asthma protocol therapy.

**Source of funding**
Supported in part by Specialized Center of Research Grant (SCOR) HL-37117 from the National Heart, Lung, and Blood Institute and General Clinical Research Center Grant MO1 RR 00080 from the National Center for Research Resources.

**Bibliographic details**

**PubMedID**
7503089

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Acute Disease; Adolescent; Adult; Algorithms; Asthma /drug therapy /economics /therapy; Clinical Protocols; Cost Savings; Decision Trees; Emergency Service, Hospital /standards; Female; Hospitals, University; Humans; Male; Ohio; Patient Admission; Treatment Outcome

**AccessionNumber**
21996000077

**Date bibliographic record published**
31/01/1999

**Date abstract record published**
31/01/1999