Impact of school-based health centers on children with asthma

Guo J J, Jang R, Keller K N, McCracken A L, Pan W, Claxton R J

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
School children with asthma were given access to school-based health centres (SBHCs) in their own schools. These centres opened during school hours and were staffed by at least one nurse practitioner and one part time medical doctor.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The population comprised school age children with asthma.

Setting
The setting was community care. The economic study was carried out in Ohio, USA.

Dates to which data relate
The effectiveness and resource evidence were from the period 1997 to 2003. The price year was 2002.

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

Link between effectiveness and cost data
The same patients provided both the effectiveness and the cost data. The costing was conducted retrospectively.

Study sample
The study included the first four SBHC intervention school districts (7 schools) funded by the Health Foundation. Two comparison (non-SBHC) school districts (6 schools) were selected to reflect students with similar characteristics to those in the SBHC schools, based on Ohio census data from local education departments.

All of the patients who satisfied the inclusion criteria were included in the study. They had to have at least 2 years continuous enrolment in their schools and be part of the Ohio Medicaid programme. Initially, there were 556 pupils with an asthma diagnosis who were in the Ohio Medicaid programme. Of these, 282 were excluded because they had only one year of school enrolment, while one student was excluded because he had very severe asthma and multiple co-morbidities and very high health care utilisation. This left 273 students in the study, 196 (38.3% female) who attended school with an SBHC and 77 (52.0% female) who attended school without an SBHC. The average age was 8.3 years.
(standard deviation, SD=2.3) in the SBHC group and 8.2 years (SD=2.3) in the non-SBHC group. The statistical power after enrolment was found to be greater than 0.80 with an alpha size of 0.05 to detect a medium effect of 0.15.

**Study design**
This was a multi-centre study that was carried out in 13 schools in 6 school districts using a "longitudinal quasi-experimental time-series repeated measure design". The follow-up period was unclear. Blinded assessment and loss to follow-up were not reported.

**Analysis of effectiveness**
The analysis was conducted on an intention to treat basis. The health outcomes used were rate of hospitalisation per child and rate of ED visits per child. The baseline characteristics of the two groups of students showed similarity in many, but not all, respects. The non-SBHC group had a higher percentage of females and children of other races, had significantly less enrolment in managed care organisations, and less allergy co-morbidity.

**Effectiveness results**
Following the introduction of SBHCs in year 2000, the relative risk of hospitalisation decreased 2.4-fold (i.e. 3.403 - 1 = 2.4), (p<0.05), and the relative risk of ED visits decreased 33.5% (i.e. 1.335 - 1 = 0.335), (p<0.05).

When non-SBHCs were compared with SBHCs, the relative risk of hospitalisation was 1.960 (95% confidence interval, CI: 0.631 - 5.884) and the relative risk of ED visits was 1.430 (95% CI: 1.0924 - 1.865), (p<0.05).

The risk of ED visits for children enrolled in a managed care organisation plan and Children's Health Insurance Program were 5.7% (i.e. 1.00 - 0.943 = 0.057) and 24% (i.e. 1.00 - 0.76 = 0.24), respectively, lower than children enrolled in other Medicaid programmes.

**Clinical conclusions**
The authors concluded that SBHCs provided a primary care service that prevented children needing hospital services by, for example, providing medication at an earlier stage.

**Measure of benefits used in the economic analysis**
No summary measure of benefits was used as the authors carried out a cost-consequences analysis.

**Direct costs**
 Discounting was carried out at a rate of 3%. The quantities and the costs were not analysed separately. The costs of hospitalisation and ED visits were measured. These cost categories included hospital accommodation, medical therapy service, physician encounter and radiological diagnosis during the children's hospitalisation period, and ED service, medical treatment, physician encounter and radiology during the ED visit period. The costs were derived using actual data obtained from the Ohio Medicaid claims databases. The costs were measured from 1997 to 2003, and were then adjusted to the 2002 price year using the medical component of the Consumer Price Index (MPCI) (values of MPCI rates of change were provided for different years).

**Statistical analysis of costs**
No statistical analysis of the costs was carried out.

**Indirect Costs**
No indirect costs were calculated.
Currency
US dollars ($).

Sensitivity analysis
No sensitivity analysis was carried out.

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

Cost results
For the SBHC students, the cost of hospitalisations went from $203,981 before the introduction of SBHCs to $48,140 after their introduction. During the same time period, the costs for non-SBHC students decreased from $49,997 to $46,374.

During the same time period, the costs of ED visits decreased from $56,269 to $52,734 for the SBHC students and increased from $26,178 to $27,765 for the non-SBHC students.

The authors reported that the potential cost-saving for hospitalisation was $970 per child with asthma (i.e. $1,150 - $180 = $970).

It was unclear whether knock-on costs were dealt with in the costing.

Synthesis of costs and benefits
The costs and benefits were not combined as the study was, in effect, a cost-consequences analysis.

Authors' conclusions
The children's health improved after the introduction of school-based health centres (SBHCs), which resulted in fewer visits to the hospital and emergency department (ED) and, therefore, lower hospital and ED costs.

CRD COMMENTARY - Selection of comparators
The choice of the comparator, no SBHC, was implicitly justified by it being current practice in many settings. You should decide if the comparator represents current practice in your own setting.

Validity of estimate of measure of effectiveness
The effectiveness data were derived from a single study. The study design was not appropriate for the hypothesis in that it involved comparing school districts with and without SBHCs, but did not allow for the fact that districts containing SBHCs were not necessarily going to be similar to districts in which there were no SBHCs, although the authors did select districts that appeared to have similar demographics and socio-economic status. The non-SBHC schools had a much lower percentage of pupils enrolled in a managed care organisation. The study sample was representative of the study population and the patient groups were shown to be comparable in many respects at baseline. There was a marked difference in allergy levels between the groups which was not considered when assessing the health outcomes. The authors realised that the measures of effectiveness chosen (i.e. visits to the hospital and the ED) were not measures of health but, as this was a retrospective study, they did not have access to the appropriate measure of health for asthma sufferers. The authors acknowledged that some misclassifications of disease diagnoses were possible.

Validity of estimate of measure of benefit
The authors did not derive a measure of health benefit. See the comments in the 'Validity of estimate of measure of
effectiveness’ field (above).

**Validity of estimate of costs**
Not all cost categories relevant to the cost perspective adopted (i.e. that of the health system) were included, as the study did not include the cost of setting up and running the SBHCs. This omission would have overstated the reduction in costs resulting from setting up the SBHCs. The costs and the quantities were not reported separately, which will limit the reproducibility of the study in other settings. The resource use quantities were taken from a single study, while the prices were taken from the authors’ setting. No statistical, sensitivity or any other kind of analysis of the quantities or prices was undertaken. Charges were used to proxy prices. This has the limitation of not reflecting true opportunity costs, thus restricting the external validity of the results. The price year was reported, which will aid any future reflation exercises. Discounting was necessary, as all of the costs were incurred during more than 2 years, and was therefore performed.

**Other issues**
The authors made appropriate comparisons of their results with the findings from other studies. The issue of generalisability to other settings was mentioned. The study referred to children with asthma and this was reflected in the authors’ conclusions. The authors did not present their results selectively and their conclusions reflected the scope of the analysis. The authors were aware that the data used in the study were far from perfect; they only dealt with data from children who had Medicaid claims and there was no certainty that these children had actually made use of the SBHC for their asthma. Although the authors were aware of many of the deficiencies in their study, they did not seem to realise that they should have included the cost of running the SBHC in their cost calculations.

**Implications of the study**
The authors recommended research to evaluate the effect of SBHCs on quality of life, school performance and total health costs. A prospective study is necessary to ensure that the appropriate health and cost data are collected.

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