**Cost-effective management of asthma in children**

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**ABSTRACT**

In South Africa we face a crucial addition to medical management principles, namely applying a cost-effectiveness analysis to the management plan. Disease management is a system that emphasises the need to control the disease, and not only manage the consequences. The intervention itself can be encapsulated in the form of clinical protocols or care pathways (based on guidelines) that must be disseminated and applied. Outcomes measurement and management can tell us more about the effectiveness of different interventions and may help increase the efficiency of existing systems for monitoring the quality of care. Evidence-based medicine, characterised by use of the highest grade of evidence available, is essential to this process. Population-based medicine, including disease management, is a new approach to medical care. It will not replace doctor-patient-based medicine but will partner it in the new network of delivery systems. Managed health care is an evolving science involving determination of best practice (based on evidence) and then reducing the variation in practice between providers. To integrate cost and cost-effectiveness of a therapeutic intervention requires both medical and economic justification. Two methods of addressing the issue of cost-effective asthma care in South Africa are proposed, namely wider dissemination and application of asthma guidelines and introduction of asthma clinics into general practice. An effective asthma education programme can resolve most, if not all of the shortcomings in asthma care. Such programmes in other countries have been shown to result in two- to five-fold real community cost savings, using the same medication!

There are two important principles in treating any disease: firstly, putting together the constellation of symptoms, signs and results of any specific investigations and coming up with a diagnosis or short differential diagnosis; and secondly, planning a rational course of therapy, be this short or long term, medical or surgical. In South Africa we face a third and crucial addition to these principles: applying a cost-effectiveness analysis to the management plan. This does not mean compromising on patient care, but rather critically choosing a road forward which benefits not only the patient but also the community.

**Asthma in the South African context**

In general, in the field of asthma a window of opportunity now exists for addressing the principles of disease management, managed health care, and cost-effective care.

**Disease management**

This involves a change from the classic model of an individual physician providing health care, as in the clinical setting, to a population-based systematic approach that identifies persons at risk, intervenes, measures the outcomes, and provides continuous quality improvement. It is a system that emphasises the need to control the disease, and not only to manage the consequences. The three essential elements of disease management are:

- A knowledge base that quantifies the economic structure of the disease problem and describes care guidelines
- A delivery system that co-ordinates all care: primary, secondary, tertiary and social
- A quality improvement system that audits performance against evolving standards.

Because of its status as a cost-reducing initiative and its potential for broad application, disease management has become a popular but as yet poorly applied strategy in the healthcare system. Pharmaceutical companies, funders of health care, (medical aids/administrators) and patient education organisations are very keen to be involved. However, pharmaceutical companies have been accused of using the promise of disease management as a way to sell particular drugs. For example, companies with large investments in asthma drugs are leading the charge to develop asthma disease management programmes. The involvement of these companies increases the possibility that disease management will become more of a marketing tool than a contribution to the healthcare delivery process, and control over health care could be transferred from physician to drug company. However, the trade, especially in the asthma field, appear to be acting ethically and with insight.

More important than who is running a disease management programme is whether there is a good reason to believe that the proposed programme will work. Comprehensive disease management requires a deep understanding of the natural history of disease to determine where in the life cycle of disease an intervention should be implemented. Because most chronic diseases have a long natural history, similar interventions could be implemented for patients with existing disease (secondary prevention) and for those as yet without symptoms (primary prevention). However, the economic consequences and time frames would differ because of the frequency of events or the success of the interventions.

For planning purposes, the intervention itself can be encapsulated in the form of clinical protocols or care pathways (based on guidelines) that must be disseminated and applied. Disease management programmes would include many components, each of which must be identified, implemented and measured for outcome (Table I).

Although disease management programmes have perhaps not yet been fully evaluated, some of their components have been studied. For example, recent research has shown that automated telephone...
Population-based medicine

The cycle of care for the individual begins with one or more health risks before any care is sought, and ends with one or more outcomes after care is received. The sum of the individual risks, demands, diseases and outcomes of the members of a population can be approached systematically by interventions that favourably alter the population’s health and healthcare costs.

Evidence-based medicine, characterised by use of the highest grade of evidence available, is essential to this process. Randomised controlled trials are preferred, and guidelines must be referenced to appropriate evidence. Cochrane Collaboration-style evidence (systematic reviews) should be used where available.

If there is insufficient evidence to support one option, then this should be stated clearly, and guidelines should subsequently be revised in the light of new evidence. Evidence-based medicine should result in valid, cost-effective clinical guidelines.

Population-based medicine, including disease management, is a new approach to medical care. It will not replace doctor-patient-based medicine but will partner it in the new network of delivery systems, and it offers several promises, to:

- Improve efficiency
- Find systems to solutions healthcare problems, showing ways in which care can be improved by changing the delivery system rather than the people who provide the service
- Improve medical decision making by allowing doctors to understand the other role players in healthcare delivery and exposing doctors to the full ramifications of their decisions.

Managed health care

This is an evolving science involving determination of best practice (based on evidence) and then reducing the variation in practice between providers. It focuses on the ‘average’ case, and can comfortably accommodate the options in terms of algorithms. True managed care is not simply about reducing the cost of a particular disease in order to sustain care. In fact we must change our thinking to an appreciation of the role of an absolute rand value of medical intervention. In South Africa, a country with medical inflation fairly consistently increasing at twice the consumer price index, the major objective of managed health care is the afford-

### Table I. Examples of components of disease management programmes

<table>
<thead>
<tr>
<th>Component</th>
<th>Patient Identification</th>
<th>Programme Implementation</th>
<th>Outcome Measurement</th>
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</thead>
<tbody>
<tr>
<td>Health risk assessment</td>
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<tr>
<td>Chart audit protocols</td>
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<td>Database analysis</td>
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<tr>
<td>Psychometrics (such as quality of life)</td>
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<td>Clinical guidelines</td>
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<td>Clinical pathways</td>
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<td>Clinical trials</td>
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<td>Professional education</td>
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<tr>
<td>Patient education</td>
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<tr>
<td>Automated telephone systems</td>
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remind systems can increase clinic attendance by nearly 35%, and the use of home blood pressure monitoring can reduce physician office visits by 44%. Asthma management programmes have been shown to save $11 for every dollar spent on education. In South Africa, Access Health (Pty) Ltd conducted an Asthma Management Programme during 1999. (H Potgieter – personal communication) Participants were encouraged to set goals for managing their condition. Before commencing the programme participants took 4 986 sick days per year from work. The rate decreased by 546 after 120 days of participation. In addition, before commencement of the programme, participants had 676 emergency visits per thousand per year. After 120 days of participation there were no reported emergency visits.

Outcomes measurement and management

Outcomes research is a rapidly evolving field that incorporates epidemiology, health services research, health economics and psychometrics. It can tell us more about the effectiveness of different interventions and may help increase the efficiency of existing systems for monitoring the quality of care; perhaps this information will facilitate the formulation of guidelines for efficient decision making (Fig. 1).

Disease management incorporates outcomes research technology into outcomes measurement and management programmes, between which there is only a technical distinction. Outcomes management assumes that optimal therapy can be determined through reviewing treatment and measuring outcomes. This is a dynamic management model that seeks to produce outcomes in a clinical setting and is therefore the application of outcomes research in practice. Uniform collection and coding of outcomes data in the population are necessary. To obtain these, providers have to be linked through a computerised information system. If system administrators and healthcare professionals have access to the outcomes data, they can more easily evaluate the economic and health outcomes for each patient.

The model for the management of disease is population-based, and involves management of health risk, disease, demand and outcomes. The management code words of population-based medicine – ‘health risk’, ‘demand’, ‘disease’, and ‘outcomes’ – refer to population-based interventions delivered at different points in the healthcare cycle.
ability of health care. Government needs to provide better health care to more citizens, employers want low-cost cover, patients want quality and choice, doctors want autonomy, and funders want to balance their books. These are the bottom-line expectations of medical interventions. Is it possible to meet all of these diverse requirements? It may well be, provided we create our own model for South Africa by critically considering each point in the chain and re-evaluating the disease under discussion (in this case asthma) and the interventions needed.

Cost-effective care

To integrate cost and cost-effectiveness of a therapeutic intervention requires both medical and economic justification. The first of these involves both the efficacy and safety of a particular intervention (medical or surgical, pharmacological or procedural). Economic justification on the other hand, is not the rand value of such an intervention, but the rand value of a successful outcome. It is therefore a more difficult endpoint to quantify.

Likewise, efficacy is not synonymous with effectiveness. A controlled clinical trial of a pharmacological agent can be rigorously assessed by subjection of measurable clinical and/or laboratory parameters to statistical analysis for efficacy. With effectiveness, however, the day-to-day practice reality intervenes, and the choice of whether to use a certain agent, its impact on patients (both compliant and non-compliant), the side-effects, the patient preference and many other variables are tested. Furthermore, when a pharmacological agent is tested under controlled circumstances, its cost is usually not measured. In many circumstances an inexpensive agent may be highly cost-ineffective. A drug that is cost-saving improves outcomes at a lower overall cost, whereas a cost-effective drug improves outcomes at a ‘reasonable’ increase in overall cost. In practice therefore, the only way to migrate from cost to cost-effective intervention, is to combine the rand value with outcome measures for a particular disease. Eisenberg and colleagues have created a graphic illustration of this principle by integrating the point of view scenario with the types of costs to be considered in determining cost-benefit (Fig. 2). As shown, cost may be extremely difficult to quantify because intangible costs (such as quality of life) are not measurable by standard methods.

Cost-benefit may be even more difficult to measure than cost-effectiveness. Here the choice of using a treatment modality at one point in time is subjected to review at another point in time. Cost-benefit analysis allows for the identification and comparison of the costs associated with the implementation or use of a medical programme or technology, and the benefits derived from its application. Both costs and benefits are defined in monetary terms and adjusted to nett present value, and both usually reflect a wider societal point of view. The intervention is said to be cost-beneficial if the benefit-to-cost ratio exceeds 1:0. However it is often difficult to express all benefits in economic terms, hence the use of cost-effectiveness analysis. In this case the health consequences of treatments are expressed in ‘natural’ units such as symptom-free days.
or years of quality-adjusted life saved. Important non-economic factors can also be incorporated into the assessment. Usually two interventions are compared, or an intervention compared with non-intervention, provided the selection of the therapeutic options is based on similar knowledge and state of disease at the original point. It is therefore imperative that the disease state and its therapy are fully understood by the medical fraternity before any cost-effectiveness data can be obtained. What measures of effectiveness are possible? First is a measure of symptoms, signs and laboratory tests. These may be measured by questionnaire, clinical parameters or absolute numbers. At the very least, where a test is used, it must be known to correlate with the clinical state of the disease. Secondly, effectiveness can be measured against the reduction of usual therapeutic interventions – pharmaceuticals, consultations, hospitalisation, etc. However, it must be remembered that every disease will present with a spectrum of severity, and this may vary within the time course of an illness. Thirdly, patients’ and their families’ behavioural changes may indicate the effectiveness of therapy. Lastly, but probably most importantly, outcome can be measured by improvement in health-related quality of life. This requires a subjective assessment by the patient and/or parent.

The need for intervention in asthma management is obvious; the method of such intervention is more obscure. In assessing cost-effectiveness of asthma care, cost of direct healthcare interventions can be measured. Indirect health-related cost is defined as lost work/school and a better quality of life. Apart from direct cost savings, guidelines-based management is also likely to result in fewer days off work/school and a better quality of life.

**How can this be achieved?**

An effective asthma education programme can resolve most, if not all, of the shortcomings in asthma care. Such programmes in other countries have been shown to result in two- to five-fold real community cost savings, using the same medications! In order to succeed, a programme of this sort will have to have many facets, including:

- An education programme directed at healthcare workers to improve recognition and treatment of asthma. Protocols that are recommended must cover available medicines.
- An education programme for patients to empower them to take responsibility for their condition. In other words, with complete information about their condition, treatment options and treatment goals, patients will be able to contribute more fully to the decision-making process of management. This is now referred to as the ‘concordance’ approach.
- A multi-lingual, multi-cultural education programme, comprehensible by those to whom it is directed. All the major languages in South Africa must be accommodated, and the educational material must be culturally acceptable and understandable by the people receiving the information.

**ASTHMA CLINIC CONCEPT**

Because of the poor management of asthma, many opinion leaders have identified the need for the establishment of asthma and/or allergy clinics/centres of excellence in the private sector; however, a market opportunity also exists for accessible GP-based clinics, offering a comprehensive diagnostic, assessment, educational and treatment service of the highest quality, at affordable rates.
The potential benefits of establishing such a clinic network would be:

- Optimal patient care (reduced total cost)
- Control over prescribers:
  - guidelines-based approach
  - formulary control
- Comprehensive patient and cost data
- Preferred provider status with managed care companies
- Controlled environment for clinical pharmaco-economic studies
- Preferred supplier options (managed care groups would seek out clinics functioning in this way)
- Opportunity to secure patient loyalty and responsibility
- Opportunity to maximise benefits of patient database services
- Partnership opportunities with like-minded groups
- Alignment with professional societies, specialist groups and academic units
- Opportunity to focus on health maintenance and the need to optimise inter-episodic care.

Many asthmatics in South Africa are not being treated according to local or international guideline recommendations. Decision Services International (DSI) data indicate that only 12-20% of asthmatics receive inhaled corticosteroids, with the majority of sufferers receiving no ‘preventer’ medication. The frequent use of bronchodilators (7:1) vs corticosteroid, together with the large number of prescriptions for oral steroids (equal to inhaled corticosteroid scripts), highlights the inadequate management of this condition.

CONCLUSION

Asthma is common and treatable. We can afford to manage this condition adequately. All that is needed is attention to the principles of cost-effective care. In this way everybody (providers, dispensers, funders and patients) will benefit.

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