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REVIEW

Enhancing care for people with asthma: the role of communication, education, training and self-management

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ABSTRACT: Reduction in the morbidity associated with asthma requires attention to several aspects of the behaviour of health professionals and patients, and to the interactions between these two groups. In this review, what has been learnt about health professional/patient communication and patient education (skills, settings and materials), lay and health professional liaison (including telephone helplines), patient education in low-income countries, the integration of patient education into clinical practice, health professional training and the implementation of guidelines, and the role of national asthma campaigns is drawn together. What changes in public policy would enhance asthma care, and whether the promotion of asthma self-management skills is cost effective are also considered. It is concluded that, although further research is necessary in many areas, well-educated health professionals who recognize the person with asthma as an individual, and who give advice about self-management, can significantly reduce the suffering and costs associated with asthma.
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During the World Asthma Meeting in Barcelona, December 1–13, 1998, five working groups met to discuss the current state of knowledge and future research agenda for "Epidemiology", "Prevention", "Pathogenesis", "Therapeutics", and "Education and Delivery of Care". Short summary documents from each of the working groups have been published in the *European Respiratory Journal* [1].

The present review is based on the longer background document that was prepared by the Education and Delivery of Care Working Group to service their deliberations in Barcelona and summarized for the earlier publication. Essential elements in the delivery of effective care to people with asthma are well-educated health professionals, who are effectively organized and working, in an adequately funded system in which there is good communication between patients and health professionals and in which prescriptions for medication are offered in a manner making it likely that patients use the medication. This review covers all aspects of delivery of care to people with asthma, as listed in table 1.

The importance of good communication

"It is more important to know what sort of person this disease has than to know what sort of disease this person has." Many health professionals are reiterating W. Osler's 90-yr-old admonishment. They are prompted by the growing use of technologically sophisticated devices to assess and monitor patients and an increased number of pharmaceutical agents and devices, while the time available for consultations/medical visits steadily lessens in the face of a rising tide of morbidity associated with chronic illness.

Table 1. – Factors to consider when developing a model for the delivery of effective care to people with asthma

The importance of good communication between health professionals and patients, how it can be promoted and how communication can be improved
The key elements of education for asthma patients
The efficacy of various aspects of patient education and self-management
The best opportunities or settings for patient education
Whether asthma self-management is cost effective
The value of different educational materials and media for patients
How to develop appropriate asthma information materials for patients
How to integrate educational activities into clinical care
Opportunities for lay and health professional liaison in asthma care
Asthma education in developing countries
How to encourage health professionals to implement guidelines on asthma care
The role of national training centres in the training of health professionals
The role of national asthma campaigns
The role of asthma telephone helplines
Changes in public policy that would enhance patient education and self-management

Good communication within a consultation/medical visit is essential for a satisfactory outcome, and all published national and international guidelines for managing asthma recommend a partnership between clinician and patient. A ground-breaking study by KORSCH *et al.* [2], in 1968, quantified the lack of attention paid by physicians to patients' fears and concerns, and the negative impact of this behaviour on patient satisfaction. The characteristics of doctor/patient communication have since been described. Key behaviours that help clinicians to communicate more effectively include adopting a congenial demeanour (friendliness, humour and attentiveness), showing empathy (eliciting and acknowledging patient fears and concerns) and giving encouragement, praise and reassurance, in addition to providing the patient and their family with information about what to expect from the consultation, and about the condition and treatment plan [3–6].

What can we learn from prospective studies about the effect of communication on patient outcomes? A review of 21 studies over a 10-yr period found that 16 reported the quality of communication as influencing patient health outcomes such as emotional health, resolution of symptoms, function, physiological measures and pain control [7]. Two randomized controlled clinical trials have shown that improving the skills of physicians in communication and patient education leads to better development of disease management strategies during the consultation, greater patient satisfaction and improved patient outcomes, with no increase in consultation time [5, 8]. The results of another study identified an association between the use of more positive communication, for example encouraging patients to talk using humour, and informing patients what was going to happen during the consultation, and fewer malpractice claims, suggesting that the process and tone of a consultation may be more important than what is said [3]. In contrast, a programme focusing only on the physician eliciting and responding to the concerns of patients found this behaviour to have no effect on patient outcomes [9]. However, baseline measures of patient satisfaction were already high in this study. Methodological issues in this and other studies indicate the need for further research.

Few studies explicitly describe interventions to improve separately but simultaneously the communication skills of the health professional and the knowledge and involvement of the patient. In one such study of children with asthma, physicians included children more often in the discussion of medical treatment and the children retained more information and expressed stronger preferences for being active in maintaining their health, but no differences were noted in parent or physician satisfaction with the consultation [10].

An analysis of four clinical trials in various practice settings, among patients with long-term illness from different socioeconomic backgrounds, concluded that the physician/patient relationship was an important factor influencing patients' health outcomes and must be taken into account in light of current changes in the healthcare delivery system that may place this relationship at risk [11].

One challenge facing medical practice is to ensure that advances in technology do not impede direct communication with patients or their carers, but are used as tools to improve it. Timesaving tools, rather than reducing consultation times, could allow more time to be spent talking with patients and their families, and new technology such as e-mail can itself be the means of enhanced communication and, because of its convenience, a source of patient satisfaction [12].

Improving communication between health professionals and patients

Research and clinical experience suggest that, with training, health professionals can improve their communication skills in such a way that patients experience measurably better outcomes, but few effective models have been tested [13]. Similarly, there are few validated tools with which to assess health professional communication [4, 6]. One instrument that measures physician behaviour with respect to asthma is useful in evaluating performance and developing communication training programmes [14].

However, studies over 25 yrs have identified several factors that weaken the patient/clinician partnership, reduce communication and keep patients from being competent managers of their own disease.

Patients, and parents of children with asthma, may not be forthcoming with clinicians because they: 1) feel that they are wasting the clinician's valuable time; 2) omit details they deem unimportant; and 3) are embarrassed to mention things that they think will make them look bad. Patients and parents may fail to follow clinicians' instructions because they: 1) do not understand medical terms; and 2) believe that the clinician has not really listened to them and so does not have the information needed to make a good treatment decision.

Strategies have been identified that improve professionals' communication with patients, enhance information exchange and focus consultations on the patients' personal goals [15]. Detailed strategies may need to differ from culture to culture, but good general guidelines exist (table 2) [13].

At least one study in asthma has shown that education for the healthcare provider, based on 1) clinical guidelines for asthma treatment, 2) the 11 consultation skills described in table 2, and 3) basic educational messages for patients, can change provider behaviour and improve patients' satisfaction, health and use of healthcare [5].

What are the key elements of asthma education for patients?

The education of patients with asthma should provide them with the knowledge, skills and attitudes necessary to control their symptoms and cope effectively with their condition, and enable them to recognize and avoid ineffective practices. There is reasonable consensus as to the self-management skills that patients with asthma require and should possess as a result of education (table 3) [15]. However, it is only beginning to be understood, first, which of these skills are the most important; secondly, how much this differs from patient to patient; and thirdly, which components of patient education most influence the development of these skills.

WILSON and coworkers [17–19] analysed reports from health professionals, patients and parents of patients concerning the asthma management behaviours of asthma

Table 2. – General guidelines for the health professional on how to behave in a way that improves communication with patients and their families

Be attentive to the patient (signalled by cues such as using eye contact, sitting rather than standing when in conversation with the patient, moving closer to the patient and leaning slightly forwards to attend to the discussion)
Elicit the underlying concerns of the patient about their condition, or those of parents about their child
Construct reassuring messages that alleviate fears (fear is a distraction; reducing it enables the patient to focus on what the physician is saying)
Address immediately concerns expressed by the family (enabling patients to focus their attention on the information being provided)
Engage the patient or parents in interactive conversation through the use of open-ended questions, simple language and analogies to teach important concepts
Tailor the therapeutic regimen by eliciting and addressing potential problems in the timing, dosage or side-effects of the medicines recommended
Provide patients or parents with a written management plan, ideally in their own handwriting
Use appropriate nonverbal encouragement (such as a pat on the shoulder or a nod in agreement) and verbal praise when the patient reports using correct disease management strategies
Elicit the patient′s or parent′s immediate objective with respect to control of the disease and agree with the family on a short-term goal (*i.e.* a short-term goal that is important to the patient, and that both healthcare provider and patient/parents will strive to reach)
Review the long-term measures by which success of the treatment plan is judged
Help the patient to plan decision-making about their long-term condition (for example by using diary information or guidelines on how to deal with potential problems) and explore contingencies liable to arise in managing the disease

patients and their families. From these reports, they identified effective and ineffective self-management practices of children, adults and parents of very young children with asthma. They also attempted to identify the knowledge, attitudes and skills necessary for successful self-management practices, and showed that patient outcomes were improved by education programmes developed to teach this knowledge and build the identified attitudes and skills [19, 20].

This research has provided a list of asthma self-management behaviours that are critical to asthma control for at least some patients, and identified relevant skills, but questions remain. Which skills are most likely to be lacking in patients without adequate asthma education? Can a minimum set of essential knowledge, attitudes and skills that might allow for more efficient patient education be defined? For example TAKAKURA *et al.* [21] found that teaching patients about asthma medicines and when each should be used, and about inflammation improved outcome; giving other information, such as that on the structure and function of the lungs, had no effect. An understanding of the stages through which patients pass in developing effective asthma management skills, as defined by ZIMMERMAN *et al.* [22] in a study of parents of children with asthma, can help focus attention on what information and motivation asthma patients need to achieve effective self-management.

Table 3. – The attitudes, skills and knowledge required by a patient with asthma if they are to manage the disease effectively

Acceptance that asthma is a long-term treatable disease
The ability to describe accurately asthma and its treatment
Active participation in the control and management of their asthma
Identification of factors that make their asthma worse
The ability to describe strategies for avoidance or reduction of exacerbating factors
The ability to recognize the signs and symptoms of worsening asthma
Following the prescribed treatment plan
Correct administration of inhaled medications using appropriate device (metered-dose inhaler, breath-actuated inhaler, spacer and nebulizer)
Taking appropriate action to prevent and treat symptoms in different situations
Using medical resources appropriately for routine and acute care
Monitoring symptoms and objective measures of asthma control
Identification of barriers to adherence to the treatment plan
Addressing specific problems that have an impact on their condition

Further work is needed to define the ideal curriculum content and most effective teaching strategies. The main questions concern the relative importance of different behaviours, and the specific knowledge and skills that patients need if they are to carry out the required actions effectively. Clinical experience suggests that the most important things for the patient to understand are: the role of inflammation in asthma; how preventer/controller and reliever medicines work and when they should be used; what to do in an emergency; and proper technique for self-administration of inhaled medications.

What are the best opportunities or settings for patient education?

Although research evaluating education for asthma has been conducted in many settings, hospitals, emergency rooms, community organizations and schools, there have been no studies explicitly comparing the value of different settings. To date, there is no clear evidence that one setting is best: rather, each offers specific advantages and limitations that should be viewed as shaping the educational goals that can be attained.

Emergency departments and inpatient wards

A series of studies performed in emergency departments and inpatient wards, in adults and children, have been reported. Such acute settings selectively capture patients whose asthma is poorly controlled at a time when they may be more receptive, and thus may provide a "window of opportunity", when motivation is high and behaviour modification may be possible.

The primary goals for education in these settings are to teach preventive action that will reduce healthcare use, and to direct patients to sources of preventive care and educational programmes. There is some evidence of benefit

from asthma education in the acute setting. A recent review of adult asthma self-management programmes identified five studies in which patients were selectively included from either a hospital ward or a hospital emergency department [23]. All five studies showed a significant reduction in subsequent hospital admissions or emergency department use or both. In one study that showed both of these benefits, patients were randomized to a control group or an intervention group that received one small-group education session, including practical training with the provision of an asthma plan and advice on altering medication [24]. On follow-up, the number of readmissions in the intervention group were one-seventh of those in the control group, and emergency department attendances were significant reduced. Similar benefits from intervention delivered to an acutely ill hospital population have been described in children [25].

Primary care and clinics

Consultations in primary care and routine clinics take place in a setting that potentially facilitates the integration of medical care and education. Patients can be seen at regular intervals, allowing plenty of opportunity for reinforcement and review of an educational programme. Pres-sure on clinical time can be eased by group teaching, and sharing of asthma care between physician and nurse.

The primary goal for education in this setting is to reduce asthma morbidity and its consequences by teaching patients a preventive approach to asthma care. This may be achieved by focusing on developing partnerships, teaching patients how to follow asthma plans, and addressing fears and concerns that may act as barriers to compliance. The observed benefits have mainly related to improvements in knowledge, compliance with medication (self-reported) and peak flow meter use, with some reduction in numbers of patient visits to the doctor [26, 27]. To date, most of the studies in general practice have focused on an intervention delivered directly to the patient. CLARK *et al.* [5] studied the effect of physician education on child patient outcomes; the study used interactive teaching of self-management, using lectures, videos and observation logs. The teaching emphasized the paediatrician′s central role in enabling patients to be self-managers. It emphasized communication skills. The authors observed change in physicians′ prescribing behaviour, and improved parental satisfaction with the asthma consultations. Significant benefit was detectable, in terms of hospital admissions and emergency department use, after allowance was made for children with more severe asthma.

Schools

Schools offer a unique setting for asthma education, and improved asthma behaviour instilled in children, if maintained in adulthood, should have at least some effect on longer-term asthma morbidity. Schools provide an opportunity to reach large numbers of children independent of their access to medical care. However, the disadvantage of school-based asthma education is its lack of direct integration with clinical care. The primary goal for education in this setting is to reduce the negative effects of asthma morbidity on school attendance and educational performance, and to increase children′s confidence that they can control their asthma and pursue active lives. Most studies of asthma education in schools have been conducted in the USA [28, 29]. The benefits observed were altered health behaviour, reduced asthma symptoms and improved school performance. For example children have been shown to be more likely to engage in productive cough and in breathing and relaxation exercises, and to make attempts to stay calm in the face of asthma symptoms [30].

Other community organizations

Community organizations have been used primarily as a mechanism for introducing broad multiactivity educational programmes. The programmes usually entail alliance with medical care organizations and use trained community residents plus professional educators to reach both asthma patients and the public. The main advantage of this approach is the ability to reach community members who are not receiving care or education through the healthcare system. The main limitation has been the complexity of organizing and delivering such community programmes.

The primary goals for asthma education through community programmes are to promote prevention and appropriate treatment, and to direct the public towards healthcare facilities through mediums that are easily accessible and tailored to the needs and beliefs of the local target population. Such programmes are difficult to evaluate but have been found to be effective [31, 32]. Pharmacies have also been used as sites for education, but have not, as yet, been fully evaluated. They would appear to offer another unique opportunity to educate the public, and an opportunity to monitor patients′ skills and patterns of medication use.

No clear answer

There is no clear evidence that one setting is better than another for the provision of asthma education. "Setting" is rarely the decisive factor in study design, and rarely are settings compared in the same study, it is, therefore, impossible to determine which setting is superior for patient education and self-management interventions. The best setting is probably the one in which the individual wants to learn and is most receptive to behaviour alteration. It would seem reasonable to expect that asthma education should be available at every interface between patients and care providers, whatever the setting.

Efficacy of different combinations of patient education and self-management

In Australia, a National Asthma Campaign (Australia) working party has been examining and grading the evidence to support their Asthma Management Plan. A series of key questions has been the subject of systematic review by members of the Cochrane Airways Group. The reviews (methods and results) are described in detail in the *Cochrane Database of Systematic Reviews* [33, 34], and summarized below [26]. The system for grading the evidence is detailed in table 4.

Table 4. – Grading evidence: levels of evidence used for classifying the quality of studies aimed at assessing the effect of educational interventions in asthma*

Level of evidence	Study types from which evidence is derived	Risk of bias
I	Systematic review of all relevant randomized controlled trials Large multicentre randomized controlled trials	(a) Low: no unexplained heterogeneity of effect between studies or centres; or (b) moderate: unexplained heterogeneity of effect between studies or centres or heterogeneity not explored
II	One or more randomized controlled trials and studies	(a) Low or (b) moderate
III	Controlled trials without randomization Cohort case/control analytical studies[+] Multiple time series	(a) Low
	Before and after studies (preferably from more than one centre or research group	(b) Moderate[#]
IV	Other observational studies	
V	Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees	

*: research to explore variation in the levels of evidence provided by analytical observational studies and a range of quasiexperimental studies is under way; [+]: if more than one randomized controlled trial or study is available, the results can be combined in a meta-analysis; combined results would change the level of evidence from II to I; [#]: hospital-based case/control studies would not be rated higher than IIb.

Does the provision of information about asthma and its management improve asthma outcomes in adults?

In 11 randomized controlled trials, no clinically important differences were demonstrated in hospitalization, forced expiratory volume in one second (FEV_1), peak expiratory flow (PEF) or unscheduled visits to the doctor for asthma between those who were provided with education (using information only) and those who were not. Some improvement was noted in self-reported symptoms of asthma. (Evidence level Ib.)

Interventions for asthma must enable patients to acquire skills and not just information about asthma.

Does the provision of optimal self-management education improve asthma outcomes in adults with asthma?

Essential components of self-management education are taken to be: 1) information about asthma; 2) self-monitoring; 3) regular review, for assessment of medications and asthma severity; and 4) individualized written action plan, including avoidance of symptom precipitants and use of preventive medication.

Optimal self-management education leads to a clinically significant reduction in hospital admissions, emergency department visits and unscheduled visits to the doctor for asthma. Statistically (but not clinically) significant improvements also occur in lung function as measured by FEV_1 and PEF. Successful completion of an optimal self-management education programme by 20 patients prevents one admission to hospital; successful completion by eight patients prevents one emergency department visit. (Evidence level Ia.)

Optimal self-management thus builds a therapeutic alliance between the doctor and the patient, and entails regular review and optimization of medication; knowledge is conveyed to the patient, who acquires self-management skills and uses a tailored self-management plan. Identifying and overcoming barriers to this comprehensive approach to asthma management should secure better outcomes and greater cost benefit for interventions.

Peak flow or symptoms can be the basis for self-monitoring in conjunction with optimal self-management; does it make any difference which is used?

No difference was shown in the four studies that compared these two forms of self-monitoring. However, the data available on this topic are limited. (Evidence level Ib.)

Action plans and self-monitoring should, therefore, be tailored to the skills and lifestyle of the patient, and may be based on peak flow, symptoms or both of these methods of assessment.

Is there a difference between patients who are managed solely by regular review by their doctor and those who are also instructed in optimal self-management?

Five studies compared patients who managed their own asthma between medical visits using optimal self-management (peak flow or symptoms) with patients who regularly visited the doctor for their management but were not instructed in optimal self-management. The doctors undertook periodic structured clinical review, assessing medication use and asthma severity on the basis of symptoms and lung function. There was no reported difference between the two groups. (Evidence level Ib.)

Does providing asthma education during patient visits to an emergency department improve asthma outcomes?

Providing any form of education (information only or self-management) appears to reduce the number of repeat visits to the emergency department by patients at greater than average risk of experiencing asthma attacks. (Evidence level Ib.)

The population of patients who present to emergency departments are at high risk of severe asthma exacerbations and hospital admission. Provision of even brief education before discharge can reduce representation rates. This subject is considered further in the next section.

Developing and assessing asthma information materials for patients

It is easy for health professionals to assume that they know what patients need to know and how best to provide that information. However, if the information materials produced are to be of real value to patients, it is necessary to ask the following questions. 1) Are we giving patients the information they want? 2) Are we using the most appropriate media? 3) Are written materials prepared at the right readability level, and what can they achieve?

Giving patients the information they want

Patients' sense of control appears to depend as much on information about the implications for their way of life of the disease process [35] as on information about diagnosis and treatment. Researchers developing patient information on migraine [36] were surprised to find that patients did not primarily want "medical" information about the physiology of migraine attacks, or explanation of how migraine drugs worked. Patients wanted "life impact information" and to know "what to do when" [37]. Health professionals are not always good at giving this information [38].

KAI [39, 40] found that parents felt that they had not been told how to recognize when illness is severe, where it was appropriate to seek help and why the doctor had decided on the treatment, and this was the information they wanted. Doctors [41] can significantly underestimate patients' desire for information, and they overestimate patient understanding of advice [42]. AABAKKEN *et al.* [43] found that, among patients undergoing endoscopy, 79% felt that an information leaflet given before the procedure gave them important information, and 39% felt that their doctor had given them important information. There is high patient demand for written information to supplement what they are told in health consultations. In a study of 3,500 patients, GIBBS *et al.* [44] found that those randomized to receive information leaflets were more satisfied with their treatment than those not given leaflets. In 1997, the National Asthma Campaign (UK) received 480,000 requests for information booklets for asthma patients.

MORRIS and KANOUSE [45] found that patients significantly preferred "frank" rather than "reassuring" information on the hypnotic flurazepam. HOWLAND *et al.* [46] found that patients who received explicit information on drug side-effects were no more likely to report side-effects than patients who had not received the information. Therefore, there seems no reason for protective restriction of the information provided to patients.

Using appropriate media

Patient education can be accomplished not only in different settings but also through different media. Pamphlets, books, videos, audio cassettes, asthma educational courses, support groups, television programmes, the Internet, video games and direct contact with a healthcare professional have all been used to spread information. Some of these methods are more effective than others. For example one study showed better retention of information after listening to an audiotape on asthma than after reading a book [47]. The most preferred and effective methods of helping patients control asthma seem to be those that emphasize personal interaction and allow personalization of advice [48]. It has been reasoned, therefore, that information should perhaps first be relayed to the patient verbally, providing a direct opportunity for feedback, and then reinforced with different techniques, such as videos, audiotapes, leaflets, *etc.* [49].

Can audiovisual material meet patients' needs better than written material? Studies show not much difference between videos and written material in patient perception of helpfulness or retention of information [50, 51]. Patients do not always prefer videos; ROBINSON *et al.* [52] gave depressed patients booklets and a video, and more (82%) patients found the booklets helpful than the video (69%). Videos are not necessarily more successful than written material in influencing patient behaviour; patients who watched four educational videos, and said they were helpful [53], showed no improvement in compliance with regular medication. However, VAN DER PALEN *et al.* [54] found that a videotape giving instruction on inhalation technique for asthma medication, which patients could take home and keep for a few months, was very effective. They compared inhalation technique in patients who received group education, personal instruction or videotaped instruction with that in a control group who received no instruction. All three instructed groups also received a checklist on correct inhalation technique. Both group education and video instruction were superior to personal instruction. A distinctive feature of the videotaped instruction was the patients keeping the tape at home. MEADE *et al.* [55], in a study of 1,100 patients with poor literacy skills, found significantly improved understanding of colon cancer among patients given a videotape or a booklet compared to those who received neither, but no difference between videotape and booklet.

The Internet allows access to an enormous amount of information, the quality of which is unregulated. Patients obtain information and use it in their strategies for coping with illness. Clearly the accessibility and use of Internet health information sources has the potential to change the relationship between patients and health professionals. Rating tools are being devised to assess the reliability of health information on the Internet [56], but it is not clear whether patients will accept health professionals' views on the quality of information.

Accessibility of written information

Formulae can be used to determine the readability of text [57]; they can give differing assessments of the same patient [58] but give a broad appraisal that reflects reading ease. Evidence suggests that written material is still written at unnecessarily high reading levels. The minimum criteria for written health information material are that it should be written at an easy reading level and give concrete information. It should also be written from the patient's point of view, and be judged as acceptable by patients and accurate by health professionals.

DAVIS *et al.* [59] took a standard information leaflet on polio vaccination, written at Grade 10 reading level, and

rewrote it at Grade 6 level. The simple pamphlet was better understood and remembered, and preferred, by both a higher- and a lower-educational level group. BAKER *et al.* [60] rewrote a dermatology leaflet at "digest magazine" level. Medical students and patients better understood the "easier" leaflet. BUTOW *et al.* [61] asked 36 patients to review five cancer information booklets, and there was a clear preference for one booklet. The reading level of the preferred booklet was Grade 8, and that of the others Grade 12.

What can written material achieve? Using valid criteria to assess material

Booklets that give clear advice on the action to take seem most likely to affect patient behaviour, for example by reducing acute contacts for medical care [62, 63]. However, advice booklets can also increase medical contact. A patient education booklet on cough [64] increased contacts for winter cough by 50% in four general practices. Healthcare professionals must be clear about what message they are giving to patients in the materials that they create.

Booklets are important to patients in ways other than providing advice on action to take in illness. They can encourage patients to discuss their concerns with their nurse or doctor. MANFREDI *et al.* [65] found that patients who asked for written information from a cancer counselling service were likely to take this to discuss with their doctor. These patients were more likely to have a trusting relationship with their doctor. Patients may also use booklets to convince other family members to accept a diagnosis and cooperate with treatment. Booklets serve as a basis for family discussion, and can help family members feel more confident about what they can do for the person with illness. Written material may be a necessary back-up to individual self-management plans. In all studies showing significant benefits to asthma patients from individual management plans, the plans have been supported by written educational information.

Lay and health professional liaison in asthma

Liaison describes a process of communication and cooperation between individuals or organizations. In the healthcare setting, the term "liaison" is typically used to describe specific staff posts (*e.g.* asthma liaison nurse) whereby the holder facilitates the transfer of patient care from one setting to another. Liaison in its original sense seems an appropriate term to describe the growing number of asthma initiatives uniting health professionals and the public.

Today a growing number of organizations provide support and help to patients and their families outside the healthcare setting, especially in the USA. Several liaison initiatives have been described in published studies. They include large-scale community intervention studies, liaison with adolescents and community layworker liaison for children with asthma.

Liaison via *community intervention studies*

A Neighbourhood Asthma Coalition was developed in the USA, targeting a predominantly Afro-American population [66]. The target audience helped to plan and implement the programme, which was a joint initiative of the local university department and neighbourhood social services. Projects included using ("change asthma with social support") (CASS) workers to deliver local peer-led education to socially isolated parents. After 2 yrs, 64% of a cohort of 144 children had attended at least one Coalition activity and 97% of families had been reached by the CASS worker (face to face, by telephone or both). Qualitative feedback showed that parents perceived the CASS workers as friendly nonauthoritative and supportive, and more like equals than doctors.

The Fresno Asthma Project, aimed at an entire low-income multiethnic population, is another example of liaison between health professionals and the public [67]. There was an extensive effort first to train asthma educators, who were health professionals, and then to support them as they offered regular asthma education programme. The educators ran the programmes in the healthcare settings in which they worked or as volunteers in programmes offered by the local American Lung Association. Opportunities for liaison were created throughout the community: pharmacists provide point-of-sale advice, physicians can refer patients to local asthma awareness and self-management classes, and local media are supporting the project and allow asthma information to be circulated. Mortality and morbidity data are not yet available, but the project has achieved substantial penetration into the target community. Both the training of asthma educators and the patient education programmes offered have become permanent in many of the healthcare institutions in the area.

Liaison with adolescents

Another liaison initiative with an "at-risk" group is the Adolescent Asthma Action (AAA) programme [68]. In this Australian programme, a local respiratory department collaborated with a girls school to set up a "cascade" model of peer-led education, whereby senior-year pupils reinterpreted the programme for a lower year. Comparison with a control school showed that the AAA programme had improved asthma knowledge in students and their peers. The programme did not alter quality of life in asthma but it was well received and students demonstrated favourable attitudes towards asthma.

Community layworker liaison for children with asthma

Further examples of community outreach projects have been reported from the USA. In a pilot study with 23 low-income families, intervention by a trained community-based layworker was associated with reduced use of healthcare services (using patients as their own historical controls) and client satisfaction [69]. The layworker, who was employed from the targeted community, had no formal healthcare training, and worked in a team with a paediatrician, a pharmacist and a public health nurse. The

nurse was responsible for training and supporting the layworker, and the whole team provided professional supervision and advice on decision-making. The uptake of healthcare services is one measure of the impact of such interventions. All families were retained in the programme, and attendance for follow-up clinic visits almost doubled. Focus group work elicited a clear preference among parents to disclose and discuss information with the layworker, despite confidence and trust in their child's care-provider, demonstrating a need for, and the value of, liaison.

A worthwhile approach

The programmes reviewed here were designed to target "at-risk" groups or individuals not always reached by existing healthcare services, such as indigent, multi ethnic or adolescent populations, for whom the consequences of the disease are greater. They are valuable for this reason alone, and have the potential to reach more individuals than traditional asthma programmes. The participation of local community members gives the programmes social credibility.

Asthma telephone helplines

Telephone helplines are proliferating worldwide. In the UK alone, the telephone helpline directory published by the Telephone Helplines Association (THA) lists ~1,000 helplines. However, although information is available on the number of helplines and the number of people calling them [70], little is published on why those with asthma call helplines and how their needs influence asthma association activities.

In the "Asthma Association Directory" compiled by the Global Initiative for Asthma (GINA), 21 of the 44 national asthma associations [71] report that they run a telephone helpline for those with asthma in their country. Such a helpline is potentially a source of information to people with asthma, and a resource that allows them to check or clarify information received from other sources, in addition to offering support and an empathic listener. It also provides the host organization with an opportunity to monitor the needs and concerns of a large number of people with asthma.

The UK National Asthma Campaign telephone helpline

The National Asthma Campaign set up their Asthma Helpline in 1990, after a survey of 1,500 members of the Campaign identified concerns about diagnosis and lack of understanding about their condition [72]. Ninety-one per cent of survey respondents felt that a telephone helpline would be an important service.

The helpline is staffed by asthma nurse specialists and offers independent information, advice and support to people with asthma and their carers. Health professionals often have concerns about the quality of the service and information provided to patients by such helplines. The Asthma Helpline is a member of the THA and must adhere to the THA code of practice. All information given to callers is based on the "British Guidelines on Asthma Management" [73]. In 1997, the helpline answered >17,000 calls.

What is the role of a telephone helpline in providing a service for people with asthma?

Using a telephone presents the caller with an easy and effective means of communication. It provides a safe, anonymous and confidential environment over which the caller has control. The annual evaluation of the Asthma Helpline [74] indicates that callers range in age <16–>65 yrs. Although callers clearly have needs that are not being met in the course of the consultations they have with their nurse or doctor, calling the helpline should never be seen as an alternative to consulting a health professional directly; callers are always advised to return to their health professional.

Another concern of some health professionals is that patients who call a helpline become more knowledgeable and, consequently, more challenging because they want to participate more in the management of their condition. This anxiety, voiced when formal programmes for the education of patients with long-term diseases first began >20 yrs ago, is heard less often today but may be a greater concern in countries or within cultural groups in which patient autonomy is not highly valued. A patient's desire to be more active in the management of their condition should be viewed positively, as a move towards a more informed partnership between patient and health professional.

Calls to a telephone helpline offer a unique opportunity to identify patient concerns and identify omissions or gaps in information provided to them. The UK National Asthma Campaign's information leaflets and booklets are continuously reviewed in the light of helpline queries, to ensure that they acknowledge and address patient concerns.

Asthma education in low-income countries

Plans for asthma education programmes in many high-income countries, although notably not in the USA, tend to presuppose: 1) a broadly similar prevalence of asthma throughout the country; 2) a high level of literacy that enables rapid and easy dissemination of information; 3) a reasonably uniform cultural attitude to diseases and their management, in most patients; and 4) access to medical care and medication for most of the population. In a low income country, none of these baseline assumptions can be made. The differing prevalence of asthma among urban and rural populations in India, for example, is well documented [75, 76] and is one of the advantages of studying asthma in a low-income country, as differences in environment, food, *etc.* may provide clues to its causes.

India contains one of the world's largest populations. A few asthma patients at the upper end of the socioeconomic scale can obtain the latest information from the Internet, but millions are illiterate and have only a sketchy and primitive idea of diseases and their causes. Female literacy varies between Indian states, 12–>90% [77]. India's cultural diversity is also immense.

Traditional systems of medicine, such as Ayurveda, Siddha and Unani, have concepts of disease that have pervaded the thinking of people throughout India, including practitioners of Western medicine. There is much to be learnt from these ancient systems, and there is evidence that certain types of complementary therapy may be effective in asthma [78]. However, critical scientific inquiry into traditional medicine is necessary; its influence has spawned several "traditional remedies" of dubious merit.

In India, as in other low-income countries, education alone does not improve the quality of asthma care, and constraints related to cost and availability of medication may be more important [79]. The cost of asthma medication in India is generally lower than in high-income countries, and the daily cost of inhaled medication is nearly the same as that of tablets. However, the initial cost of the inhalers, particularly with a spacer device, is high enough to influence most Indians to prefer tablets.

Strategies for asthma education in India clearly have to consider different methods and messages for different groups of people in widely varying conditions. The importance of asthma education among the educated and enlightened minority cannot be overemphasized. This elite 10% is the most visible segment of the population, and what is acceptable to them often becomes the standard towards which others strive. Public meetings, asthma education groups in schools and colleges, Internet sites, books, magazines, pamph1ets, *etc.* would all be taken advantage of by this group.

How can educational activities be integrated into clinical care?

There are two broad strategies for the integration of asthma education into clinical care: 1) patients are referred to organized asthma education programmes sponsored by or associated with the clinical setting; and 2) clinicians provide the essentials of asthma education during the consultation. The first of these strategies has been the most widely studied. Organized education programmes are not intended to replace patient education during clinical contact, but to provide supplementary individual or group instruction. Outside the healthcare system, for example in schools or the workplace, they offer access to patients who may not be receiving regular medical care. Evaluation of more than two dozen programmes, using controlled research designs, has shown improved symptom control or physical function, better psychological status, reduced use of emergency healthcare services or improved self-management practices in patients taking part in such programmes [23, 80, 81]. Unfortunately, the added time and cost required to offer and attend such programmes mean that not all patients have access to them.

As a result, increasing attention is being paid to providing the essentials of asthma education during consultations. Learning how to follow a peak-flow-guided self-management plan during the clinic visit has been shown to improve lung function and symptom control [82, 83] and significantly reduce the number of days of absence from work and use of emergency healthcare services [76]. Teaching a similar self-management plan and providing 1.5 h of education from a nurse during the clinical visit reduced symptoms, use of rescue medications, number of days of absence from work and use of emergency healthcare services [84].

Two recent studies suggest that primary care physicians can also provide self-management education. Training in communication and patient education skills for the staff of public paediatric clinics increased the amount of teaching by paediatricians and nurses as reported by their patients [85]. Similarly, after paediatricians in private practice were instructed in guideline-based medical management of asthma and in communication and patient- education skills, in two interactive seminars, their patients reported increased teaching and satisfaction with their paediatrician [5]. The education was particularly effective in patients who were started on anti-inflammatory treatment during the study, as those in the intervention group showed reduced use of emergency healthcare services compared to controls. In spite of the added teaching, treatment group paediatricians reported shorter initial patient consultations than did control-group paediatricians.

Role of national training centres in the training of health professionals

High quality, unbiased, standardized and assessed training is essential for the preparation of health professionals for greater participation in asthma management.

Although there is little evidence to show that national training centres are fulfilling the role of providing such training, experience has shown that they can provide a much-needed bridge between knowledge and practical application in the care of the patient with asthma. Independent national training centres can serve to instil in health professionals the importance of giving clear, impartial and consistent messages in addition to simply transmitting evidence based information to their patients. However, their chief responsibility should be to train and educate health professionals who, in turn, will be able to educate their patients (*i.e.* to initiate the "cascade" effect).

DICKINSON *et al.* [85], in a study in North-East England, showed that general practices that employed a specialist asthma nurse, who had received training from a national centre, had more patients operating self-management plans, fewer patients with symptoms and days lost from work because of asthma, and fewer acute attacks; they were also more 1ikely than other practices to give patients short courses of steroids. In addition, patients cared for by health professionals in the study received changes in treatment that were in line with the "British Guidelines on Asthma Management".

The UK′s National Asthma and Respiratory Training Centre (NARTC) provides specialized standardized asthma training at its headquarters and throughout the country. The training network of 350 lecturer practitioners has enabled >20,000 health professionals (predominantly nurses) to receive initial and ongoing training and updating over the past 10 yrs. Successful completion of the NARTC Diploma in Asthma Care has been shown to be associated with favourable patterns of structure, process and clinical outcome [86].

Those who teach patients and their families asthma information and self-management skills must be sufficiently knowledgeable and skilled themselves to be

successful. Personal experience with the disease is insufficient preparation to deliver high-quality education, especially to patients ranging widely in age, asthma severity, comorbid conditions and personal/social circumstances. Standards for asthma educators should be set in each country and supported by the professional community with structured preparation and carefully constructed and validated certification examinations. This approach has worked well in training and certifying diabetes patient educators. The advantages of certification are two-fold: teaching competence; and reliable standards of quality.

In Malaysia, the Public Health Institute runs courses for university graduates who wish to become patient education officers, and for paramedical staff or others who have received specific training, including communication skills. Training at the national and state level is carried out by clinical specialists and certified educators. Paramedical staff and doctors have to attend special courses before they are allowed to participate in patient education programmes, and only those who have been trained as patient education officers may be certified as educators. All educators are encouraged to use the materials provided by the Patient Education Department of the Ministry of Health.

Encouraging health professionals to implement guidelines on asthma care: the role of practice-based education

Guidelines are systematically developed statements intended to help practitioners decide what is appropriate care in specific clinical circumstances. Asthma management guidelines have proliferated, but how widely are they implemented? How are guidelines best disseminated?

Adherence to national asthma management guidelines is poor [87], particularly in areas of social deprivation [88, 89]. High quality trials testing the practical implementation of asthma guidelines are few; however, their conclusions broadly support the findings of five systematic reviews that address educational interventions in other clinical areas [90–94]. These findings are as follows. 1) Guidelines can change practice and improve patient outcomes [90]. Change is more likely in cases in which there is a specific educational intervention, such as a practice-based discussion meeting, to introduce the guidelines to clinicians, and when patient-specific reminders are used to prompt the clinician to implement recommendations during consultations (see below and table 5). 2) Multiple implementation strategies are probably more effective than a single approach [91]. 3) National guidelines attributed without a strategy for implementation are unlikely to be effective. Local adaptation and implementation is a practical and effective approach. 4) Studies do not identify any one strategy that is universally effective for the implementation of guidelines; they only indicate approaches that are more or less effective in particular settings. 5) Guidelines are only one of several tools that can change clinician behaviour [94]. 6) Educational outreach visits are an important and effective means of changing clinician behaviour, especially prescribing. Their effect is enhanced if they are combined with strategies targeting barriers (*e.g.* administrative, attitudinal) to change, and with other behavioural change strategies (*e.g.* reminder systems) [94]. 7) Educators who are not peers (*e.g.* pharmacists educating doctors) can also be effective. 8) Remote strategies (*e.g.* telephoning target groups) and nonpersonal strategies (*e.g.* electronic summaries of guidelines) are weakly effective. 9) Qualitative studies highlight administrative, organizational and worldoad-related barriers to behavioural change.

The authors use the term "practice-based education" to mean any training or educational intervention taking place largely or wholly within the healthcare provider's own setting. This includes outreach visits (*i.e.* a personal visit by a trained person), but also interventions in which the provider receives educational material within the practice but from a remote setting *via* a trained person (*e.g.* telephoning target groups and mailed computer education). Interventions aimed at patients are excluded. The definitions of study types are as provided by the Cochrane Effective Practice of Care (EPOC) working group.

Systematic reviews of guidelines implementation

Three systematic reviews of the implementation of guidelines were identified.

GRIMSHAW and RUSSELL [90] reviewed 91 studies, and found that guidelines are more likely to change practice when they are disseminated to clinicians using a specific educational intervention (such as a practice-based discussion meeting), and when patient- specific reminders are used to prompt clinicians to implement their recommendations during consultations.

WORRAL *et al.* [91] reviewed 13 studies (only two addressing asthma) of guidelines introduction in primary care. Only five trials showed improvements in care and these were, at best, modest.

WENSING and GROL [92], comparing the efficacy of single and combined strategies for the implementation of guidelines, found evidence that combined strategies are more effective. A combination of two more powerful strategies (*e.g.* outreach visits and patient-specific reminders) is likely to be more effective than two weak strategies (such as mailshots and audit with feedback).

Systematic reviews of practice-based training

Two systematic reviews looked at practice-based training (outreach visits).

Table 5. – Introducing clinical practice guidelines: likely efficacy of different methods

Chance of being effective	Development	Dissemination	Implementation
High	Internal	Specific educational intervention	Patient-specific reminder at consultation
Above average	Intermediate	Continuing medical education	Patient specific feedback
Below average	External, local	Mailing targeted groups	General feedback
Low	External, national	Publication in a journal	General reminder

(Adapted from [95].)

THOMSON *et al.* [93] identified 18 trials (of which only one addressed asthma) that met quality criteria. All 18 showed improvements in practice. Outreach visits were shown to reduce inappropriate prescribing by 24–50%. Combining outreach visits with additional interventions was effective in 12 of 13 trials (15–68% relative improvement). Only one trial compared outreach visits to audit and feedback; outreach was more effective. No trial investigated whether multiple visits were more effective than single visits, or whether outreach visits can be made more effective by modifying how they are carried out.

A review by DAVIS *et al.* [94] of the efficacy of continuing medical educational (CME) strategies also supports outreach visits as an effective method of changing clinician behaviour.

Randomized controlled trials of asthma guidelines development and implementation

Four trials exploring the development and implementation of asthma guidelines were scrutinized.

The North of England Study of Standards and Performance in General Practice [95] randomized 92 general practitioners working in accredited training practices to develop standards and guidelines for the management of a range of conditions. Doctors who developed guidelines for the management of recurrent wheeze in children improved their prescribing; the parents of the children they saw were more satisfied and the children wheezed less frequently.

This study suggests that doctors who develop (and hence "own") their own asthma guidelines provide improved care. However, it is impractical for individual practices to develop guidelines *de novo*, and local adaptation of high-quality national guidelines is a more realistic strategy.

FEDER *et al.* [97] randomized 24 underdeveloped inner-city general practices to receive either asthma or diabetes guidelines. Additional intervention included three 1-h practice visits by local opinion leaders (doctors or nurses), audit with feedback and a simple medical record reminder system. One year later, intervention practices receiving diabetes guidance showed improvements in all seven diabetes process-of-care measures, but intervention practices receiving asthma guidance showed improvement in only two (quality of prescribing and review of inhaler technique) of six asthma measures.

This trial highlights two points. First, guidelines can be effective in underdeveloped general practice if appropriate implementation strategies are used. The trial does not pick out any one component of the multifaceted strategy as most effective. Secondly, controlled comparisons are essential in trials of asthma care. The control practices all improved their asthma care during the study, a "secular trend" effect that perhaps resulted from a general current interest in asthma. Trials lacking a control group cannot determine whether changes result from the intervention or other influences.

EVANS *et al.* [27] assessed management of children in 22 community paediatric clinics in a deprived area of New York. The intervention used the National Asthma Education and Prevention Program guidelines, with >20 h of clinic-based group education and follow-up and intensive administrative support. Improved rates of diagnosis, follow-up and prescribing were seen. This study supports the suggestion that overcoming administrative barriers is an important part of successful implementation of clinical guidelines in areas of high deprivation.

In a study referred to previously, CLARK *et al.* [5] studied 74 US general practice paediatricians willing to undertake a programme of educational development. The clinicians were randomized to control and intervention groups, and the latter took part in two interactive seminars (total of 5 h) on management and physician communication. Follow-up for 12 months showed improved prescribing of asthma prophylaxis, better communication during consultations and reduced nonemergency care. Reduced attendance for emergency care was seen in patients who were frequent (>3 attendances·yr^{-1}) emergency attenders.

These results show the benefit of using a particular educational method (improving consultation and communication skills) to enhance guidelines implementation.

Nonrandomized controlled trials of asthma guidelines implementation

In a nonrandomized study, GORTON *et al.* [98] observed the effect of three methods of disseminating US national asthma guidelines, compared with no intervention, using four groups of 20 primary care physicians in Arkansas. The methods used were: 1) telephoning targeted groups with a summary, and a CME conference; 2) computerized guideline summary (not an interactive decision-support system); and 3) multimedia: posters, videos, faxes and a CME conference. Four months later, all three intervention groups showed small improvements in prescribing or peak flow measurement, but no group showed improvements in both. Thus it was shown that promotion of the use of guideline requires methods additional to these three relatively weak strategies.

Randomized controlled trials of practice-based asthma education

WHITE *et al.* [99] randomized 27 UK general practitioners to one of two educational interventions or a control group. Intervention groups developed asthma management strategies over eight sessions. No process measures were assessed, but follow-up of patients over 2.5 yrs showed no improvements in asthma morbidity. Changes in patient outcome are difficult to detect, and the researchers in this trial did not measure the process of asthma care.

In a later study, WHITE *et al.* [100] randomized 23 general practices to receive patient-specific morbidity feedback, inserted into patient records, with additional presentations to practice teams. No improvements in patient morbidity or prescribing were found. The lack of benefits from this intervention is surprising, and suggests that multiple strategies may be needed.

Qualitative studies

BRADLEY and RIAZ [101] interviewed inner-city general practitioners about perceived barriers to improving asthma care; these included workload, and difficulties with administration and patient communication.

The role of a national asthma campaign (experience from Australia)

Most not-for-profit organizations or charities active in health issues develop and thrive through the dedicated efforts of patients and their lay carers. The Australian National Asthma Campaign (NAC) began quite differently, in 1988, when representatives of the major regional bodies concerning asthma (the Thoracic Society of Australia and New Zealand (TSANZ), the Royal Australian College of General Practitioners, the Pharmaceutical Society of Australia and the seven Asthma Foundations) and others with expertise in respiratory medicine and epidemiology came together to consider the high number of deaths due to asthma in Australia. An unusual combination of circumstances gave them immediate access to excellent advertising, public relations, and commercial and strategic advice.

Concomitant with this, two other important developments occurred. First, in 1998, the National Health and Medical Research Council formed a working party on asthma- associated deaths. The working party reported that: 1) up to 60% of deaths due to asthma were associated with avoidable factors; 2) information and learning techniques were available to assist people with asthma to manage their condition in consultation with health professionals; 3) current education programmes for health professionals and consumers were unco-ordinated, had no common goal and in most cases had not been evaluated; and 4) there was a paucity of epidemiological data about the prevalence, incidence and severity of asthma in Australia [102]. Secondly, TSANZ published the Australian Asthma Management Plan, the guidelines for general practitioners on asthma management [102].

The embryonic NAC ran a campaign, "Could it be asthma?" to increase awareness of asthma in the Australian community [104]. The country′s 20,000 general practitioners received an asthma information mailshot about asthma management and the campaign. The public were involved through a multimedia campaign that included television and radio commercials, print advertisements and public relations activities. Evaluation proved the campaign to be effective and the stage was set for further national social marketing activities.

The TSANZ commissioned the Australian NAC to publish the Asthma Management Plan in a user-friendly Asthma Management Handbook and promulgate this among general practitioners and pharmacists. Workshops on asthma management were held for health professionals (general practitioners, pharmacists, nurses and asthma educators) across Australia.

The Australian NAC was formally launched in 1990 and has as its major roles: 1) ongoing provision of up-to-date information on asthma management to health professionals; 2) delivery of national community education campaigns on specific asthma topics to people with asthma; and 3) development of policy on asthma issues. The organization has just celebrated its first decade of asthma activities. These seem to have been effective since: 1) annual number of deaths due to asthma have declined from 964 in 1989 to 730 in 1996 [105]; 2) surveys conducted in 1996 indicate that the asthma management practices of general practitioners (Bhasale A *et al*, National Asthma Campaign of Australia, personal communication) and pharmacists [106] have improved, against the baselines established in 1990 and 1991 respectively; 3) asthma management practices of children have improved significantly and those of adults have improved [107]; 4) high levels of asthma awareness have been maintained with improved understanding of the role of preventer and relief medication [108]; 5) the cost of asthma in Australia, in terms of financial burden and quality of life, has been evaluated [109]; 6) an evidence-based review of the Six Step Asthma Management Plan is well underway; 7) an extraordinary spirit of collaboration has been developed among all the stakeholders in asthma, including government and the community; and 8) Australia′s seven Asthma Foundations have grown in stature and influence, co-ordinating and generating all kinds of activities at state level and developing an increasing national consumer focus.

In spite of these significant advances, asthma prevalence in Australia is increasing [110], as it is in other countries with a Western lifestyle [111]. The NAC has co-ordinated the development of a National Asthma Strategy [112, 113] and is working on its Implementation Plan. This is a 4-yr plan to sustain the progress made so far and accelerate current efforts to combat asthma. The focus of the NAC will be on implementing and evaluating adherence strategies for health professionals and people with asthma and maintaining a high profile for asthma.

What public policy changes would enhance patient education and self-management?

International guidelines on asthma management uniformly indicate that patient education is an essential part of asthma care. This is true for all long-term diseases and the need for education should be taken into consideration by those who decide policy.

Several European countries (Finland, France, Italy, the Netherlands, Norway and Sweden) have adopted programmes for reducing asthma morbidity and mortality, on the basis of providing information to the general public and patients and promoting strategies for prevention. Worldwide, national programmes are also in place in Peru, Australia, Malaysia, New Zealand and the USA. Those in Peru and Finland are associated with careful monitoring of a variety of outcomes and clearly defined targets. A summary of the Finnish programme is shown in the Appendix.

Is asthma self-management cost-effective?

Many clinical studies have demonstrated the effectiveness of self-management and educational programmes in asthma. Such programmes can be costly to develop and evaluate, but there is evidence that, from the perspective of an agency that is both providing the education and paying for the cost of care, such programmes can be cost-beneficial. If better use of the available treatment leads to better asthma control, then patients′ use of other healthcare resources and absence from work might be reduced. However, more research is needed to look at a broader range of costs and savings. Most healthcare is not justified solely on the basis of reducing costs to insurers and payers.

Economic evaluation of self-management and educational programmes has shown them to be associated with

fewer attendances at emergency departments and fewer visits to the doctor. Review of published evaluations reveals several methodological flaws (*e.g.* there is no common variable, such as symptom-free or episode-free days, by which effectiveness can be judged) [114]. However, the overall picture is that self-management programmes in asthma are cost-effective interventions. The cost/benefit ratios in published studies range 1:2.5–1:11.22 [115–119]; that is the most effective programme brought a saving of US$11.22 for every dollar spent.

LAHDENSUO *et al.* [120] carried out an economic evaluation, comparing guided self-management of asthma with best usual care. The analysis was based on results from a single-blind randomized study with parallel groups (56 patients in the guided self-management group and 59 in the traditional treatment group) over 12 months in outpatient clinics in Finland. The measure of effectiveness was the number of healthy days (*i.e.* days without incidents caused by asthma), and this was higher in the guided self-management group; in these terms, guided self-management was 4.3% more effective ($p< 0.001$) than the traditional treatment. The direct healthcare costs per patient were greater in the guided self-management group by 649 Finnish marks (FIM) ($p<0.1$), mainly because of the higher costs of counselling. However, the guided self-management saved FIM2,412 per patient in indirect costs such as time off work ($p<0.01$), and, as a result, the total costs of asthma were FIM1,762 less per patient treated ($p<0.1$) during the 1-yr study period. (The authors stated in their paper that, at that time, FIM8.84 were equivalent to £1 sterling.)

As most published studies cover only the initial year of treatment, the cost effectiveness of self-management programmes in asthma is likely to be underestimated in these reports. Costs were evaluated over 3 yrs in one study, in which the cost-effectiveness of a structured asthma treatment and teaching programme was analysed [117]. Use of healthcare was reduced over the whole 3-yr period, although the teaching programme was provided only in the first year. Thus the programme achieved a saving for society in each year of the study, and it would appear that asthma education continues to generate net economic benefits even after an initial year of educational investment.

Conclusion

No benefit can be gained from the excellent treatments available for asthma if these treatments are not prescribed and are not used by patients. In this review, the individual factors that need to be in place if there are to be successful outcomes in asthma care have been addressed. In many areas, further research is necessary but, in the meantime, morbidity could be reduced by implementing current knowledge.

The key features are for well-educated health professionals to be able to communicate well with those with asthma and to recognize each as an individual. Those with asthma need to be offered the information they want and need, and the spoken word should be reinforced with time, and by other methods. Specific advice should be offered regarding self-management, and written treatment (action) plans should be given. These fundamental issues which are addressed during the individual consultation are likely to be enhanced by parallel activities at national and community level and in schools. The evidence is now clear that, if attention is paid to education and the way in which care is organized, the gain is significant in terms of reduction in patient suffering and enhanced cost-effectiveness.

Appendix: Asthma network and guided self-management: keys to successful asthma management in Finland

In the early 1990s, the annual cost of asthma in Finland was estimated at FIM2.5 billion. This was anticipated to increase considerably without the introduction of effective prevention and treatment. The number of asthma patients was also expected to increase by up to 60% by 2000. In 1993, the Ministry of Social Affairs and Health appointed a working group to design a national programme for the prevention and alleviation of problems caused by asthma and reduction of the costs to society. "Asthma Programme in Finland 1994–2004" was published in 1996 [121].

The working group put special emphasis on cooperation between primary and secondary healthcare. For specialist medical treatment, Finland is divided into 21 hospital districts. According to the Asthma Programme, hospital districts should ensure that the primary healthcare system is capable of diagnosing asthma and providing proper treatment to patients. It is recommended, that in each district, a specialist (usually a chest physician) plus a paediatrician and, in some districts, a nurse is responsible for asthma knowledge and quality of treatment at a regional level. In primary health care, local contacts (a doctor and nurse) should disseminate information and co-ordinate training. The programme emphasizes the importance of guided self-management.

An evaluation of the Asthma Programme begun by the Ministry of Social Affairs and Health was completed at the end of 1998. Although the number of asthma patients is still increasing, use of hospital resources for asthma care and asthma mortality are steadily declining. Extensive educational activities have taken place throughout Finland, and much important scientific research has been carried out. Guided self-management of asthma is used increasingly, with good results. The regional asthma network has proved of great benefit to asthma treatment outcomes.

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