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Title: **Asthma Guidelines Implementation:
A guide to the translation of GINA Guidelines into improved care**

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Abstract

In 1995 the Global Initiative on Asthma (GINA) published an evidence-based workshop report as a guide to clinicians managing asthma patients, and has updated it annually to ensure that recommendations remain current. Although the report has been widely disseminated and influenced clinical practice and research, its major objective, of forming the basis for local and country initiatives to improve services for asthma patients, remains to be achieved. Over recent years, the science of guideline implementation has progressed, and encouraging examples of successful asthma programmes published. This report is intended to draw on this experience and assist with the translation of asthma guideline recommendations into quality programmes for patients with asthma using current knowledge translation principles. It also provides examples of successful initiatives in various socio-economic settings.

Introduction

Worldwide, significant “care gaps” - defined as discrepancies between optimal and provided care – still exist for the management of major chronic diseases, including asthma and Chronic Obstructive Pulmonary Disease (COPD) [1,2]. The provision of evidence-based guidelines has helped guide optimal disease management and clinical practice guidelines (CPGs) have been developed for most conditions [3,4]. Moreover, experience over two decades has also resulted in considerable modification and improvement in the methodology for their development. Quality standards have been suggested for the development of these guides, such as stated in the AGREE tool and recent reports [5-8]. Furthermore, grading the evidence has been improved and tools such as the “Grades of Recommendation, Assessment, Development, and Evaluation” (GRADE) system is increasingly used by National and International Societies, including the World Health Organisation (Guyatt GH, Oxman AD, Schünemann HJ, Tugwell P, Knottnerus A. GRADE guidelines: a new series of articles in the Journal of Clinical Epidemiology. J Clin Epidemiol. 2011;64:380-2). GRADE is considered by many as the best option to grade evidence in the production of current clinical practice guidelines, making it possible to bring the scientific evidence close to real life and clinical practice. It provides a systematic and transparent framework that helps to clarify questions, determine the outcomes of interest, and summarize the evidence that addresses a question (<http://www.gradeworkinggroup.org>).

However, even the best guideline, if not adequately disseminated and implemented, will not influence patient care. It is obvious that, at best, the adoption and implementation of asthma guidelines is patchy. This is attributable to a large number of barriers, both at programme level and related to the behaviour and habits of patients and physicians. [1,9,11]. As reviewed by Baiardini et al., guidelines implementation is a complex process that is influenced by different factors, including the characteristics of guidelines, the social, organizational, economic and political context and by implementation strategies . **(Baiardini I, Braido F, Bonini M, Compalati E, Canonica GW. Why do doctors and patients not follow guidelines? Curr Opin Allergy Clin Immunol. 2009;9:228-33).** Patient and physician's guidelines implementation of recommendations are influenced by their knowledge, attitudes, skills, experiences, beliefs and values

Fortunately, these issues have been considered and the science of guideline development has been accompanied by the development of methodologies and tools to facilitate the uptake of guideline recommendations and to translate them into concrete actions. While these are better known to health systems experts, their importance is less well appreciated by practicing clinicians. Since narrowing the care gap involves both the organisation of health services and individual best practice, a co-ordinated comprehensive and carefully planned approach is required, involving all players in the provision of health care. [12-15]. Although lack of financial resources is often cited as the limitation to implementing improved care, the experience of many local and national initiatives is that quality improvements may be

achieved with little or no additional financial cost - (savings have even been reported) - as cost-shifting, principally from expenditure on acute services to effective chronic disease management forms the basis of the strategy. Ideally, the quality improvement programme should involve dissemination of customised best *practice guidelines*, an *implementation strategy* and an *evaluation plan* to assess its impact and guide further programme improvements.

The need for these three components is not widely appreciated by those who, with good intentions, develop clinical practice guidelines. In a survey of guideline developers who submitted their guidelines to the Canadian Medical Association Infobase between 1994 and 2005 (n = 2341, 1664 surveys returned - response rate: 71%), although there had been improvements in guideline development methodology, developers were more likely to report using computerized search strategies (94% vs 88%), publish the search strategy (42% vs 34%), reach consensus using open discussion (95% vs 78%), and evaluate the effectiveness of the dissemination strategies (12% vs 6%), for the periods 1994 to 1999 versus 2000 to 2005, dissemination and implementation activities appeared to have decreased, as had the study of the impact of the guideline on health outcomes (24% vs 5%) [16].

Guideline dissemination is the easiest of the three components, but may be the least effective. It is usually achieved through medical/scientific publications, mailings, Continuing Professional Development (CPD), workshops, symposia and increasingly, innovative internet based programmes. Formal evaluation of the

effectiveness of these methods confirms that some of the most widely practiced methods, such as lectures and distribution of guidelines are ineffective or insufficient to change the behaviour of carers, particularly physicians. More complex interventions employing social marketing techniques, are more successful, but form only part of successful strategies [15,17].

Educational meetings alone [18]. Educational meetings alone did not seem to be effective in changing complex behaviour patterns amongst physicians. Grimshaw et al also reported a systematic review of the effectiveness and cost of different guideline development, dissemination and implementation strategies [19]. The authors concluded that there remains an imperfect evidence base on which strategy is best, and that many factors need to be considered. For example, implementers should select a clinical need that is most likely to be responsive to an intervention, and has potential for improving behavior. An assessment of barriers and facilitators of the intervention and its likely cost-benefit is essential. Readers are advised to consult some of the published literature on this topic [20-24].

Guideline implementation requires specific interventions tailored to different health care systems and settings, taking into account available human and material resources. Knowledge translation models have been developed to help “operationalize” the integration of evidence provided through guideline recommendations or other means of knowledge synthesis - e.g. Cochrane meta-analyses, web-based repositories, and other forms of knowledge synthesis - into

care, such as the “Knowledge-to-Action” Framework developed by Graham and collaborators [25] (Figure 1). Furthermore, tools to assess “implementability” of a guideline (e.g. GLIA Tool) have become available and can be useful to evaluate how a particular guideline is translatable into care [26] .

The purpose of this document is to provide some basic principles for Practice Guideline Implementation, an outline of the steps required, as well as examples of such initiatives in various socioeconomic settings. It is based on the current literature on CPGs implementation and on the experience of colleagues involved in the Global Initiative for Asthma (GINA). It is hope that this will serve aid those considering local or national implementation of CPGs, particularly of GINA Strategy for Diagnosis and Management of Asthma.

Planning a guideline implementation programme

Steps involved in the development of a guideline implementation programme are shown in Table 1. Although listed in the order in which they might be addressed, this can be varied according to local condition. The programme described is for a national or regional initiative, but most steps need to be applied in smaller scale initiatives in practices, clinics and hospitals.

1. Identify stakeholders and form of a working group

Stakeholders at national or local level, should be identified and invited to participate, including public health authorities, government representatives, non-governmental

organizations (NGOs), respiratory and allergy societies, patient organizations, and others. The motivation behind each participant's involvement should be determined, to ensure that these are addressed, and as far as possible, met. Strategies should be considered to motivate other partners to become involved in the initiative.

Then, a working group should be developed. In some countries, this has been done under the auspices of, or in collaboration with the national leadership of the Global Alliance against Chronic Respiratory Diseases (GARD) [27], a scientific society, a group devoted to respiratory care, or a local or national health authority. The intention should be, where possible, to ensure that the plan for asthma care is adopted by and becomes embedded in the activities of health services in a local region or national health authority. This is usually best achieved when health authorities become full members of the initiative, and at an early stage of the process. The working group should include a mix of specialists/opinion leaders in the management of asthma, primary care physicians and general practitioners, nurses, pharmacists, health educators and patients with asthma. Ideally specialists in implementation methodology and in communications should also be involved. It should be remembered that enduring and productive collaborations are more likely when partners are involved from the start, than when they are invited later.

Once an implementation plan has been developed participants should agree on milestones, and then allocate specific tasks to members, to ensure that the work is completed within a realistic timeframe. It is usually best to develop the plan around

existing structures and interested groups. Ideally a project co-ordinator should be hired to supervise the various aspects of the initiative.

2. Select the guideline to be implemented and whether it requires adaptation

Before disseminating or attempting to implement guidelines, they must be adapted for use in the intended practice setting. This should be done by local experts, but more sophisticated instruments such as the ADAPTE [28] tools have been developed in recent years, to provide a framework for this task. This method involves a series of steps, including: a) planning and set-up, b) the adaptation process; and c) the development of a final document. Although this requires resources and expertise, in many instances it serves as a valuable exercise to sensitise the team to local realities and results in a more implementable management and treatment guideline.

3. Perform a needs assessment, review of current asthma care and barriers to care

The most up-to-date statistics on asthma morbidity, mortality and health care use - including hospital admissions, in the target area should be collected. The most useful of these are statistics on hospitalizations and emergency room visits for asthma, as proposed in the recently launched “GINA 5-Year Asthma Control Challenge” [29].

Next, is a comprehensive review of current practices and resources available for the care of patients with asthma? This should involve points of care (public and private sector), referral patterns, including use of acute care facilities and hospitals, availability and accessibility of asthma drugs, organisation of health services, training of health carers and practitioners, treatment policies and practices, and many other facts.

This analysis will enable the identification of barriers to implementation. Barriers to optimal care, as summarized by Cabana et al, [30,31] include external barriers that limit ability to perform the recommended action, such as those related to patients, guideline or environmental factors, and internal barriers that limit adherence. The latter include prevailing knowledge gaps, beliefs and attitudes. Barriers relating to both caregivers and to patients should be considered.

4. *Select the main care gaps to be addressed and key-messages*

A list of common asthma care gaps is shown in Table 2. Care gaps should be ranked in terms of the size and their effect upon the morbidity and/or mortality. The reasons for gaps should be sought and considered in planning strategies for addressing them. Finally, the strategy for educating carers and patients must be developed. The most important gaps must be prioritized and a limited number (3 or 4) selected for social marketing. Social marketing is defined as the systematic application of marketing to achieve specific behavioural goals for social good. The messages must be few, simple, clear and practical. The language and emphasis must be tailored to the group to whom they are addressed. For example, for health professionals a message might be that - “a child that coughs at night in the absence of a “cold” may have asthma;” “Inhaled corticosteroid is the treatment of choice for persons with persistent asthma symptoms;” “persistent symptoms of bronchitis after a URTI indicates a need for intensified controller treatment for asthma”. For patients and parents: “asthma attacks do not routinely require antibiotics”.

5. *Develop and prioritise implementation strategies*

A review of experience in other countries or practice environments similar to that being considered will provide useful clues to successful interventions and approaches. Examples of these are provided as resources on the GINA website (<http://www.ginasthma.org>).

Prioritization of strategies could be based on their ability to address identified barriers and to leverage identified facilitators in a specific context. Evaluating the evidence about the effectiveness of the strategy is also important. The Cochrane Effective Practice and Organization of Care Group (EPOC) publications are a useful reference for checking the effectiveness of proposed interventions [32]. It should be remembered that quality of care improvements are generally made in small steps that address critical barriers rather than through broad-ranging changes.

For example, all of the following have been shown to improve asthma outcomes; increasing access to controller drugs (ICS), encouraging the performance of spirometry, improving the recognition and diagnosis of asthma, increasing awareness of the need to assess asthma control, encouraging use of written action plans, and providing asthma education [33-37]. It is wise for the working group to first select interventions which it considers will have the greatest societal impact, such as improving access to inhaled corticosteroids in children, especially those with a recent hospital admission [38], as this serves as encouragement to all involved and is likely to attract the attention of health authorities.

Finally, patients “at risk” should be targeted. These include patients with frequent exacerbations and/or highest morbidity, those with poor adherence to treatment and follow-up, and those with psychosocial and economic problems [39]. Teenagers and elderly patients are also “at-risk” groups [40,41].

Among the most effective methods, reminders (ideally at the site of care), interactive workshops, audit and feedback, and multifaceted interventions, combining 2 or more methods such as audit and feedback, reminders, local consensus processes, or marketing [36, 42-44].

6. *Develop and agree on specific indicators of change and targets for each outcomes in the initiative*

Medical audit has been used to improve both the process and the quality of care for patients. The process involves setting standards, measuring current care against those standards, identifying gaps between the standards and the achievement of these, and finally following up the performance of new interventions in terms of these standards. This process serves both as a stimulus to change and as a means of educating health professionals on best guideline-based practice [19,35,45-47]. Live, dynamic audit can be used to provide data, with immediate feedback for participants, as a motivator for change. In one such example (available at www.guideline-audit.com) physicians audited their care of patients with COPD, chest infections, and the diagnosis, acute management and assessment of control of patients with asthma, and are able to compare their management performance with that of others and standard benchmarks.

An integral part of guidelines implementation is the selection of realistic targets and key-indicators to determine if these have been achieved. Ideally, a main goal and a selection of secondary objectives should be identified. The most relevant outcomes to be measured and what levels of change should be achieved should be decided

(see Table 3 for examples of selected outcomes). Furthermore, milestones for evaluating the interventions should be established with specific proposals for the type of action to be considered if the targets are not achieved.

7. *Ensure that the resources needed are available*

It is essential to determine the resources and funding that will be required to support the initiative, and to assess whether they are available. Funding can be obtained from various sources, including national funds, funding agencies (for implementation research), medical or scientific societies, and industry partners.

8. *Produce a step-by-step implementation plan*

The implementation plan should involve an initial intervention or a series of pilot projects that provide the basis for the final plan and its expansion and scale-up in the target region. Long-term sustainability must be a primary objective of any plan developed.

It is usually wise to begin on a small scale with a limited number of people, and select an initial intervention that has a good chance of success, as this will motivate the group. It is also important to initially select a targeted group who express interest in seeing the plan implemented. The importance of buy-in was illustrated by Sheehan *et al.* who reported that while only 53% of those stating their intention to implement an action, did so, in those expressing reluctance, only 3% became involved. [48]. Furthermore, choosing a medium-range time schedule (e.g. 3

months) will allow rapid assessment of early results. The initiative should then be reviewed in the light of the initial pilot projects and other information gathered, to determine if and how the strategy should be continued or improved, and if it is sustainable with the current resources available and level of commitment from the planning group and other parties.

The outcome of interventions should be assessed according to the pre-determined indicators, and barriers and facilitators reviewed on a regular basis. The monitoring/evaluation processes must capture unintended outcomes or impacts as well as expected ones (or ones of interest). Other aspects of the project such as cost-benefit, reduction of morbidity outcomes, health care use, etc. (Table 3) are important in decisions on long-term goals and refinement of strategies. Successes should be publicized. A useful format is to describe successes around individual cases and personal experiences.

9. Ensure long-term planning

Continuation and expansion of the initiative and its long-term evaluation process should then be decided. It should be determined how the intervention will be sustained, who will be charged with the task of ensuring its continuation, and how continuing financial and organisational support will be provided. Regular communications on the project's impact on current care will help to sustain interest and provision of resources for the project.

Use of knowledge translation theories in developing implementation plans

Knowledge translation initiatives should be based on sound behavioural and educational theories and evidence-based strategies, such as those described in the Cochrane Effective Practice and Organization of Care Review Group [44,45]. A more recent model developed in Canada is the Knowledge-to-Action (KTA) conceptual framework developed by Graham *et al*, which builds upon commonalities found in an assessment of planned-action theories [25]. The KTA framework involves three phases.

In the ***planning phase***, selected guideline recommendations are prioritized. Once the population targeted and settings are selected, key-messages and main outcomes to measure to evaluate how implementation is successful are decided, as well as actions to be taken.

In the ***assessment phase***, current status of implementation and uptake by the target audience are evaluated as well as the impact of an intervention and its sustainability of the implementation intervention. The intervention should be tailored, and the strategy selected according to the targeted population and identifies potential barriers to implementation.

Finally, uptake by the targeted population and outcomes selected should be ***monitored*** for impact and sustainability. The action cycle allows improving interventions in building on successes and learning from failures, in addition to

reassess barriers and facilitators overtime and addressing them. The impact of the intervention should therefore be adequately evaluated at the patient, provider and system levels.

New methods of guideline dissemination in support of implementation plans

New communications tools such as the internet, Intelligent Telephones and hand-held computers, offer innovative ways of communicating guideline recommendations [49]. Web-based programs, social networks and other means of interacting (e.g. Communities of Practice) are being increasingly used for guidelines dissemination and translation [50,51]. Embedding guidelines into electronic health records is a novel way of improving access to treatment recommendations at the site of care [22]. Further research is required to determine the effectiveness of these methods.

Strategy proposed within the context of GINA Strategy

One of the major goals of GINA is to disseminate proven methodologies for implementing asthma guidelines, and in particular, the GINA report: Global Strategy for Asthma Management and Prevention. Those interested in being more aligned with this goal may wish to consider becoming a GINA Country Initiator. A GINA Country Initiator is a person or an organization that is prepared to initiate the process of forming a national or local task team. The Initiator is given the endorsement of GINA Dissemination and Implementation Committee and becomes a member of the GINA Assembly. This position ensures that the Initiator receives encouragement from GINA and has the opportunity to present their programme and progress to GINA for comment and advice.

Potential partners in GINA Strategy implementation initiatives could be identified within the Ministry of Health such as programme managers and technical staff from specific programmes on chronic respiratory diseases; programme managers and technical staff from supporting programmes, services, departments such as the Human Resources Development Department, the Health Statistics Department, the Health Finance Department, the Drug Control Department, the Health Education Programme, the Health Care Reforms Unit, the Environmental Health Unit. They may also be from outside the Ministry of Health: such as related ministries (education, science and technology, social welfare, sport and leisure, labour, industry, environment); chronic respiratory diseases experts, knowledge translation experts, and public health experts from academic and training faculties; representatives from professional associations and scientific societies (medical, pharmacists, physiotherapists and nursing); representatives from patient groups; local and international nongovernmental organizations; representatives from the educational sector; potential partners in providing technical and financial support such as multilateral and bilateral agencies; and finally, representatives from the community, churches and religious leaders, the private sector and the media.

Examples of successful asthma guidelines implementation initiatives

The examples provided below illustrate the processes described above, and in particular the various stages of the KTA Model (Figure 1).

Finland

A multidisciplinary national asthma programme included strategies for prevention and treatment, but also an operational plan for their dissemination and implementation [52-57]. Effective strategies involve multiple methods, decision support systems, and interactive education. In the Finnish case, state officials,

representatives of patient organizations, nurses, pharmacists, and GPs took part in the steering group of the programme. They created a network of asthma responsible contact persons in local health centres as well as regional treatment action plans. This network included as many nurses as doctors but also pharmacists in almost every pharmacy in Finland. The contact persons coordinated the local work, but did not personally take care of all asthmatics. The network was kept motivated by continuous educational activities, which had a high rate of participation. The organizational key to success was to emphasize the role of GPs in addition to specialist care.

The asthma specific key for treatment improvement was the strong message to detect asthma early and start anti-inflammatory medication immediately after diagnosis, i.e. "hit early and hit hard". The idea was to take asthma in to control by using rather a step-down- than a step-up-strategy. Once the control was achieved, the minimum medication to maintain control was titrated during 3-6 months. To prevent asthma attacks and worsening, especially during respiratory infections, guided self-management was effectively implemented. The patient was taught by the GP or nurse to increase the inhaled medication instantly, if signals of symptom increase appeared. The patients also had corticosteroid tablets at home and instructions how to start the course by themselves, if intensified inhalation therapy did not improve control in a few days.

The extra costs of planning and implementing the programme were small, mainly as

most of the activities were done as part of the routine work of the clinicians and administrators. From 1994 to 2000 the number of asthma medication users for persistent disease in Finland increased by 42%, detection and treatment of asthmatic symptoms in the population being improved. The major increase (75%) in the use of inhaled corticosteroids was a direct consequence of the programme which promoted their introduction as first line therapy. The savings of total asthma costs (1. hospital days, 2. out-patient visits, 3. medication, 4. disability, and 5. loss of production) were significant, from 300 to almost 500 million Euros (minimum or maximum scenario) in only one year, 2005 [58].

Brazil

Many programs have been developed in Brazilian cities in the last decade [55-57]. A Program for Control of Asthma (ProAR) was developed from 2003 in Salvador, Bahia – Brazil, prioritizing the control of severe asthma. By facilitating referrals from the public health system and providing proper multidisciplinary but simple management including education and medication, for free, the Program enrolled over 4,000 patients with severe asthma in 4 reference clinics. They are offered regular follow up and discharged back to primary health care only when asthma control can be maintained without requirement of a combination of an inhaled corticosteroid and a long acting beta 2 agonist. This intervention was associated with a steep decline in health resource utilization and remarkably reduced the rate of hospital admissions due to asthma in the entire 2.8 million inhabitants City by 74% in 3 years [55]. Cost analysis demonstrated this intervention was very cost-effective

and provided a financial relief to the families and the government [60,61]. Various other programs have been developed in Brazilian big cities or smaller towns with favorable results, such as the intervention reported from Itabira, Minas Gerais [52].

South Africa

In South Africa, the management of asthma and other chronic diseases in the public health sector has to some extent been eclipsed by the demands of treating large numbers of patients with tuberculosis and human immunodeficiency virus (HIV) infection. Researchers in that country developed and over the course of several years achieved the nationwide rollout of a programme that make asthma a component of comprehensive primary care offered for all common respiratory diseases including COPD, tuberculosis and other infections. This programme is based on the Practical Approach to Lung Health approach, developed by the WHO. PALSAs Plus, as it is termed in South Africa is a locally customized, integrated, algorithm-based diagnostic and management tool for use by nurses and front-line doctors in primary care clinics. It has improved the recognition of and ensured resourcing for the management of asthma in these facilities. The intervention comprises a practical high quality manual (guideline) containing details of diagnosis and management of asthma (updated annually) and educational aids developed using latest knowledge translation methodology. Educational outreach is performed using social marketing techniques and audit forms a part of the programme. To date more than 13 000 nurses have received training in the methods and initial results from field research confirm improvements in care, including increased prescriptions

of inhaled corticosteroids [62,63]. The impact of this programme on mortality and hospitalizations remains to be confirmed.

Ireland

Irish asthma guidelines published in 2000 were based on GINA international asthma management guideline [64]. In a survey of 400 patients with current asthma, over the previous year 27% reported having had either an emergency visit to the hospital or their general practitioner (GP), 7% had been hospitalised for asthma 19% had sleep disturbance at least once a week, 29% missed work or school. The level of asthma control and asthma management in Ireland still falls short of recommended national and international asthma guidelines and initiatives to address this problem have been developed, with the full support of the national department of health.

Canada

The impact of asthma guidelines not only on asthma care but also broader policy issues has been reviewed [65]. There are emerging models of improved management of chronic disease with targeted funding to improve physicians adherence to guideline-based care. In British Columbia the number of hospitalizations for acute asthma has fallen from over 3,000 annually to less than one thousand between 2003 and 2007 [66]. In addition in the context of multicultural societies the impact of health literacy and ethnicity has been emphasized [67].

In the province of Quebec, Towards Excellence in Asthma Management (TEAM) was a four-phase disease management program of the Quebec Asthma Education Network (QAEN), to be carried out over an 8-year period. It included [68]: 1) the determination of current asthma-associated morbidity and mortality in various Quebec regions, using population maps, 2) analysis of the burden of asthma, taking into account the socioeconomic consequences of the disease and the quality of life of the patients, 3) comparing current medical practices with the Canadian Asthma Consensus Guidelines for adult and paediatric populations and 4) determining patient's adherence with medical treatment and with the environmental changes recommendations. Key observations from this program included the identification of specific patterns of non-adherence in the use of inhaled corticosteroids, lack of progress in increasing access to spirometry in asthma education centres to detect new cases, increase the number of referrals to an asthma educator, improvement in the ability nurses to provide asthma education using an asthma hotline telephone service, and the beneficial effects of practice tools aimed at facilitating the assessment of asthma control and treatment needs by general practitioners. This program has informed continuing efforts to improve guideline implementation..

Other countries

In a review of efforts to implement asthma guidelines in developing countries, Ait-Khaled et al. evaluated 456 consecutive patients from Algeria, Guinea, Ivory Coast, Kenya, Mali, Morocco, Syria, Turkey and Vietnam [69]. Overall, in 58% of patients surveyed the diagnosis of asthma had been confirmed using recognised criteria.

Agreement between the practitioner and the guidelines in assigning grade of severity was moderate. Practitioners tended to underestimate the severity of asthma. Agreement between the practitioners' assessment of severity and treatment with inhaled corticosteroids was poor and inhaled corticosteroids were with underutilised.

The future of guidelines implementation

Much remains to be done with regard to guidelines implementation. The basic principles of guideline implementation are well established, but unfortunately resources continue to be wasted on ineffective methods [14,15,17] (Table 4). It is important that both effective and ineffective attempts to implement asthma guidelines be reported so that others can learn from these experiences. Joint international efforts, for example through the Guidelines International Network (G-I-N) at <http://www.g-i-n.net/>, provide a forum for guidelines implementers to exchange ideas on effective methods for overcoming barriers to knowledge translation, access tools to produce better and more “translatable” guidelines. It is likely that new means of communications such as computer based-programs or exchanges through the Internet will be used [70].

Conclusions

Evidence-based guidelines are intended to provide best practice advice, but the science of implementing them has lagged behind. Knowledge translation techniques have been developed and there are encouraging examples of their use in several countries. Although conditions may vary in different various practice settings, a

common set of principles for successful guideline adaptation and implementation are now available, and are gaining wider use, and their effectiveness confirmed, even in resource poor settings. Given the continued increase in asthma prevalence in most countries and the continuing care gaps identified in almost all, GINA, together with other members of the medical community involved in asthma care should see implementation as the most urgent priority if progress is to be made in addressing this treatable condition.

List of abbreviations used

COPD:	Chronic Obstructive Pulmonary Disease
CPD:	Continuing Professional Development
CPGs:	Clinical Practice Guidelines
EPOC:	Effective Practice and Organization of Care Group
GARD:	Global Alliance against Chronic Respiratory Disease
G-I-N:	Guidelines International Network
GINA:	Global Initiative on Asthma
HIV:	Human Immunodeficiency Virus
ICS:	Inhaled Corticosteroids
KTA:	Knowledge-to-Action
NGOs:	Non-Governmental Organizations
ProAR:	Program for Control of Asthma
QAEN:	Quebec Asthma Education Network
TEAM:	Towards Excellence in Asthma Management
WHO:	World Health Organization

Competing interests

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Rhinitis and its Impact on Asthma (ARIA). Member of the Planning Group of the Global Alliance against Chronic Respiratory Diseases.

SP: Disclosure of potential conflict of interest

SP has participated over the past 3 years in consultancy activities for AstraZeneca, GlaxoSmithKline, Neolab, and Nycomed. He has spoken at meetings sponsored by GlaxoSmithKline and Nycomed.

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Authors' contribution

All authors have contributed significantly to the research and preparation, revision and final production of this manuscript and approve its submission to this journal.

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Table 1**A plan for a guideline implementation programme**

1. Identify stakeholders and form a working group
2. Select the guideline to be implemented and determine if it needs adaptation
3. Perform a needs assessment and review current status of care and main care gaps
4. Select the main care gaps to be addressed and key-messages to convey
5. Develop and prioritize implementation strategies
6. Develop and agree on specific indicators of change and targets for each outcomes in the initiative
7. Ensure that resources needed are available
8. Produce a step-by-step implementation plan
9. Plan initial interventions & evaluate their effects
10. Review the project in light of pilot projects and other information gathered
11. Determine how the current interventions could be improved / evaluate the feasibility of implementing the project
12. Plan continuation/expansion of the initiative and its long-term evaluation: ensure long-term planning

Table 2**Common asthma management care gaps***

Management care gap	Barriers to reducing the gap (example)	Possible Implementation strategy	Process and outcome measures
Over/underdiagnosis/ lack of early recognition of asthma Not considering asthma when symptoms present.	Unavailability of pulmonary function tests Increase awareness of asthma.	Identification of nearby PFT facilities Prevalence of new asthma diagnoses.	% patient in whom PFTs are done
Physician's non-adherence to guidelines	Insufficient knowledge/ motivation to implement guideline	Improved dissemination/ interactive workshops	Assessment of recommendations implementation into care
Patient-doctor communication	Insufficient time/ communication skills	System changes – Asthma educator referral	Degree of patient satisfaction with communication
Inadequate assessment of asthma control	Lack of knowledge of criteria	Education/CME	Survey of criteria use
Insufficient environmental/ preventative measures	Lack of time to explain	Increase access to educator, Involve patients as educators	Survey implementation of intervention
Lack of individualized pharmacotherapy	Insufficient knowledge of guideline	Education/CME	Assessment of treatment (e.g. audit)
Lack of education and guided self-management	Unavailability of educators	Increase access to educator. Involve patients as educators in the process	% patients offered education
Absence or no use of an action plan for the management of exacerbations	Not enough time to produce and explain	Increase access to educator, involve patients as educators in the process. Provide simple printed formats for clinicians	Number of patients receiving a written action plan
No assessment of techniques (inhalers, peak flow measurement)	Lack of time or knowledge	Systematic assessment at visits	% patients in whom this is checked
No assessment of adherence to therapy	Not integrated to practice	Reminders	% patients in whom this is checked
No regular follow-up - discontinuity of care	Lack of follow-up arrangements	Improved management	Survey on regular follow-up
Inadequate management of acute asthma	studies	Adherence to guidelines. Improve ED staff training/asthma management	Regular survey of hospital admission and deaths
Variable/insufficient access to care – non availability of asthma controllers	Insufficient resources	Increase resources- revise process	Assess continuity of care

Poor communication between various groups of health care personnel	Lack of willingness to change	Organize joint sessions on asthma care	Focus group assessing this aspect of care
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*N.B.: For some of these care gaps, more evidence on the effectiveness of implementation strategies is required. However the recommendations provided are based on current recommendations.

Table 3**Examples of outcomes to assess the burden of asthma and implementation****Patients**

1. Asthma control (according to validated tools)
2. Asthma patients' quality of life
3. Adherence to treatment
4. Satisfaction with treatment

Providers

1. Satisfaction with the guideline
2. Use of the guideline in current care

System outcomes

1. Hospital admissions for asthma (number, hospital days)
2. Emergency Department Visits
3. Unscheduled visits to physicians for worsening asthma
4. Economic outcomes [cost savings for payer and patients (direct and indirect costs)]

Table 4**Some suggestions regarding guideline translation into care**

1. Identify and address each care gap individually
2. Keep interventions simple and targeted
3. Include assessment of their effects
4. Assess barriers and facilitators to change
5. Tailor interventions to the local barriers and environment
6. Motivate participants and publicize successful interventions
7. Identify/create practice tools to support medical practice
8. Identify/create incentives to guidelines implementation
9. Foster multidisciplinary work and effective communications
10. Build upon existing structures
11. Review previous implementation efforts before designing an implementation strategy (both successful and unsuccessful interventions can be useful in guiding the implementation design).

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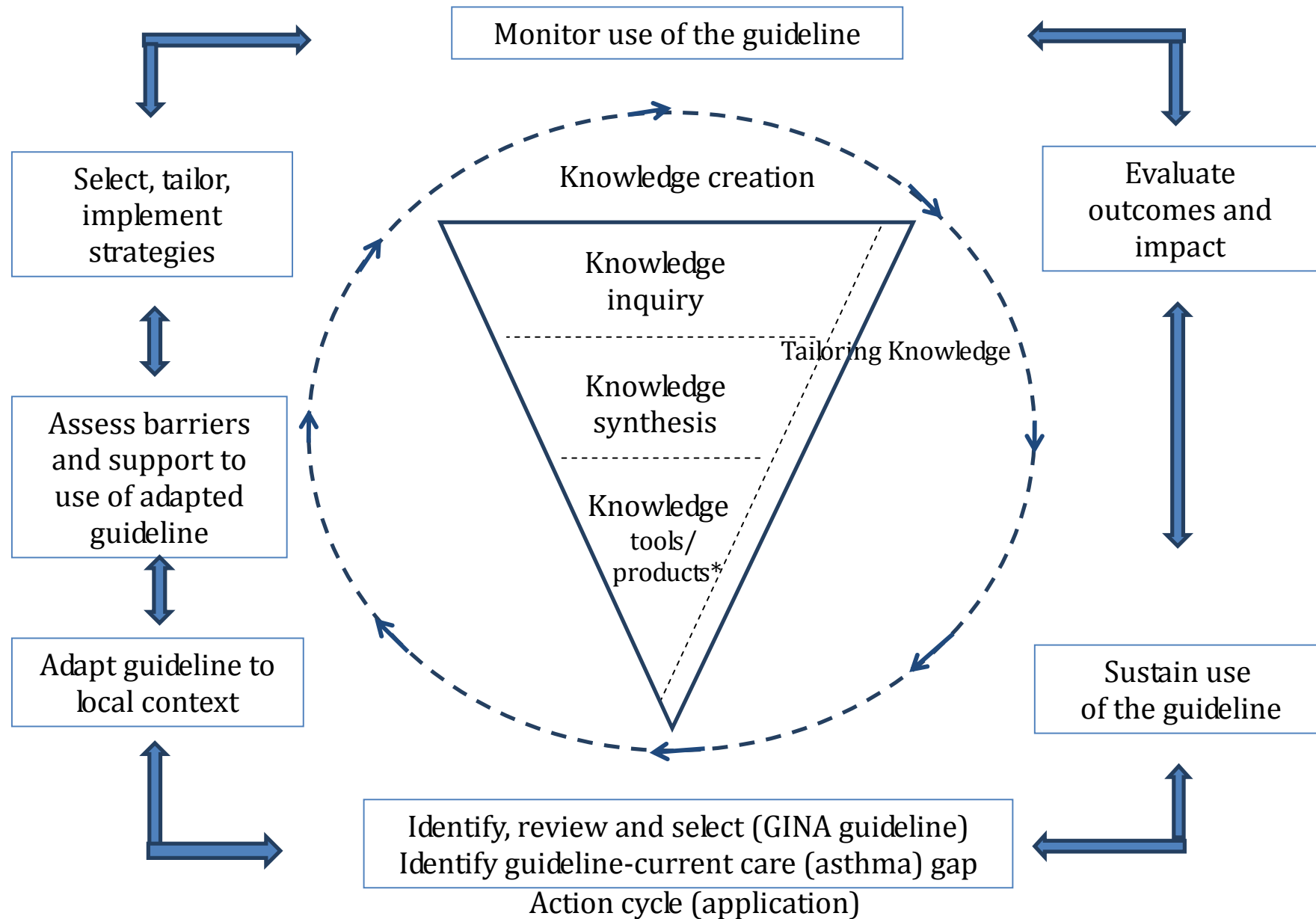
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Figure 1

The Knowledge-to-Action model (Adapted from Graham et al.)



- Such as Global Initiative on Asthma Guideline

