



Asthma guidelines: the Global Initiative for Asthma in relation to national guidelines

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Purpose of review

To compare and contrast national asthma guidelines with the Global Initiative for Asthma (GINA) strategy for asthma management and prevention.

Recent findings

The common goal of GINA and national asthma guidelines is to improve asthma care using the best evidence available from published data. This evidence-based approach has evolved from an initial perspective of expert opinion but with that evolution has not always considered the breadth of asthma phenotypes. GINA and national guidelines differ in a number of ways. GINA reviews available data and updates the core document and recommendations based on the latest data on a yearly basis to offer local, regional and national guidelines materials needed for knowledge mobilization. It remains the purview of those organizations to structure and implement those locally appropriate guidelines.

Summary

Both GINA and national guidelines have furthered asthma care to narrow the care gap from what is known to how asthma care is delivered, hopefully in a more directed, personalized manner. As well, both GINA and national guidelines have helped to shape the direction of research for the future benefit of children and their families.

Keywords

asthma, asthma control, asthma guidelines, implementation

INTRODUCTION

Asthma is a global health concern. It is the most common chronic disease of childhood although internationally there are wide variations in asthma prevalence [1]. The World Health Survey estimates the global prevalence of asthma in adults to be 4.3% with as much as 21-fold variation among countries [2].

Asthma guidelines were first published almost 30 years ago in Australia, New Zealand [3] and in Canada [4]. As stated in the first Canadian document from 1990, these initial guidelines were not intended to be 'an absolute or definitive statement on assessment and treatment' of asthma due to a 'lack of definitive information and a lack of agreement among experts on several questions' [4]. These were largely consensus-based documents from expert groups that stemmed from a population-based need to decrease asthma morbidity and mortality exemplified by the dramatic increase in asthma mortality from 1970 to 1985 in New Zealand [5]. The suggestion was that the increase was due largely to preventable factors, and the recognition of asthma as an epidemic helped provide the impetus for these initial guidelines.

Over the past 30 years, there has been an explosion of national asthma guidelines. Four of the most recently updated major national guidelines are the National Heart, Lung, and Blood Institute's Expert Panel Report 3 (NHLBI EPR3 2007) [6], the Canadian Thoracic Society (CTS) 2012 guideline [7], the British Thoracic Society Scottish Intercollegiate Guidelines Network (BTS/SIGN 2016) [8], and the National Asthma Council Australia's Australian Asthma Handbook (2016) [9].

With the asthma epidemic expanding worldwide beyond high-income countries through the 1980s, the NHLBI and the WHO recognized a need to support guideline development worldwide. In 1993, they collaborated to establish the Global

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KEY POINTS

- Guidelines have contributed to improved asthma care and helped direct research toward areas that are poorly studied, including those applicable to a pediatric population that provides an increasing focus on personalized/precision care.
- National guidelines face the limitations of infrequent updating and the need for local dissemination and implementation.
- GINA promotes a strategy for use in local, regional and national guideline development, providing data and recommendations that are updated yearly.
- National guidelines and GINA serve different roles in asthma knowledge translation, but both have unequivocally increased asthma awareness and understanding over the past few decades.
- Although GINA offers a platform for ease of dissemination, the more difficult task of implementation falls to those organizations developing local, regional or national guidelines.

Initiative for Asthma (GINA) with the goal to provide a mechanism to more rapidly translate scientific evidence into improved asthma care by developing a Global Strategy for Asthma Management and Prevention. This strategy uses twice yearly reviews of published literature and has been updated online yearly since 2002 [10¹¹]. GINA provides the background to increase asthma awareness and improve asthma treatment internationally through development of guidelines appropriate to local, regional or national environments.

National guidelines and GINA have many overlapping similarities. The common aim is to decrease asthma morbidity and mortality by closing the gap between what is known and how asthma management is practiced. On the other hand, there are significant differences. The focus of this article will be to explore the major differences between national guidelines and the GINA strategy in terms of focus, scope, strengths and weaknesses.

NATIONAL GUIDELINES

Introduction

There are four basic components of an effective guideline: the guideline should be evidence-based, widely implemented, improve outcomes and remain up to date [11]. On a national level, guidelines must interpret the data based on their countries' environment and then effectively

disseminate and implement recommendations to further narrow the 'asthma care gap' between what is known and how healthcare is practiced (or can best be practiced) in a particular country or region.

National Heart, Lung, and Blood Institute's National Asthma Education and Prevention Program/expert panel reports

One of the most commonly cited guidelines is the NHLBI National Asthma Education and Prevention Program (NAEPP), published in 1991 with the subsequent EPR, which had been published about every 5 years until the most recent iteration, EPR3, which was published in 2007 [6]. This guideline was published to serve as a national American standard in asthma care and provide a comprehensive reference for the treatment of asthma. As with all major national asthma guidelines, the NAEPP and EPR updates are based on a rigorous review of scientific literature, and graded based on defined levels of evidence for each recommendation. However, as a result of this, as with most guidelines, populations typically excluded from rigorous research protocols (i.e. 'real-world' populations) are less well represented.

Due to the extensive process and time commitment involved in drafting guidelines (the most recent EPR3 is 440 pages long), it is updated largely when, as recently stated in an editorial, there is 'a major new direction or a new concept that results in a paradigm shift in asthma management along with a significant body of knowledge that affects asthma care' [12]. For example, the EPR3 adopted a focus on the concept of 'asthma control' initially espoused in Canadian guidelines and introduced the concept of 'future risk' for asthma exacerbations. However, if not frequently updated, guidelines become 'outdated' and attract less focus from those to whom they ought to be directed.

The NHLBI guideline has made important contributions to asthma care and research. The 1991 EPR1 guideline, for example, catalyzed focus on long-term asthma management instead of treatment of asthma exacerbations [13]. The 2007 EPR3 guideline initiated the concept of 'future risk' to complement asthma control [14]. The NHLBI guidelines have also exposed deficiencies in asthma knowledge and have acted to stimulate formation of research networks, such as the Asthma Clinical Research Network (initiated in 1993) and the Childhood Asthma Research and Education Network (initiated in 1999). These networks have furthered asthma understanding with research directed at important gaps of knowledge.

The NHLBI guideline has been, to varying degrees, widely disseminated – over 300 000 copies

of the EPR1 guideline were distributed to healthcare professionals [11]. In addition, there is evidence that, when properly adhered to, the NHLBI guidelines can improve asthma control and quality of life for asthmatic patients. For example, a study of more than 60 000 patients showed that almost three quarters had poor asthma control, and 40% were not using controller therapy. After implementation of the NHLBI guidelines by the primary care physicians the study [15] found a 52% increase in use of inhaled corticosteroids. In studying 20 pediatric practices, researchers found that education about the NHLBI guideline improved inhaled corticosteroid use (47% increase) and resulted in 56% fewer asthma outpatient visits and a dramatic 91% decrease in emergency room visits for asthma [16].

However, studies have also noted that among primary guideline goals, effective implementation of guideline recommendations has been challenging. For example, a US study [17] of 6703 asthmatics noted that compliance with the NHLBI guideline was consistently low with, at best, two-thirds of the patients having been prescribed an inhaled corticosteroid and less than half of those patients using it daily. A survey of 671 primary care physicians in the United States noted that although 72% of respondents had read the NHLBI guidelines, practice markedly differed from guideline recommended care (e.g. only 21% used spirometry regularly, and only 50% provided written action plans) [18].

In addition, it remains unclear whether or not establishment of a US guideline has altered national asthma morbidity or mortality. Data from the Centers for Disease Control note that from 2001 to 2010, asthma mortality rates declined but so did asthma healthcare encounters [19]. However, studies have noted a slight increase in Emergency Department visits and hospitalizations for asthma among major pediatric centers across the United States of America [20].

Strengths and weaknesses of other major national asthma guidelines

Each major national guideline has contributed significantly to asthma care and research in its own unique way. The Australian guideline's collaborative approach to its guideline formation, including not only subspecialty physicians, but also general practitioners, pharmacists and asthma foundations representing patient interests provides a well rounded approach. It also addresses a spectrum of asthma populations including the pediatric asthma population and has a strong focus on accessibility (including multiple easy-to-follow algorithms on the website and community awareness programs).

The Canadian guideline was the first to focus on the concept of asthma control, paving the way for a major shift in approach to asthma management that has subsequently been adopted by other national guidelines. It also set the foundation for evaluation of guideline efficacy and similar to the Australian guideline had a strong focus on guideline implementation and asthma education (in fact, there was an implementation committee established in 1999). The BTS/SIGN guideline, very similar to the NHLBI guideline in style and substance, although with a rather more rigorous grading of evidence, was the first to specifically address the asthmatic toddler with a separate guideline category for children under the age of 5 years.

Other major national guidelines face similar successes and challenges as the NHLBI guideline. For example, most are only updated every several years (the CTS guideline is updated about twice a decade; the Australian guideline was updated after an 8-year gap in 2014 and then quickly again in 2016). The effect of guidelines on decreasing asthma morbidity and mortality also remains ambiguous. For example, data from the Public Health Agency of Canada from 2011 report that only 34.4% of Canadian asthmatics had well controlled asthma [21]. Implementation of these guidelines remains an important challenge. A study [22] of asthma symptoms in 4239 school-aged children in Australia noted that among symptomatic children, only 60% had been diagnosed with asthma, only 20% were on appropriate asthma medications and less than 10% had objective assessment of airway function. However, there are data showing that asthma care does improve with proper implementation. For example, with the institution of the National Asthma Campaign focused on implementation of the guidelines in Australia, a study [23] of 8746 school-aged children noted improved asthma management (decreased use of routine bronchodilator medication, increased use of asthma controller medication, increased lung function monitoring).

GLOBAL INITIATIVE FOR ASTHMA STRATEGY

Introduction

The GINA was established in 1993 as a collaboration between the NHLBI and the WHO, with its first report published in 1995. In contrast to national guidelines, GINA was designed to increase asthma awareness and promote guideline development and knowledge translation on a global scale, based on a local area's available resources and needs. The goal of GINA has been 'disseminating information about

asthma management, and providing a mechanism to translate scientific evidence into improved asthma care' [24[■]]. It remains the purview of those developing national, locally appropriate guidelines to ensure that their guidelines will be implemented.

How Global Initiative for Asthma differs from national asthma guidelines

Although GINA also focuses on high levels of evidence and scientific rigor, it differs from national guidelines in several key ways. GINA, due to its more global focus, contains information less applicable to some national guidelines, such as sections on health economics and potential strategies for guideline implementation [25]. Instead of focusing on preferred therapies, it reviews all traditional and complementary therapies as asthma treatment may vary on the basis of local availability of medications [25]. The 2016 GINA update also focuses on 'humanomics' that has been described as 'taking into account the behavioral, social and cultural factors that shape outcomes for individual patients' [26]. Due to its global scale, GINA has a strong impetus to be both 'accessible and relevant' [24[■]] and hence contains a variety of clinical tools such as summary tables and flowcharts [24[■]].

GINA is updated and posted online annually, which sets it apart from the major national guidelines. The GINA documents are openly available on the website for use in establishing locally appropriate recommendations. These documents add the most current asthma research to modify the established published data that can then improve on previous recommendations. For example, the 2014 GINA guideline added the emerging concept of the asthma/chronic obstructive pulmonary disease overlap syndrome. In keeping with its global focus, there were also sections on asthma health literacy and how to alter health-related behavior [24[■]]. As another example, the GINA guideline has a wealth of information about pediatric asthma, due to increasing research and evolving knowledge in this area over the past several years.

Overall, the process of GINA differs from national guidelines, providing a broader scope, more frequent updates of published data and ease of access for organizations to develop their own, environmentally and culturally appropriate guidelines. Further, it remains the purview of local and national guideline developers to not only disseminate those guidelines to their constituent communities but to also ensure that implementation of those guidelines takes place. The ideal would be to allow use of the GINA strategy to assist in local guideline development, to help strategize approaches toward

effective implementation, and to study knowledge translation to define the most effective approach to implementation in the context of where those guidelines are developed.

FUTURE DIRECTIONS

For asthma, as for other aspects of medicine, there is a move toward personalized medicine (also known as precision medicine). There is increasing understanding that substantive phenotypic differences exist within asthma, especially in young children [27]. For example, a recently released study [28[■]] of 300 children aged 12–59 months with asthma noted a 74% differential response to step 2 asthma treatment strategies, with both aeroallergen sensitization and elevated blood eosinophils predicting response to inhaled corticosteroids. These phenotypes need better delineation to create endotypes that may help to identify the most appropriate approach to therapy to direct development of newer approaches to treatment. Further research is critical to determine the role of currently available biomarkers (such as exhaled breath condensate, airway inflammatory cells and exhaled nitric oxide) in asthma therapy [29,30[■]]. This may assist in defining the role and impact of biologic immunomodulators in asthma, which may further improve our ability to treat patients with specific asthma phenotypes and endotypes [30[■]]. That will be true personalized, precision medicine.

Increasing research will also allow better direction around the natural course of asthma (such as what variables are correlated with asthma onset in young children, what variables are associated with asthma disease progression, and how to predict long-term consequences such as airway remodeling) [29]. In addition, further education of families and schools about asthma care and control, such as the recently described School-based Asthma Management Program, will increase knowledge translation and implementation [31]. Of ultimate importance, research into asthma prevention will provide a new generation with a life free of this far too common chronic disease. As research evolves, and knowledge gaps are filled, guidelines will be better able to direct effective, personalized asthma care and, more importantly, asthma prevention.

CONCLUSION

Increasingly guidelines need to embrace both evidence-based data and real-world research [32[■]] with strategies toward the ultimate goal of improving asthma care on a local, regional, national or international level. GINA and national guidelines have

shared the limitation of being based on rigorous efficacy research (largely randomized controlled trials) which in the past has excluded some asthmatic patient populations, and where interventions are studied in settings of optimal compliance [25]. National guidelines and the GINA strategy share common benefits of working toward improving dissemination of asthma-related information. However, GINA and national guidelines differ in one key aspect. It remains the responsibility of local guideline developers to engage knowledge users and effectively implement knowledge translation in the context of the local environments. This will require more focus on implementation research to allow each guideline developer to determine how best to transmit this knowledge in their local environments.

GINA has focused as a resource to collate published data as currently as possible to improve global understanding of asthma to serve as a knowledge-based stepping stone to guideline development.

Asthma is a complex disease with varying phenotypes and endotypes. There is no 'one size fits all option' as a result of this [33]. One could argue, as well, that there is no 'one size fits all' option for asthma guidelines either. Both the GINA strategy and national guidelines serve to different strengths and weaknesses, and both have unequivocally increased asthma awareness and understanding and have helped to decrease the 'asthma care gap' over the past few decades.

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REFERENCES AND RECOMMENDED READING

Papers of particular interest, published within the annual period of review, have been highlighted as:

- of special interest
- of outstanding interest

1. Lai CK, Beasley R, Crane J, *et al.*, International Study of Asthma and Allergies in Childhood Phase Three Study Group. Global variation in the prevalence and severity of asthma symptoms: phase three of the International Study of Asthma and Allergies in Childhood (ISAAC). *Thorax* 2009; 64:476–483.
 2. To T, Stanojevic S, Moores G, *et al.* Global asthma prevalence in adults: findings from the cross-sectional world health survey. *BMC Public Health* 2012; 12:204.
 3. Woolcock AJ, Rubinfeld A, Seale P. The Australian asthma management plan. *Med J Aust* 1989; 151:650–653.
 4. Hargreave FE, Dolovich J, Newhouse MT. The assessment and treatment of asthma: a conference report. *J Allergy Clin Immunol* 1990; 85:1098–1111.
 5. Jackson R, Sears MR, Beaglehole R, Rea HH. International trends in asthma mortality: 1970 to 1985. *Chest* 1988; 94:914–918.
 6. National Institutes of Health, National Asthma Education and Prevention Program. Expert panel report 3: guidelines for the diagnosis and management of asthma. NIH publication no. 08-4051. Bethesda, Maryland: National Institutes of Health, National Asthma Education and Prevention Program; 2007; <http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>. [Accessed 8 October 2016]
 7. Loughheed MD, Lemiere C, Ducharme FM, *et al.* Canadian Thoracic Society 2012 guideline update: diagnosis and management of asthma in preschoolers, children and adults. *Can Respir J* 2012; 19:127–164.
 8. BTS/SIGN. British guideline on the management of asthma. 2016. <https://www.brit-thoracic.org.uk/standards-of-care/guidelines/btssign-british-guide-line-on-the-management-of-asthma>. [Accessed 8 October 2016]
 9. Australian Asthma Handbook. 2016. <https://www.nationalasthma.org.au/health-professionals/australian-asthma-handbook>. [Accessed 8 October 2016]
 10. Global strategy for asthma management and prevention (updated 2016): ■ Global Initiative for Asthma (GINA). <http://www.ginasthma.org>. [Accessed 8 October 2016]
- This provides the most updated review of data and recommendations for consideration in guideline development.
11. Myers TR. Guidelines for asthma management: a review and comparison of 5 current guidelines. *Respir Care* 2008; 53:751–767.
 12. Szefer SJ. Is it time to revise the asthma guidelines? *J Allergy Clin Immunol* 2011; 128:937–938.
 13. National Institutes of Health, National Asthma Education and Prevention Program. Expert panel report 1: guidelines for the diagnosis and management of asthma. Publication No. 91–3642. Bethesda, Maryland: National Institutes of Health, National Asthma Education and Prevention Program; 1991.
 14. Busse WW, Lemanske RF Jr. Expert panel report 3: moving forward to improve asthma care. *J Allergy Clin Immunol* 2007; 120:1012–1014.
 15. Carlton BG, Lucas DO, Ellis EF, *et al.* The status of asthma control and asthma prescribing practices in the United States: results of a large prospective asthma control survey of primary care practices. *J Asthma* 2005; 42:529–535.
 16. Cloutier MM, Wakefield DB, Sangelot-Higgins P, *et al.* Asthma guideline use by pediatricians in private practices and asthma morbidity. *Pediatrics* 2006; 118:1880–1887.
 17. Meng YY, Leung KM, Berkbigler D, *et al.* Compliance with US asthma management guidelines and specialty care: a regional variation or national concern? *J Eval Clin Pract* 1999; 5:213–221.
 18. Finkelstein JA, Lozano P, Shulruff R, *et al.* Self-reported physician practices for children with asthma: are national guidelines followed? *Pediatrics* 2000; 106 (4 Suppl):886–896.
 19. Akinbami LJ, Moorman JE, Bailey C, *et al.* Trends in asthma prevalence, health care use, and mortality in the United States, 2001–2010. *NCHS Data Brief* 2012; (94):1–8.
 20. Weinberger MM. What is the problem with asthma care for children? *Arch Pediatr Adolesc Med* 2011; 165:473–475.
 21. Fast facts about asthma: data compiled from the 2011 survey of chronic diseases in Canada. 2012. www.phac-aspc.gc.ca. [Accessed 7 October 2016]
 22. Bauman A, Young L, Peat JK, *et al.* Asthma under-recognition and under-treatment in an Australian community. *Aust N Z J Med* 1992; 22:36–40.
 23. Comino EJ, Mitchell CA, Bauman A, *et al.* Asthma management in eastern Australia, 1990 and 1993. *Med J Aust* 1996; 164:403–406.
 24. Reddel HK, Bateman ED, Becker A, *et al.* A summary of the new GINA ■ strategy: a roadmap to asthma control. *Eur Respir J* 2015; 46:622–639.
 - A brief, easily read update on changing perspectives in guideline strategy.
 25. Bousquet J, Clark TJH, Hurd S, *et al.* GINA guidelines on asthma and beyond. *Allergy* 2007; 62:102–112.
 26. Bousquet J, Humbert M. GINA 2015: the latest iteration of a magnificent journey. *Eur Respir J* 2015; 46:579–582.
 27. Drzen JM. Asthma: the paradox of heterogeneity. *J Allergy Clin Immunol* 2012; 129:1200–1201.
 28. Fitzpatrick AM, Jackson DJ, Mauger DT, *et al.* Individualized therapy for persistent asthma in young children. *J Allergy Clin Immunol* 2016; 138:1608–1618.
 - An excellent study which is a trailblazer for more personalized/precision care of young children with asthma.
 29. Szefer SJ, Chmiel JF, Fitzpatrick AM, *et al.* Asthma across the ages: knowledge gaps in childhood asthma. *J Allergy Clin Immunol* 2014; 133:3–13.
 30. Anderson WC, Szefer SJ. New and future strategies to improve asthma ■ control in children. *J Allergy Clin Immunol* 2015; 136:848–859.
 - A beautifully done and organized review of where we are and where we are (potentially) going in therapeutic strategies using concepts of focus on phenotype and endotype.
 31. Lemanske RF, Kakamanu S, Shanovich K, *et al.* Creation and implementation of SAMPRO: a school-based asthma management program. *J Allergy Clin Immunol* 2016; 138:711–723.
 32. Price D, Brusselle G, Roche N, *et al.* Real-world research and its importance in ■ respiratory medicine. *Breathe (Sheff)* 2015; 11:26–38.
 - A perspective of research that encompasses a broad range of patient populations which in many ways comes full circle to support the concept of 'expert opinion' based on consultant–patient experience.
 33. Weinberger M. Why clinical practice guidelines hinder rather than help. *Pediatr Respir Rev* 2016. [Epub ahead of print]