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## Quality of Evidence-Based Pediatric Guidelines

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**ABSTRACT.** *Objective.* To identify evidence-based pediatric guidelines and to assess their quality.

*Methods.* We searched Medline, Embase, and relevant Web sites of guideline development programs and national pediatric societies to identify evidence-based pediatric guidelines. A list with titles of identified guidelines was sent to 51 leading pediatricians in the Netherlands, who were asked to select the 5 most urgent topics for guideline development. Three pediatrician reviewers appraised the available guidelines on the 10 most frequently mentioned topics with the Appraisal of Guidelines for Research and Evaluation (AGREE) instrument.

*Results.* A total of 215 evidence-based pediatric guidelines were identified; of these, 17 guidelines on the 10 most frequently mentioned topics were appraised. The AGREE instrument rates guidelines among 6 domains. For the scope and purpose domain, the mean score was 84% of the maximal mark. For stakeholder involvement, the mean score was 42%, with 12 guidelines (71%) scoring <50%. For rigor of development, the mean score was 54%, with 5 guidelines (29%) scoring <50%. For clarity and presentation, the mean score was 78%, with 4 guidelines (24%) scoring <50%. For applicability and editorial independence, performance was poor, with mean scores of 19% and 40%, respectively. Low scores were partly attributable to poor reporting. After considering all domain scores, the reviewers recommended 14 of 17 guidelines (82%) to be used in local practice.

*Conclusions.* The current volume of pediatric guidelines categorized as evidence based in popular databases is large. Overall, these guidelines scored well, compared with other studies on guideline quality in fields outside pediatrics, when assessed for quality with the AGREE instrument. This holds especially for guidelines published or endorsed by the American Academy of Pediatrics or registered in the National Guideline Clearinghouse. *Pediatrics* 2005;115:1378–1391; *practice guidelines, evidence-based medicine, quality of health care, pediatric.*

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ABBREVIATIONS. AGREE, Appraisal of Guidelines, Research, and Evaluation; AAP, American Academy of Pediatrics; SIGN, Scottish Intercollegiate Guidelines; CMA, Canadian Medical Association; NGC, National Guideline Clearinghouse; ICC, intraclass correlation coefficient.

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Clinical practice guidelines are systematically developed statements to assist practitioners and patients in making decisions about appropriate health care in specific clinical circumstances.<sup>1</sup> For many health care conditions, a gap exists between what medical science has shown to be effective practice and what is actually done.<sup>2</sup> The primary goal of practice guidelines in pediatrics is to improve the health of infants and children by ensuring that they receive up-to-date, evidence-based care. Practice guidelines represent one of the various tools that can be used to improve the quality of care.<sup>3</sup> Several studies have shown that adherence to evidence-based guidelines leads to improvement in the quality of care provided.<sup>4–10</sup>

In recent decades, the number of available clinical practice guidelines has grown enormously. It is estimated that ~2500 guidelines are already in existence. This recent increase in the production of clinical practice guidelines has been accompanied by growing concern about the variations in guideline recommendations and quality. In fact, several studies suggested that many existing guidelines are of poor quality.<sup>11–15</sup> As the numbers of published guidelines increase, there have been calls for the establishment of internationally recognized standards to improve the development and reporting of clinical guidelines. For this purpose, an international group of researchers from 13 countries, the Appraisal of Guidelines, Research, and Evaluation (AGREE) Collaboration, has developed and validated a generic instrument that can be used to assess the quality of clinical guidelines.<sup>16</sup>

The number of published pediatric guidelines available to pediatricians is also increasing rapidly. However, their quality has not been assessed systematically. We set out to measure the current volume of potentially high-quality, published, pediatric guidelines, to assess their quality with the AGREE instrument, and to see whether we could adjust them for local use (to avoid potential duplication of effort within our Dutch national guideline development program). We limited our search to evidence-based guidelines, to enhance the yield of high-quality guidelines. We asked the following 2 questions. What evidence-based pediatric guidelines exist currently? What is the quality of these guidelines?

## METHODS

### Literature Search

We searched Medline (1966 to January 2004) and Embase (1988 to January 2004) with the following terms: evidence-based medicine (Medical Subject Heading) or evidence based.tw (text word) or evidence-based.tw and practice guidelines.pt (publication

type), with the limits "child" and "English language." Furthermore, we looked at relevant Web sites of agencies known to produce and/or endorse evidence-based guidelines, ie, American Academy of Pediatrics (AAP) and Scottish Intercollegiate Guidelines (SIGN), and Web sites of databases known to register evidence-based guidelines, ie, the Agency for Health Care Policy and Research National Guideline Clearinghouse (NGC) and the Canadian Medical Association (CMA) Clinical Practice Guidelines Infobase.

### Inclusion of Guidelines

Included were practice guidelines that concerned the management of diseases among children and neonates. Not all agencies that produce guidelines focus solely on the pediatric age group and, to be included in our sample, guidelines were required to make specific recommendations for children and/or neonates. Excluded were guidelines on prevention, screening, prenatal diagnoses, psychiatry, surgery, general practice, and very rare disorders. One of our aims was to appraise critically a sample of the retrieved guidelines, to see whether we could adopt them for use in the Netherlands. We sent the list of evidence-based guidelines that had been identified through the literature search to all directors of pediatric training programs in both academic teaching hospitals ( $n = 10$ ) and affiliated teaching hospitals in community practice settings ( $n = 22$ ) and to the chairpersons of all subspecialty working groups of the Dutch Board of Pediatricians in the Netherlands ( $n = 19$ ), and we asked them to select the 5 most urgent topics for national pediatric guideline development.

### Appraisal of Guidelines With the AGREE Instrument

We appraised the evidence-based guidelines published up to 2002 that were identified through the literature search for the 10 topics mentioned most frequently by 51 Dutch leaders in pediatrics, with 3 separate reviewers (N.B., C.R.L., and M.O.) using the AGREE instrument to evaluate the scientific quality of the selected guidelines. We collected all documentation related to each guideline available in the public domain. Before we started to appraise the guidelines, we appraised a practice set to reach consensus about the interpretation of all items. The AGREE instrument is an international, methodologically rigorously developed, validated instrument.<sup>16</sup> It contains 6 domains, with a total of 23 items, and allows for the assessment of several components that are integral to guideline development, as follows: (1) scope and purpose (3 items), (2) stakeholder involvement (4 items), (3) rigor of development (7 items), (4) clarity and presentation (4 items), (5) applicability (3 items), and (6) editorial independence (2 items) (Appendix 1). The score for each domain is obtained by summing all of the scores of the individual items in a domain and then standardizing as follows: (obtained score - minimal possible score) / (maximal possible score - minimal possible score). The maximal possible score for each domain would be the number of questions multiplied by the number of reviewers times 4 (ie, the score for "strongly agree"). The minimal possible score for each domain would be the number of questions multiplied by the number of reviewers times 1 (ie, the score for "strongly disagree").

The final item of the AGREE instrument involves a recommendation regarding the use of the guideline in practice, as "strongly recommended," "recommended with provisos or alterations," "would not recommend," or "unsure." For ease of interpretation, we considered "strongly recommended" and "recommended with provisos or alterations" as responses indicating "recommended" and "would not recommend" or "unsure" as responses indicating "not recommended."

Cohen's  $\kappa$ , a widely used measure of agreement, was considered. For this purpose, the AGREE response categories were dichotomized into strongly agree/agree versus strongly disagree/disagree, because we judged an analysis of agreement at this level to be sufficient. However, substantial imbalances in the distribution of the tables' marginal totals were present, making comparison and interpretation of the  $\kappa$  values according to Cohen's criteria inappropriate.<sup>17,18</sup> Intraclass correlation coefficients (ICCs) were considered to assess the inter-rater reliability within each domain. Similarly to  $\kappa$  values, ICCs are dependent on the variance of the item scores and thus the resulting domain scores. Because of lack of variance of the obtained item scores for some domains in this study, resulting ICCs were low and could be misinterpreted as indicating lack of agreement. For that reason, we report only the

observed proportion of overall agreement among the reviewers for each of the 23 items of the AGREE instrument.

## RESULTS

### Literature Search

A total of 215 guidelines were identified by the search process after application of inclusion and exclusion criteria (Appendix 2). We identified 51 relevant guidelines in Medline and 15 in Embase. In the NGC, we identified 119 guidelines. The AAP had 26 guidelines (endorsed guidelines included) available that fulfilled our inclusion and exclusion criteria. The SIGN had 3 guidelines available that fulfilled our inclusion and exclusion criteria. On the Web site of the CMA Clinical Practice Guidelines Infobase, we identified 34 guidelines. Some of the guidelines were found in several databases. All of the AAP and SIGN guidelines were also registered in the NGC. Seven guidelines were found in both the NGC and Medline. Three guidelines were found in both Medline and Embase.

### Priority List

The response to our request to colleagues to provide a list of 5 topics that needed a Dutch national guideline most urgently was 47% (24 of 51 individuals) after 2 mailings. The 10 most frequently mentioned topics and clinical problems are listed in Table 1.

### Appraisal of Guidelines

We appraised 17 evidence-based guidelines regarding the 10 most frequently mentioned topics. One guideline on procedural sedation did not address the prioritized topic and therefore was not appraised. The quality of the guidelines is indicated by their scores in Table 2. Table 2 lists 19 guidelines published in 17 documents; 2 guidelines (1 in Medline and 1 in Embase) were appraised for fever among children <2 months of age and children >2 months of age. We now describe the appraisal results according to AGREE domain.

### Scope and Purpose

The score for this domain represents the degree to which the overall objectives of the guideline, the clinical questions covered, and the patients to whom the guideline was meant to apply were described specifically. Overall, the mean score was 84% (range: 59–100%).

TABLE 1. Prioritized Topics for Guideline Development

Topics
Constipation
Urinary tract infections
Head injury among children <2 y old
Head injury among children >2 y old
Diabetic ketoacidosis
Sedation for procedures
Antiemetics for patients receiving chemotherapy
Vesicoureteral reflux
Fever without source among children <2 mo old
Fever without source among children >2 mo old

**TABLE 2.** AGREE Domain Scores for Selected Evidence-Based Guidelines

Guideline	Score					Overall Recommendation
	Scope and Purpose	Stakeholder Involvement	Rigor of Development	Clarity of Presentation	Applicability	
Constipation						
Idiopathic constipation and soiling in children (NGC) <sup>21</sup>	89	42	52	81	0	Recommended
Constipation in infants and children: evaluation and treatment (NGC, AAP endorsed) <sup>22</sup>	81	47	75	86	0	Recommended
Urinary tract infections						
Diagnosis, treatment, and evaluation of the initial urinary tract infection in febrile infants and young children (AAP, NGC) <sup>23</sup>	100	58	75	86	52	Recommended
Evidence-based clinical practice guideline for patients ≤6 y old with a first-time acute urinary tract infection (NGC) <sup>24</sup>	81	44	52	86	15	Recommended
Head injury among children <2 y old						
Evaluation and management of children <2 y old with apparently minor head trauma (Medline) <sup>25</sup>	96	39	57	92	19	Recommended
Head injury among children >2 y old						
Management of minor closed head injury in children (AAP) <sup>26</sup>	96	53	71	86	37	Recommended
Early management of patients with a head injury (NGC, SIGN) <sup>27</sup>	81	39	67	97	59	Recommended
Management of children with head trauma (CMA) <sup>28</sup>	59	19	2	36	0	Would not recommend
Diabetic ketoacidosis						
Provincial protocol for the treatment of diabetic ketoacidosis in children (CMA) <sup>29</sup>	70	36	10	89	7	Recommended
Antiemetics for patients receiving chemotherapy						
Recommendations for the use of antiemetics: evidence-based, clinical practice guidelines (NGC) <sup>30</sup>	74	50	81	81	11	Recommended
ASHP therapeutic guidelines on the pharmacologic management of nausea and vomiting in adult and pediatric patients receiving chemotherapy or radiation therapy or undergoing surgery (NGC) <sup>31</sup>	93	44	79	81	30	Recommended
Vesicoureteral reflux						
Management of primary vesicoureteral reflux in children (NGC, AAP endorsed) <sup>32</sup>	93	69	84	89	30	Recommended
Fever without source in children <2 mo old						
Practice guideline for the management of infants and children 0–36 mo old with fever without source (Medline) <sup>33</sup>	93	31	59	94	22	Recommended
Evidence-based clinical protocol guideline for fever of uncertain source in infants ≤60 days old (NGC) <sup>34</sup>	85	53	62	89	15	Recommended
Evaluation of the infant with fever without source: an evidence-based approach (Embase) <sup>35</sup>	81	17	40	28	15	Would not recommend
Fever without source among children >2 mo old						
Practice guideline for the management of infants and children 0–36 mo old with fever without source (Medline) <sup>33</sup>	93	31	59	94	22	Recommended
Evidence-based clinical practice guideline of fever of uncertain source: outpatient evaluation and management for children 2–36 mo old (NGC) <sup>36</sup>	85	47	49	89	7	Recommended
Evaluation of the infant with fever without source: an evidence-based approach (Embase) <sup>35</sup>	81	17	40	28	15	Would not recommend
Management of the febrile 1- to 36-mo-old child with no focus of infection (CMA) <sup>37</sup>	67	19	11	31	0	Would not recommend
Means	84	42	54	78	19	40

NGC: [www.guideline.gov](http://www.guideline.gov); AAP: [www.aap.org/policy/paramtoc.html](http://www.aap.org/policy/paramtoc.html); SIGN: [www.sign.ac.uk](http://www.sign.ac.uk); CMA: [mdm.ca/cpgsnew/cpgs/index.asp](http://mdm.ca/cpgsnew/cpgs/index.asp).

### Stakeholder Involvement

This domain evaluates the degree to which the guideline represents the views of its intended users. Included are questions regarding the composition of the guideline development group (specifically, whether individuals from all relevant professional groups were represented), whether patients' experiences and expectations influenced the development of the guideline, whether the target users of the guideline were well defined, and whether the guideline was pilot-tested among end-users. Overall, the mean score for this domain was 42% (range: 17–69%), with 12 guidelines (71%) scoring <50%. Thirteen guidelines (76%) included individuals from all relevant professional groups in the guideline development stage, but none involved patients in the development or was pilot-tested among end-users.

### Rigor of Development

This domain evaluates specifically whether systematic methods were used to search for evidence, whether the criteria for selecting the evidence and the methods used to formulate the recommendations were described clearly, whether there was an explicit link between the recommendations and the supporting evidence, whether health benefits, side effects, and risks were considered during formulation of the recommendations, whether the guideline was reviewed externally by experts before publication, and whether a procedure for updating the guideline was provided. Overall, the mean score for this domain was 54% (range: 2–84%), with 5 guidelines (29%) scoring <50%. Specifically, 14 guidelines (82%) described systematic methods for searching and selecting the evidence, 9 guidelines (53%) considered health benefits, side effects, and risks during formulation of the recommendations, 11 guidelines (65%) described the methods used to formulate the recommendations, 14 guidelines (82%) indicated an explicit link between the supporting evidence and the recommendations, and 11 guidelines (65%) were reviewed externally before publication. Only 3 guidelines (18%) described a procedure for updating the guideline.

### Clarity and Presentation

This domain describes the clarity of the guidelines. Specifically, it describes whether the recommendations were specific and unambiguous, whether the different management options were presented clearly, whether key recommendations were easily identifiable, and whether the guideline was supported with tools for application. Overall, the mean score for this domain was 78% (range: 28–97%). Four guidelines (24%) scored <50% for this domain.

### Applicability

This domain evaluates the likely organizational, behavioral, and cost implications of applying the guideline. In addition, review criteria that link guideline use to audits and other quality improvement initiatives should be developed. The score on this domain was the lowest of all, with a mean score of 19% (range: 0–59%). Only 2 guidelines (12%) scored

≥50%. One guideline provided review criteria for monitoring purposes, and 3 discussed potential organizational barriers. Only 1 guideline discussed cost implications.

### Editorial Independence

This domain addresses conflict of interest, specifically whether the guideline was editorially independent from the funding body and whether potential conflicts of interest were reported for the members of the guideline development group. The mean score in this domain was 40% (range: 17–78%). Seven guidelines (41%) scored >50%. In 15 guidelines (88%), potential conflicts of interest on the part of guideline developers were not recorded.

### Agreement Among Reviewers

Of the 17 guidelines appraised, the reviewers agreed about the subjective judgments for 88% (15 guidelines) and came to a consensus with respect to an overall recommendation for each guideline. In total, we recommended 14 of 17 guidelines (82%). Table 3 summarizes the observed simple agreement among reviewers for the 23 items of the AGREE instrument. Observed agreement among reviewers was 41% to 60% for 3 items, 61% to 80% for 12 items, and >80% for 8 items.

## DISCUSSION

Practice guidelines have become an increasingly popular tool for synthesis of clinical research that may be used to change clinical practice and to improve quality in health care. The quantitative growth in the number of guidelines available in different specialties is, however, a source of concern, because there is evidence that the quality of these guidelines is generally poor.

We used the AGREE instrument to assess the quality of current pediatric guidelines. Mean domain scores in this survey were 84% for scope and purpose, 42% for stakeholder involvement, 54% for rigor of development, 78% for clarity of presentation, 19% for applicability, and 40% for editorial independence. Compared with other studies of the quality of guidelines assessed with the AGREE instrument in fields outside pediatrics, these scores are fairly good. For example, the international validation survey of the AGREE instrument ([www.openclinical.org/prj-agree.html](http://www.openclinical.org/prj-agree.html)) showed mean domain scores of 69% for scope and purpose, 36% for stakeholder involvement, 41% for rigor of development, 66% for clarity of presentation, 37% for applicability, and 30% for editorial independence. A Canadian study reviewed the quality of drug therapy guidelines developed or

**TABLE 3.** Agreement Among 3 Reviewers for AGREE Instrument Items

Agreement, %	No. of Items
0	0
0–20	0
21–40	0
41–60	3
61–80	12
>80	8

endorsed by Canadian organizations from 1994 to 1998.<sup>14</sup> Only 5% of the 217 guidelines reviewed met one half or more of the 20 criteria defining the rigor of development process. Another recent study assessed the quality of clinical practice guidelines in lung cancer with the AGREE instrument.<sup>19</sup> Of the 51 relevant guidelines identified, most were of poor overall quality. Only 19 of 51 (37%) of those guidelines were recommended for use in practice.

### Application of Pediatric Guidelines

In this study, we recommended 14 of 17 (82%) pediatric, evidence-based, practice guidelines for use in the Netherlands. This high percentage of recommended guidelines is attributable in part to the fact that we searched deliberately for high-quality guidelines. We restricted our searches in Medline and Embase with the term "evidence-based," because searching Medline for practice guidelines (publication type) yielded many consensus statements, position papers, workgroup reports, clinical policies, and standards. Although such documents are potentially useful in practice, their emphasis is usually not on the key clinical management questions and the supporting scientific evidence to answer those questions but rather on opinion and expert advice. We recognize that, because this was a selective search for potentially high-quality guidelines, we might have missed some good-quality guidelines.

All 14 guidelines were recommended with provisos or alterations. Typically, guideline recommendations are based on evidence, which is considered to be global, and other considerations, which are local and may differ among cultures. Each country has its own cultural and legal standards, and values and organizational limitations may affect the local recommendations. It is therefore not surprising that, in light of the same scientific evidence, different guideline developers produce different recommendations for local practice. For the successful implementation of good research evidence into clinical practice, we think that local groups of practitioners should create their own recommendations involving all relevant evidence and all local stakeholders.

### Sources of Pediatric Guidelines

The NGC is a freely available database with >1000 high-quality, evidence-based, practice guidelines. Not only American but also foreign guidelines can be registered if they fulfill a set of criteria, eg, a systematic review of the literature should be performed. The SIGN and AAP guidelines are all registered in the NGC. The appraised guidelines indexed in the NGC and produced by the AAP were all recommended. Two of the 3 guidelines indexed in the CMA Clinical Practice Guidelines Infobase were not recommended because they scored low on rigor of development (2% and 11%). The guideline found in Embase was also not recommended; the score on rigor of development was 40% for this guideline.

Agencies that produce good-quality guidelines submit them to the NGC, which applies stringent quality criteria before it indexes a given guideline. To search for high-quality guidelines, therefore, we rec-

ommend starting by searching the NGC. However, in searching for a guideline on a specific topic that cannot be found in the NGC, it can be rewarding to search the Internet, because some guideline developers prefer simply to post their guidelines on their Web sites, as opposed to publishing them in journals or having them indexed in the NGC.

### Areas for Pediatric Guideline Improvement

On the basis of the results of our survey, we identified various areas in which pediatric guidelines can be improved. First, patient preferences and experiences were not sought. This is especially important for guidelines in which quality of life plays an important role or in which treatment can have significant morbidity or side effects. However, in the present selection of guidelines, this might have been of lesser importance. Furthermore, most guidelines did not provide evidence of pilot testing. This is an important issue to ensure that the guideline can be put into actual clinical use.

Because we were looking for evidence-based guidelines, the AGREE domain scores for rigor of development are notable because they relate directly to how evidence based a guideline is. The fairly low mean score on this domain (54%) is partly attributable to the fact that the rigor of development domain contains not only questions on how evidence based a guideline is but also questions about whether the guideline was reviewed externally by experts before publication and whether a procedure for updating the guideline was provided. Items 8, 9, and 10 (ie, whether systematic methods were used to search for evidence and whether the criteria for selecting the evidence and the methods used to formulate the recommendations were clearly described) are the most important items relating to the issue of how evidence based a guideline is. If we only take these questions into account, the mean score would be 70% for our 14 recommended guidelines. It is generally recommended that guidelines be updated at least every 3 years, because new evidence can change the recommendations.<sup>20</sup> However, only 3 guidelines (18%) described a procedure for updating the guideline and 5 guidelines were already outdated by this criterion (ie, >3 years old). For most recommended guidelines, we advised additional literature searches to update the evidence.

Another area in which most guidelines performed poorly was in the domain of applicability. Well-developed guidelines should include at least some consideration of potential barriers to implementation and cost implications, and they should supply monitoring criteria to assess the guideline's impact on practice organization and patient outcomes. Finally, editorial independence was stated rarely. Poor performance in this domain could represent true conflicts of interest between funding sources and guideline development panels or might reflect simply poor reporting on these topics.

### Limitations of the AGREE Rating Instrument

In this survey, we used the AGREE instrument to assess the quality of pediatric guidelines. Although

this instrument is fairly new, it is one of the few guideline assessment tools with demonstrated validity and reliability.<sup>16</sup> A guideline that addresses the issues covered by the AGREE instrument is more likely to be a rigorously developed guideline. However, the AGREE instrument showed its limitations in this particular survey. We found that some of the variability in ratings might be attributable to differences in interpretation of several items. For example, for item 22, which is in the domain of editorial independence, the observed agreement was 53%. This apparently poor agreement probably arises from the fact that some reviewers considered that the criterion was not met unless the statement was explicitly made in the guideline, whereas others interpreted the criterion to be met if the funding agency was a national government. In contrast, for 3 items (items 7, 8, and 17), the observed agreement was >90%. This is probably attributable to the fact that these questions are more straightforward. Another potential limitation of the AGREE instrument concerns the validity of the responses to the question on the overall assessment of the guideline's quality. No clear rules have been established regarding how to weight the different domains. However, in a review of the assessments compared with the domain scores, the responses appear to be valid and to reflect the quality of the guidelines. For each guideline that was recommended by all 3 raters in the present survey, the overall domain scores were  $\geq 50\%$  for at least 3 domains, with an average of 4 domains. For guidelines that were not recommended, only 1 domain scored >50%. Furthermore, the scores on the domain of rigor of development for recommended guidelines were high. All scores were  $\geq 50\%$ , with an average of 66%. Conversely, for guidelines that we did not recommend for use in our settings, the average score for this domain was only 18%. Another limitation of the AGREE instrument is that it assesses only the reporting of the different items and not the content validity of the recommendations. To assess the content validity of the recommendations, the rater must have both pediatric subject matter knowledge and skills in evidence-based medicine. When items are not reported specifically, they receive a low score (ie, 1, strongly disagree), although in fact the developers might have met the criterion. It is therefore important that future guidelines report all different items specifically.

### Opportunity for International Collaboration on Pediatric Guidelines

The development of some parts of a guideline, specifically the comprehensive literature reviews, is time-consuming work. For some topics, we found several evidence-based guidelines with a substantial overlap in evidence summaries. Collaboration between guideline developers throughout the world could be a way to avoid unnecessary duplication of effort. One current collaboration in this respect is the International Guidelines Network ([www.g-i-n.net](http://www.g-i-n.net)), which has grown to 46 member organizations from 24 countries. The International Guidelines Network

seeks to improve the quality of health care by promoting systematic development of clinical practice guidelines and their application in practice, by supporting international collaboration in guideline development.

Currently, no pediatric organization is a member of the International Guidelines Network. If we had a worldwide collaboration in guideline development, then the work would be made lighter and faster through sharing of agendas for topics for guideline development and state-of-the-art guideline development methods, literature searches, and critical appraisal. When a guideline is out of date, additional literature searches should be performed. Within a framework of guideline development collaboration, local guideline development groups could produce their own recommendations without duplicating the time-consuming literature search and critical appraisal process. When, despite a rigorous search and analysis of the scientific literature, clear evidence for key recommendations is missing, it should be stated clearly on what basis local consensus has been reached. Also, recommendations for future empirical research to fill evidence gaps can be given.

### CONCLUSIONS

The current volume of pediatric guidelines categorized as evidence based in popular databases is large. Compared with other studies of the quality of guidelines assessed with the AGREE instrument in fields outside pediatrics, these guidelines score well. This holds true especially for guidelines published and endorsed by the AAP or registered in the NGC. The AGREE instrument is a useful tool to select high-quality guidelines from the international literature as candidates for adaptation to culture-specific values and local or national pediatric practices. However, to assess the content validity of the guideline and to decide on local applicability, users must have both pediatric subject matter knowledge and skills in evidence-based medicine. It is desirable to come to international collaboration among pediatric guideline developers, to exchange methods for guideline development and evidence synthesis.

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## APPENDIX 1. AGREE Instrument

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### Scope and purpose

1. The overall objectives of the guideline are described specifically.
2. The clinical questions covered by the guideline are described specifically.
3. The patients to whom the guideline is meant to apply are described specifically.

### Stakeholder involvement

4. The guideline development group includes individuals from all relevant professional groups.
5. The patients' views and preferences have been sought.
6. The target users of the guideline are defined clearly.
7. The guideline has been pilot-tested among end users.

### Rigor of development

8. Systematic methods were used to search for evidence.
9. The criteria for selecting the evidence are described clearly.
10. The methods used for formulating the recommendations are described clearly.
11. The health benefits, side effects, and risks have been considered in formulating the recommendations.
12. There is an explicit link between the recommendations and the supporting evidence.
13. The guideline was reviewed externally by experts before its publication.
14. A procedure for updating the guideline is provided.

### Clarity and presentation

15. The recommendations are specific and unambiguous.
16. The different options for management of the condition are presented clearly.
17. Key recommendations are easily identifiable.
18. The guideline is supported with tools for application.

### Applicability

19. The potential organizational barriers in applying the recommendations have been discussed.
20. The potential cost implications of applying the recommendations have been considered.
21. The guideline presents key review criteria for monitoring and/or audit purposes.

### Editorial independence

22. The guideline is editorially independent from the funding body.
  23. Conflicts of interest of the guideline development members have been recorded.
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Pulmonology/allergy/ears, nose, and throat	
British Thoracic Society. <i>British Guideline on the Management of Asthma</i> . Scottish Intercollegiate Guidelines Network; 2003	NGC, SIGN
National Asthma Education and Prevention Program. <i>Expert Panel Report: Guidelines for the Diagnosis and Management of Asthma: Update on Selected Topics</i> . National Asthma Education and Prevention Program; 1997 (revised 2002)	NGC, AAP (endorsed)
National Heart, Lung, and Blood Institute, World Health Organization. <i>Global Initiative for Asthma: Global Strategy for Asthma Management and Prevention</i> . National Heart, Lung, and Blood Institute and World Health Organization; 1995 (revised 2002)	NGC
Institute for Clinical Systems Improvement. <i>Diagnosis and Management of Asthma</i> . Institute for Clinical Systems Improvement; 1998 (revised 2000)	NGC
American Academy of Allergy, Asthma, and Immunology, American College of Allergy, Asthma, and Immunology, Joint Council of Allergy, Asthma, and Immunology. <i>Practice Parameters for the Diagnosis and Treatment of Asthma</i> . American Academy of Allergy, Asthma, and Immunology, American College of Allergy, Asthma, and Immunology, Joint Council of Allergy, Asthma, and Immunology; 1995 (revised 1998)	NGC
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Alberta Clinical Practice Guidelines Program. <i>Guideline for the Management of Acute Asthma in Adults and Children</i> . Alberta Clinical Practice Guidelines Program; 1999	CMA
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American Association for Respiratory Care. <i>Selection of a Device for the Delivery of Aerosol to the Lung Parenchyma</i> . American Association for Respiratory Care; 1996 (reviewed 2000)	NGC
Canadian Asthma Consensus Group. <i>Canadian Asthma Consensus Report, 1999: Inhaled Glucocorticosteroids in Adults and Children</i> . Canadian Asthma Consensus Group; 1999 (reviewed 2001)	CMA
American Association for Respiratory Care. <i>Infant/Toddler Pulmonary Function Tests</i> . American Association for Respiratory Care; 1995 (reviewed 2000)	NGC
American Association for Respiratory Care. <i>Static Lung Volumes: 2001 Revision and Update</i> . American Association for Respiratory Care; 2001	NGC
American Association for Respiratory Care. <i>Methacholine Challenge Testing: 2001 Revision and Update</i> . American Association for Respiratory Care; 2001	NGC
Finnish Medical Society Duodecim. <i>Prolonged Cough in Children</i> . Finnish Medical Society Duodecim; 2000 (revised 2001)	NGC
Children's Hospital Medical Center. <i>Evidence-Based Guidelines for the Medical Management of Infants One Year of Age or Less With a First Time Episode of Bronchiolitis</i> . Cincinnati, OH: Children's Hospital Medical Center; 1996 (updated 2001)	NGC
Mandell LA, Marrie TJ, Grossman RF, Chow AW, Hyland RH. Canadian guidelines for the initial management of community-acquired pneumonia: an evidence-based update by the Canadian Infectious Diseases Society and the Canadian Thoracic Society: the Canadian Community-Acquired Pneumonia Working Group. <i>Clin Infect Dis</i> . 2000;31:383–421	Medline
Children's Hospital Medical Center. <i>Evidence-Based Clinical Practice Guideline of Community-Acquired Pneumonia in Children 60 Days to 17 Years of Age</i> . Cincinnati, OH: Children's Hospital Medical Center; 2000	NGC
Institute for Clinical Systems Improvement. <i>Viral Upper Respiratory Infection (VURI) in Children and Adults</i> . Institute for Clinical Systems Improvement; 1994 (revised 2002)	NGC
American Academy of Allergy, Asthma, and Immunology/American College of Allergy, Asthma, and Immunology/Joint Council of Allergy, Asthma, and Immunology. <i>Diagnosis and Management of Rhinitis</i> . American Academy of Allergy, Asthma, and Immunology/American College of Allergy, Asthma, and Immunology/Joint Council of Allergy, Asthma, and Immunology; 1998	NGC
Allergic Rhinitis and Its Impact on Asthma Workshop Group. <i>Allergic Rhinitis and Its Impact on Asthma</i> . Allergic Rhinitis and Its Impact on Asthma Workshop Group; 2001	NGC
University of Michigan Health System. <i>Allergic Rhinitis</i> . University of Michigan Health System; 2002	NGC
Infectious Diseases Society of America. <i>Practice Guidelines for the Diagnosis and Management of Group A Streptococcal Pharyngitis</i> . Infectious Diseases Society of America; 1997 (revised 2002)	NGC

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American College of Radiology. <i>Appropriateness Criteria for Sinusitis in the Pediatric Population.</i> American College of Radiology; 1998	NGC
American Academy of Allergy, Asthma, and Immunology/American College of Allergy, Asthma, and Immunology/Joint Council of Allergy, Asthma, and Immunology. <i>Parameters for the Diagnosis and Management of Sinusitis.</i> American Academy of Allergy, Asthma, and Immunology/American College of Allergy, Asthma, and Immunology/Joint Council of Allergy, Asthma, and Immunology; 1998	NGC
Chan KH, Winslow CP, Levin MJ, et al Clinical practice guidelines for the management of chronic sinusitis in children. <i>Otolaryngol Head Neck Surg.</i> 1999;120:328–334	Embase
American Academy of Pediatrics. <i>Clinical Practice Guideline: Management of Sinusitis.</i> American Academy of Pediatrics; 2001	NGC, AAP, Medline
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Children's Hospital Medical Center. <i>Evidence-Based Clinical Practice Guideline for Medical Management of Otitis Media in Children 2 Months to 6 Years Of Age.</i> Cincinnati, OH: Children's Hospital Medical Center; 1999	NGC
Alberta Clinical Practice Guidelines Program. <i>Guideline for the Diagnosis and Treatment of Acute Otitis Media in Children.</i> Alberta Clinical Practice Guidelines Program; 2000	CMA
Institute for Clinical Systems Improvement. <i>Diagnosis and Treatment of Otitis Media in Children.</i> Institute for Clinical Systems Improvement; 1995 (revised 2002)	NGC
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University of Michigan Health System. <i>Otitis Media.</i> University of Michigan Health System; 1997 (revised 2002)	NGC
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American Academy of Allergy, Asthma, and Immunology/American College of Allergy, Asthma, and Immunology/Joint Council of Allergy, Asthma, and Immunology. <i>Practice Parameters for the Diagnosis and Management of Immunodeficiency.</i> American Academy of Allergy, Asthma, and Immunology/American College of Allergy, Asthma, and Immunology/Joint Council of Allergy, Asthma, and Immunology; 1995 (reviewed 1998)	NGC
American Academy of Allergy, Asthma, and Immunology/American College of Allergy, Asthma, and Immunology/Joint Council of Allergy, Asthma, and Immunology. <i>Disease Management of Atopic Dermatitis: A Practice Parameter.</i> American Academy of Allergy, Asthma, and Immunology/American College of Allergy, Asthma, and Immunology/Joint Council of Allergy, Asthma, and Immunology; 1997	NGC
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British Columbia Centre for Excellence in HIV/AIDS. <i>Therapeutic Guidelines for the Treatment of HIV/AIDS and Related Conditions: Part X, Section 6: Care of Children With Perinatal HIV Infection.</i> British Columbia Centre for Excellence in HIV/AIDS; 1998 (reviewed June 1999)	CMA

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Bass JB Jr, Farer LS, Hopewell PC, et al Treatment of tuberculosis and tuberculosis infection in adults and children: American Thoracic Society and the Centers for Disease Control and Prevention. <i>Am J Respir Crit Care Med</i> . 1994;149:1359-1374	Medline
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<b>Gastroenterology</b>	
Cincinnati Children's Hospital Medical Center. <i>Evidence-Based Clinical Practice Guideline for Children With Hypertrophic Pyloric Stenosis</i> . Cincinnati Children's Hospital Medical Center; 2001	NGC
Armon K, Stephenson T, MacFaul R, Eccleston P, Werneke U. An evidence and consensus based guideline for acute diarrhoea management. <i>Arch Dis Child</i> . 2001;85:132-142	Medline
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American Academy of Pediatrics. <i>Practice Parameter: The Management of Acute Gastroenteritis in Young Children</i> . American Academy of Pediatrics; 1996	AAP, NGC

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Canadian Paediatric Society. <i>Oral Rehydration Therapy and Early Refeeding in the Management of Childhood Gastroenteritis</i> . Canadian Paediatric Society; 1994 (reviewed 2000)	CMA
Felt B, Wise CG, Olson A, Kochhar P, Marcus S, Coran A. Guideline for the management of pediatric idiopathic constipation and soiling: multidisciplinary team from the University of Michigan Medical Center in Ann Arbor. <i>Arch Pediatr Adolesc Med</i> . 1999;153:380–385	Medline, Embase, NGC
Baker SS, Liptak GS, Colletti RB, et al. Constipation in infants and children: evaluation and treatment: a medical position statement of the North American Society for Pediatric Gastroenterology and Nutrition. <i>J Pediatr Gastroenterol Nutr</i> . 1999;29:612–626	NGC, AAP (endorsed)
Canadian <i>Helicobacter</i> Study Group. <i>Consensus Conference on the Approach to Helicobacter pylori Infection in Children and Adolescents</i> . Canadian <i>Helicobacter</i> Study Group; 1999	CMA
Gold BD, Colletti RB, Abbott M, et al. <i>Helicobacter pylori</i> infection in children: recommendations for diagnosis and treatment. <i>J Pediatr Gastroenterol Nutr</i> . 2000;31:490–497	Medline, AAP (endorsed)
American Gastroenterological Association. <i>Medical Position Statement: Celiac Sprue</i> . American Gastroenterological Association; 2000 (reviewed 2001)	NGC
American College of Radiology. <i>Appropriateness Criteria for Imaging Recommendations for Patients With Crohn's Disease</i> . American College of Radiology; 1998 (revised 2001)	NGC
American Gastroenterological Association. <i>Medical Position Statement: Guidelines for the Evaluation of Food Allergies</i> . American Gastroenterological Association; 2000 (reviewed 2001)	NGC
American Gastroenterological Association. <i>Medical Position Statement: Parenteral Nutrition</i> . American Gastroenterological Association; 2001	NGC
North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition. <i>Guidelines for Evaluation and Treatment of Gastroesophageal Reflux in Infants and Children</i> . North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition; 2001	NGC
American Society of Health-System Pharmacists. <i>Therapeutic Guidelines on Stress Ulcer Prophylaxis</i> . American Society of Health-System Pharmacists; 1999	NGC
American College of Gastroenterology. <i>Diagnosis and Management of Achalasia</i> . American College of Gastroenterology; 1999	NGC
American Society for Parenteral and Enteral Nutrition. <i>Nutrition Support for Infants and Children With Specific Diseases and Conditions</i> . American Society for Parenteral and Enteral Nutrition. 1993 (reaffirmed 1999)	NGC
American Society for Parenteral and Enteral Nutrition. <i>Routes to Deliver Nutrition Support in Pediatric Patients</i> . American Society for Parenteral and Enteral Nutrition; 1993 (reaffirmed 1999)	NGC
Anthony H, Collins CE, Davidson G, et al. Pancreatic enzyme replacement therapy in cystic fibrosis: Australian guidelines: Pediatric Gastroenterological Society and the Dietitians Association of Australia. <i>J Paediatr Child Health</i> . 1999;35:125–129	Medline
<b>Neurology</b>	
Schutzman SA, Barnes P, Duhaime AC, et al. Evaluation and management of children younger than two years old with apparently minor head trauma: proposed guidelines. <i>Pediatrics</i> . 2001; 107:983–993	Medline
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Children's Hospital Medical Center. <i>Evidence-Based Clinical Practice Guideline for Management of Children With Mild Traumatic Head Injury</i> . Cincinnati, OH: Children's Hospital Medical Center; 2000	NGC
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College of Physicians and Surgeons of Manitoba. <i>Guidelines and Statements: Guideline 912: Raised Intracranial Pressure in Children</i> . College of Physicians and Surgeons of Manitoba; 1999	CMA
American Academy of Pediatrics. <i>Practice Parameter: The Neurodiagnostic Evaluation of the Child With a First Simple Febrile Seizure</i> . American Academy of Pediatrics; 1996	AAP, NGC
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Hirtz D, Ashwal S, Berg A, et al. Practice parameter: evaluating a first nonfebrile seizure in children: report of the Quality Standards Subcommittee of the American Academy of Neurology, the Child Neurology Society, and the American Epilepsy Society. <i>Neurology</i> . 2000; 55:616–623	Medline
Hirtz D, Berg A, Bettis D, et al. Practice parameter: treatment of the child with a first unprovoked seizure: report of the Quality Standards Subcommittee of the American Academy of Neurology and the Practice Committee of the Child Neurology Society. <i>Neurology</i> . 2003;60: 166–175	Medline
Children's Hospital Medical Center. <i>Evidence-Based Clinical Practice Guideline for Medical Management of First Unprovoked Seizure in Children 2 to 18 Years of Age</i> . Cincinnati, OH: Children's Hospital Medical Center; 1999 (revised 2002)	NGC

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