

# Parents on the Web: Risks for Quality Management of Cough in Children

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**ABSTRACT.** *Background.* Health information on the Internet, with respect to common, self-limited childhood illnesses, has been found to be unreliable. Therefore, parents navigating on the Internet risk finding advice that is incomplete or, more importantly, not evidence-based. The importance that a resource such as the Internet as a source of quality health information for consumers should, however, be taken into consideration. For this reason, studies need to be performed regarding the quality of material provided. Various strategies have been proposed that would allow parents to distinguish trustworthy web documents from unreliable ones. One of these strategies is the use of a checklist for the appraisal of web pages based on their technical aspects.

*Objective.* The purpose of this study was to assess the quality of information present on the Internet regarding the home management of cough in children and to examine the applicability of a checklist strategy that would allow consumers to select more trustworthy web pages.

*Methods.* The Internet was searched for web pages regarding the home treatment of cough in children with the use of different search engines. Medline and the Cochrane database were searched for available evidence concerning the management of cough in children. Three checklists were created to assess different aspects of the web documents. The first checklist was designed to allow for a technical appraisal of the web pages and was based on components such as the name of the author and references used. The second was constructed to examine the completeness of the health information contained in the documents, such as causes and mechanism of cough, and pharmacological and nonpharmacological treatment. The third checklist assessed the quality of the information by measuring it against a gold standard document. This document was created by combining the policy statement issued by the American Academy of Pediatrics regarding the pharmacological treatment of cough in children with the guide of the World Health Organization on drugs for children. For each checklist, the web page contents were analyzed and quantitative measurements were assigned.

*Results.* Of the 19 web pages identified, 9 explained the purpose and/or mechanism of cough and 14 the causes. The most frequently mentioned pharmacological treatments were single-ingredient suppressant preparations, followed by single-ingredient expectorants. Dextromethorphan was the most commonly referred to suppressant and guaifenesin the most common expectorant.

No documents discouraged the use of suppressants, although 4 of the 10 web documents that addressed expectorants discouraged their use. Sixteen web pages addressed nonpharmacological treatment, 14 of which suggested exposure to a humid environment and/or extra fluid.

In most cases, the criteria in the technical appraisal checklist were not present in the web documents; moreover, 2 web pages did not provide any of the items. Regarding content completeness, 3 web pages satisfied all the requirements considered in the checklist and 2 documents did not meet any of the criteria. Of the 3 web pages that scored highest in technical aspect, 2 also supplied complete information. No relationship was found, however, between the technical aspect and the content completeness. Concerning the quality of the health information supplied, 10 pages received a negative score because they contained more incorrect than correct information, and 1 web page received a high score. This document was 1 of the 2 that also scored high in technical aspect and content completeness. No relationship was found, however, among quality of information, technical aspect, and content completeness.

*Conclusions.* As the results of this study show, a parent navigating the Internet for information on the home management of cough in children will no doubt find incorrect advice among the search results. The checklist method proposed by researchers in the field to allow lay people to select web documents of presumably higher quality is not proven to be reliable. No standards currently exist for publishing health information on the Internet; therefore, a web page cannot be expected to provide extra information that could be associated to the quality of content of the page. Because the lack of uniformity when dealing with web documents does not allow for any type of assessment based on structural components, any method for judging the trustworthiness of web documents, therefore, must base its selection directly on content.

So far, the most reliable sources of information accessible to the public remain medical professionals and information packets peer-reviewed by them. The Internet holds enormous possibilities for the future of on-line health care; however, at present, it should be used as an additional, not as a primary, source of information. New strategies must be found of producing, validating, and diffusing appropriate on-line information in a manner that involves users (consumers) to guarantee a nonauthoritarian practice, access for all to health care information, and high quality information on the Internet. *Pediatrics* 2000;105(1). URL: <http://www.pediatrics.org/cgi/content/full/105/1/e1>; *Internet, cough, drug therapy, health education, parents.*

ABBREVIATIONS. AAP, American Academy of Pediatrics; WHO, World Health Organization.

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**R**espiratory tract infections are the most common diseases in children, but their home treatment is often far from proper.<sup>1-3</sup> Without basic knowledge of the ailments concerning children, parents may worry unnecessarily and also may be easily (and wrongly) influenced in how they care for their sick children.<sup>4-6</sup> Aside from the pediatrician, advice can come from media, friends, family tradition, and other sources, but it is not always correct. Furthermore, the vast amount of drugs present on the market for treating respiratory tract infections does not help dispel the unfounded belief that these medications are indispensable for curing children.

People are taking a more active role in deciding about their health care<sup>7</sup> and are realizing that information from doctors is not enough to satisfy their desire for knowledge regarding health.<sup>8</sup> One accessible source of health information is the Internet and because more and more people are turning to it, the health sector is expanding. The number of health-related sites is estimated to be >15 000.<sup>9</sup> Health-related sites are among the most frequently accessed information resources on the web.<sup>10</sup> New sites are put up each day that provide advice on how to cure common (and not so common) ailments. Some of these health-related sites are created and maintained by hospital staff, some by individual doctors,<sup>11</sup> some by parents with an interest in a particular field, and still others by commercial companies with the intent to advertise a product. At this point, a problem arises when dealing with the Internet; the validity of the information is not assured because of the lack of a peer review process such as the one used for medical journals. A large part of the material may be helpful advice, but it is not difficult to find incorrect or incomplete information.<sup>12</sup> Quality is not the only obstacle to diffusion of information to lay people on the Internet; presentation of the material is important as well and a doctor referring his patients or their families to web sites should take the level of comprehension and clarity of information into consideration. One study that measured the reading level of a variety of health-related sites found that it is higher than that of lay people and that it may be high even for a large part of the more literate web users.<sup>13</sup>

The lack of peer review of information posted on the Internet and the difficulty lay people may have in judging which sites provide solid, scientifically proven information have led an increasing number of people/organizations to explore ways that would allow parents to distinguish between trustworthy and false sites. One approach to this problem is the creation of a checklist for people to keep in mind when searching for reliable sites from which to gather information. This checklist contains standard criteria a site should display to be considered trustworthy.<sup>14</sup>

An important function of the Internet with its plentiful health information should be to reduce parental anxiety by making them better informed; this knowledge also could lead to a decrease in unnecessary visits to the doctor.<sup>5</sup> With this in mind, as well as the poor quality of information regarding the home management of fever that was found on the Inter-

net,<sup>12</sup> a study was conducted on web pages dealing with cough in children. Cough was chosen because it is one of the most common occurrences in children, and, although seldom associated with serious diseases or complications, it often leads to patient discomfort and distress.<sup>15</sup> Therefore, any information found on this topic on the Internet is possibly consequential. Web documents were examined to further our knowledge of how beneficial the Internet actually is and to see how useful the checklist method of measuring quality, which is still under development, may be.

## METHODS

During the period of June 1997 to January 1998, the Internet was explored periodically using 6 different search engines: Altavista,<sup>16</sup> Yahoo,<sup>17</sup> Excite,<sup>18</sup> Infoseek,<sup>19</sup> Lycos,<sup>20</sup> Virgilio,<sup>21</sup> and the browser Netscape Navigator 4. Simple key words pertaining to the treatment of cough in children were inserted into each search engine, grouped in different ways and with and without the use of the + sign in front of the keywords to restrict the results (see Appendix). In cases when the set of results was vast, the first 200 were screened for relevance. Boolean operators (and, not, or) were not used to render the query more homogenous between search engines and more probable to 1 that a parent might make. The keywords were inserted in English, Spanish, and French to reveal a more realistic and unbiased view of the existing health sites. The resulting pages were screened for pertinence and many were excluded because they did not relate specifically to children. Pages that addressed only a minor area of the topic treatment of cough in children also were excluded because the limited information did not allow for a thorough analysis, resulting in a reduced number of web pages.

Three checklists were created: the first to allow for a technical appraisal of the web documents, the second to examine the completeness of the information contained, and the third to directly assess the quality of the information.

The first checklist, which used standard criteria related to the structural aspect of web documents, was based on a strategy proposed by researchers in the field.<sup>8,14,22</sup> Criteria consisted only of information on the web document's appearance and its sources of information (name of the author, credentials, references cited, date of modification, links relative to sites on cough, and a statement of caution for parents). This strategy would allow consumers to estimate the trustworthiness of a web document by assessing the technical aspect instead of the quality and reliability of the content. The checklists found in the literature were adapted to the purpose of this study; criteria that were applicable to a review of single web pages (vs entire sites) were used. The checklist for assessing completeness of information was based on criteria chosen from literature obtained in a Medline search (see Appendix), while the checklist for measuring quality of health information was based on criteria extracted from 2 documents that were chosen as guidelines: 1) a policy statement by the American Academy of Pediatrics (AAP) on the use of codeine- and dextromethorphan-containing cough remedies in children,<sup>23</sup> and 2) *Drugs in Children*, a document of the World Health Organization (WHO).<sup>24</sup> In this last checklist, regarding quality of information, the web page content was scored according to how it compared with the guidelines: 1 point was assigned for correct advice, a negative point for incorrect advice, and a zero when the topic was not addressed.

The Cochrane database and a few web sites devoted to evidence based medicine also were searched, but no material applicable to this study was found.

The EpiInfo software package, Version 6.04b, was used for data management and analysis.

## RESULTS

A total of 19 web pages regarding cough in children were found. The majority of web pages (15) were created by commercial ventures, whereas the rest were created by noncommercial organizations. Of the organizations, 16 were located in the United

States and the remaining 3 in Canada, Mexico, and France. One page was written in Spanish, 1 in French, and the rest in English. Of the documents, 12 supplied the year of creation, which ranged from 1993 to 1997.

Regarding general information on cough, 9 pages explained the purpose and/or mechanism of cough and 14 mentioned the causes, 12 of which listed respiratory tract infections or viruses as a possible cause (Table 1). The most frequently mentioned pharmacological treatments were single-ingredient suppressant preparations, followed by single-ingredient expectorants; dextromethorphan was the most commonly referred to suppressant and guaifenesin the most common expectorant (Table 2). Of the pages that mentioned expectorants, 40% discouraged their use, and none of the pages that mentioned suppressants discouraged use of the latter. Of the web documents, 16 gave advice on nonpharmacological treatment; the most frequent was the use of steam or humidity, followed by the intake of extra fluids (Table 2).

When looking at the checklist for the technical appraisal of web pages, few documents displayed a majority of the criteria (Table 3). Of the possible 6 items, the maximum number supplied was 4 by only 3 web pages; 2 web pages did not provide any of the information.

The 4 criteria in the checklist for content completeness were fulfilled by 3 web pages. Two documents did not meet any of the required items (Table 4).

Regarding the quality of information checklist, the scores ranged from -5 to 5 (Table 5), and only 1 web page (number 3) received a score that was higher than 3 (50% of the total possible, positive score). Ten web pages received a negative score, meaning that they gave more incorrect than correct information (Table 6).

Only 2 (numbers 3 and 7) of the 3 highest-scoring web pages regarding technical aspect also were considered as supplying complete information. Therefore, no relationship was found between the technical aspect checklist and the completeness of information checklist. When these 2 documents, considered to be of relatively high structural quality and to contain complete information, were checked for

**TABLE 1.** Causes of Cough in Children Mentioned in the Web Pages

Cause	Number of Web Pages
Respiratory tract infections	12
Pneumonia	6
Pertussis	3
Tuberculosis	3
Other	7
Foreign body	7
Asthma/bronchospasm	6
Allergies/postnasal drip	4
Environmental conditions	5
Psychogenic cough	3
Cystic fibrosis	2
Heart disease/congestive heart failure	2
Measles	1
Gastroesophageal reflux	1
Tumor	1

**TABLE 2.** Pharmacological\* and Physical Treatments for Cough in Children Mentioned in the Web Pages

Treatment	Number of Web Pages (%)	
	Suggested	Discouraged
Pharmacological		
Suppressant	13 (68)	
Dextromethorphan	12 (63)	
Codeine	5 (26)	—
Expectorant	6 (32)	4 (21)
Guaifenesin	4 (21)	2 (11)
Multiple-ingredient products	6 (32)	1 (5)
Benzonate	2 (11)	—
Suppressant-expectorant	2 (11)	—
Ammonium chloride	1 (5)	—
Antihistamine-decongestant	1 (5)	—
Decongestant	2 (11)	—
Homeopathic remedies	2 (11)	—
Antihistamines	1 (5)	2 (11)
Diphenhydramine	1 (5)	1 (5)
Nonpharmacological		
Steam/humidity	13 (68)	—
Extra fluid	11 (58)	—
Lozenges/hard candy	3 (16)	—
Herbal therapy	1 (5)	—
Honey	1 (5)	—
Hot drink	1 (5)	—
Saline solution	1 (5)	—
Dairy products	—	1 (5)

\* Not all pages specified an active ingredient for the type of drug mentioned.

quality of information, only 1 (number 3) resulted as satisfying all 3 sets of criteria. No relationship also was found, therefore, between technical aspect and quality of information.

## DISCUSSION

The shift toward increased responsibility for health care on behalf of the lay person<sup>25,26</sup> and the subsequent abundance of health information available on the Internet have placed more importance on the problem of quality of on-line information.<sup>27</sup> In other words, the speed and lack of standards with which information is placed on the Internet does not allow for the process of peer review, which has made paper science journals sources of quality information. The results of this study show that an abundant amount of information on the Internet is incomplete and inaccurate and, confirming previous findings,<sup>12,28</sup> suggest that the problem is not limited to 1 topic. There is no doubt that good information can be found on the Internet,<sup>29</sup> but the presence of incorrect information is of great importance because it can affect people indirectly as well as directly. Besides influencing parents on how to care for their child's cough improperly, it acts as an obstacle to the diffusion of correct knowledge, because it is difficult to distinguish false from true in the cyber world.

Because web information often can be misleading, an urgent need exists to establish applicable and effective principles that may allow consumers and professionals to judge advice they find on the web. This possibility would allow them to have an idea of whether what they are reading is reasonable and to make measured, informed decisions regarding their health.

**TABLE 3.** Technical Appraisal of Web Pages Regarding the Treatment of Cough in Children

	Host Site	Web Page URL	Lists Authors	Author Credentials	Lists References	Links Relevant to Cough	States "Not Substitute for Professional Care"	Date Modified	Number of Ys
1	Child and Family—Canada	<a href="http://cfc-efc.ca/docs/00000307.htm">http://cfc-efc.ca/docs/00000307.htm</a>	N	N	N	N	N	N	0
2	Children's Hospital RMC	<a href="http://www.chmc.org/chil/ph8391.htm">http://www.chmc.org/chil/ph8391.htm</a>	Y	N	N	N	N	Y	2
3	Dr. Reddy's Pediatric Office	<a href="http://www.drreddy.com/rhinitis.html">http://www.drreddy.com/rhinitis.html</a>	Y	Y	N	N	Y	Y	4
4	Friends & Partners	<a href="http://solar.rtd.utk.edu/~esmith/parent2.html">http://solar.rtd.utk.edu/~esmith/parent2.html</a>	N	N	N	N	N	N	0
5	Group Health Cooperative	<a href="http://www.ghc.org/health_info/self/children/cold_kid.html">http://www.ghc.org/health_info/self/children/cold_kid.html</a>	N	N	Y	N	N	N	1
6	Health World Online	<a href="http://www.healthynet/hwlibrary/articles/ullman/coughn.htm">http://www.healthynet/hwlibrary/articles/ullman/coughn.htm</a>	Y	Y	Y	N	Y	N	4
7	Health World Online	<a href="http://www.healthynet/library/books/smart/cough.htm">http://www.healthynet/library/books/smart/cough.htm</a>	Y	Y	Y	Y	Y	N	4
8	Health World Online	<a href="http://www.healthynet/hwlibrary/books/healthysel/coughs.htm">http://www.healthynet/hwlibrary/books/healthysel/coughs.htm</a>	N	N	N	Y	N	N	1
9	Healthline	<a href="http://www.health-line.com/articles/ap30004.htm">http://www.health-line.com/articles/ap30004.htm</a>	Y	Y	N	N	N	N	2
10	Homearts	<a href="http://homearts.com/gh/family/01famif1.htm">http://homearts.com/gh/family/01famif1.htm</a>	Y	Y	N	N	N	N	2
11	Medecin de L'Internet	<a href="http://www.espaceweb.qc.ca/netdoctor/touxen.htm">http://www.espaceweb.qc.ca/netdoctor/touxen.htm</a>	N	N	N	N	N	Y	1
12	Medicine Chest	<a href="http://pharmacy-web.com/GHW/medchest/jan31-96.html">http://pharmacy-web.com/GHW/medchest/jan31-96.html</a>	Y	Y	N	N	N	Y	3
13	Mipediatria	<a href="http://www.mipediatria.com.mx/tos.htm">http://www.mipediatria.com.mx/tos.htm</a>	Y	Y	N	N	Y	N	3
14	Parent Time	<a href="http://cgi.pathfinder.com/@T6jh*wQAYaOo*fq/ParentTime/Health/coughco.html">http://cgi.pathfinder.com/@T6jh*wQAYaOo*fq/ParentTime/Health/coughco.html</a>	Y	Y	N	Y	N	N	3
15	Parent Time	<a href="http://www.pathfinder.com/@T6jh*wQAY6aOo*fq/ParentTime/Health/precough.html">http://www.pathfinder.com/@T6jh*wQAY6aOo*fq/ParentTime/Health/precough.html</a>	Y	Y	N	N	N	N	2
16	Parent Time	<a href="http://www.pathfinder.com/@lia@LQQAzqZrLEfv/ParentTime/Health/ccough.html">http://www.pathfinder.com/@lia@LQQAzqZrLEfv/ParentTime/Health/ccough.html</a>	Y	Y	N	Y	N	N	3
17	Parenthood Web	<a href="http://www.parenthoodweb.com/parent_cfmfiles/pros.cfm/193">http://www.parenthoodweb.com/parent_cfmfiles/pros.cfm/193</a>	Y	Y	N	N	Y	N	3
18	Parents Place	<a href="http://www.parentsplace.com/cgi-bin/objects/web_doc/drweb71.html">http://www.parentsplace.com/cgi-bin/objects/web_doc/drweb71.html</a>	Y	Y	N	N	N	N	2
19	Thrive @ Health	<a href="http://www.thriveonline.com/health/Library/CAD/abstract11008.html">http://www.thriveonline.com/health/Library/CAD/abstract11008.html</a>	Y	N	N	N	N	N	1

N indicates no; Y, yes.

**TABLE 4.** Minimal Criteria Defined as Necessary for Content Completeness

Minimum Information Required	Host Site																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Background information																			
Gives purpose/mechanism of cough	-	+	+	-	-	-	+	+	+	-	+	-	+	-	-	+	-	+	-
Causes																			
Mentions respiratory tract infections	-	+	+	+	-	-	+	+	+	+	+	+	+	-	-	+	-	-	+
Pharmacological treatment																			
Mentions expectorants and suppressants	-	-	+	+	+	-	+	-	+	-	-	+	-	-	+	+	-	+	-
Nonpharmacological treatment																			
Suggests humidity and/or more fluids	+	+	+	+	+	-	+	+	-	+	-	+	+	+	+	+	-	-	+
Total number of +	1	3	4	3	2	0	4	3	3	2	2	3	3	1	2	4	0	2	2

+ indicates yes; -, no.

**TABLE 5.** Adherence of Web Page Advice to the Recommendations Listed in the Guidelines

Host Site	Treatment							Total
	Suppressants	Pharmacological				Nonpharmacological		
		Dextromethorphan	Codeine	Expectorants	Multiple-Ingredient Preparation	Fluids/Humidity		
1	-1	-1	0	0	0	1	-1	
2	1	1	0	0	0	1	3	
3	1	1	1	1	0	1	5	
4	-1	-1	0	1	-1	1	-1	
5	-1	-1	0	1	0	1	0	
6	0	0	0	0	0	0	0	
7	-1	-1	-1	-1	-1	1	-4	
8	0	0	0	0	0	1	1	
9	-1	-1	-1	-1	-1	0	-5	
10	0	0	0	0	0	1	1	
11	0	0	0	0	0	-1	-1	
12	1	1	1	-1	0	1	3	
13	1	0	0	0	0	1	2	
14	0	0	0	-1	-1	1	-1	
15	-1	-1	0	-1	-1	1	-3	
16	-1	-1	-1	-1	-1	1	-4	
17	0	0	0	0	0	-1	-1	
18	-1	-1	0	1	1	0	0	
19	-1	-1	0	0	0	1	-1	

1 indicates correct; -1, incorrect; 0, aspect of cough treatment not addressed.

Although the criteria included in the checklist for the technical appraisal of web pages were modified somewhat from those found in the literature to apply them to this situation (ie, judging single web documents instead of entire sites), their use was nonetheless difficult because of the lack of structure of the Internet. For example, web site ownership and sponsorship could not be considered in this review because this information was not included in the single web pages on cough that turned up in the search engine results. A user would have to find his or her way back to the host site's home page to discover this background information. Parents searching the Internet via a search engine, as done in this study, therefore, would not have immediate access to all the information originally listed as important criteria. Overall, the criteria examined using this technical checklist method were barely provided in the web pages. The most important message that should be supplied by any document is that it should not be a substitute for professional care; the fact that only 4 web pages reminded the public of this demonstrates how carelessly the information is collected and published. Furthermore, none of the web pages fulfilled

all the criteria; 5 pages did not even consider it necessary to expose the name of the author, and only 2 pages revealed the date the information was last updated. The date is obviously important in the health care field because of constant changes and discoveries.

When the 3 web documents that scored highest in technical aspect were checked for completeness and quality, their content resulted as being generally incomplete and inaccurate. This demonstrates that an evaluation of the structure of a web page cannot be used as an indicator of the quality of the content. Tools such as checklists can, at most, be used as an aid in evaluating health information,<sup>14</sup> but from the point of view of a lay person, a simple estimation of a web page/site's quality is not enough. Lay people do not have the means to judge content, and therefore, will never be able to rely on results of a checklist that does not assess health information directly. If a user were to treat a cough in a child using the information found in the web pages with the highest score in technical aspect, the advice he/she would be following would be, for the most part, incorrect.

The incompleteness of the information on the In-

ternet can easily be seen when examining the web page sample. The checklist in Table 4 demonstrates that very few documents found on the Internet fulfill even minimal requirements for completeness of information. The items considered as minimal requirements were chosen because they cover the primary aspects of cough treatment about which every parent should be informed. The first item, regarding background information, is important for any matter concerning health to understand what one is dealing with and what the best approach to the situation may be. The second criteria addresses causes of cough, this is also fundamental because, with the plethora of medications available to treat a cough, parents have come to think of it as an illness (instead of a symptom) and erroneously to treat it as such. Therefore, parents need to be informed of the potential causes of cough, especially of respiratory tract infections, because they are the most common. Of the web pages that listed possible causes, 2 failed to include respiratory tract infections. Asthma is another frequent (and very important) cause of cough in children. Despite its frequency and the fact that it may be serious enough to require specific treatment, only 5 documents mentioned it. The presence of causes such as tumor and cystic fibrosis in the web pages, however, may unnecessarily alarm parents, so care should be taken when more serious causes are mentioned. The third aspect, regarding pharmacological treatment, requires that the web pages mention both expectorants and suppressants. This item was included because their use is not rational, or is at least questionable, yet they are the most prominent types of drugs on the market. The fourth criterion addresses nonpharmacological treatment, a fundamental aspect of the home care of cough. Drugs are not always necessary or even useful (despite common beliefs); there are often ways to relieve disturbing symptoms without relying on drugs and being subject to their possible side effects.

The checklist for measuring quality of information was based on the treatment aspect of cough, so that there was existing data against which the Internet advice could be compared. The results of this comparison indicate a significant difference in information between web advice and the guidelines (Table 6). Regarding expectorants, of the 10 web pages that mentioned them only 4 discouraged their use. Both the WHO<sup>23</sup> and the AAP<sup>22</sup> discourage the use of

expectorants because of their unproven effectiveness and administering ineffective drugs exposes children (as well as adults) to unnecessary side effects. The use of suppressants, on the other hand, is suggested with caution by some and discouraged by others in the literature. More specifically, WHO states that they may have some value in circumstances in which cough prevents restful sleep, although it also specifies that they should not be used if the cough is productive because of the potential danger of sputum retention. It is also important to avoid the use of cough suppressants in cases of productive cough because suppressing a cough can conceal a warning sign for a potentially serious underlying cause and thus delay its treatment.<sup>15</sup> In contrast, the AAP<sup>22</sup> stresses that no well-controlled studies supporting the efficacy of antitussives in children have been performed and that their use should be avoided. One study found that specific cough suppressants contribute little to reduction of coughing,<sup>30</sup> whereas another showed suppressants to be effective in specific situations such as when the cough is nonproductive.<sup>31</sup> In general, in cases of common acute viral infection causing cough, studies have shown that antitussives are ineffective and should not be used routinely.<sup>3</sup> The information supplied in the web pages in general failed to stress 2 facts regarding cough suppressants. First, that they may not be effective, and second, that they should, however, only be used in cases of real need such as when the child cannot sleep because of the cough and, even then, only when the cough is dry (mentioned by 4 pages). Both the WHO<sup>23</sup> and the AAP<sup>22</sup> strongly discourage the use of multiple-ingredient preparations, because evidence on the effectiveness of these mixtures, compared with single-entity preparations, is scant. Furthermore, doses of individual drugs in combination products may be inadequate or inappropriate, and the large number of ingredients may expose the patient to unnecessary adverse effects.<sup>32,33</sup> Some combinations, such as expectorant-suppressant preparations, are even illogical.<sup>23</sup>

The last item in the quality checklist approves exposure to a humid environment and increased fluid intake, which, in the case of cough, is the most effective physical treatment. Two documents were considered as supplying incorrect information relative to this topic because they provided advice on

**TABLE 6.** Overall Results of Information Compliance to Guideline Recommendations by Web Pages on Cough in Children

	Guidelines		Number of Web Pages		
	AAP	WHO	Correct (%)	Incorrect (%)	Not Addressed
Pharmacological treatment					
Suppressants	–	+*	4* (31)	9 (69)	6
Dextromethorphan	–	+*	3* (25)	9 (75)	7
Codeine	–	+*	2* (40)	3 (60)	14
Expectorants	–	–	4 (40)	6 (60)	9
Multiple-ingredient preparation	–	–	1 (14)	6 (86)	12
Nonpharmacological treatment					
Fluids/ambient humidity	+	.	14 (88)	2 (12)	3

+ indicates suggested; –, discouraged; ., not addressed.

\* To be used only if cough is dry.

nonpharmacological treatment without mentioning this type of therapy.

Other drugs that were not taken into consideration by the guidelines were mentioned in the web page sample, but existing literature discourages their use. One web page cited decongestants as the most effective over-the-counter cough medicine, specifying that they are often found in combination with antihistamines and that this combination counterbalances side effects; although this is an appealing idea, neither drug has been proven effective in treating acute cough. Ammonium chlorides and iodides also were mentioned in 1 web page. Iodides have been used in multiple-ingredient preparations as expectorants in the past and various adverse reactions such as sore gums, burning mouth, rashes, and hypothyroidism have been reported.<sup>34,35</sup> Benzonatate, also used in multiple-ingredient preparations, is a non-opiate agent that acts as a local anesthetic, although there is some evidence that it has a central antitussive effect as well. It is thought by some to be safe and effective in relieving acute cough associated with a variety of diseases and irritants,<sup>36</sup> but it is not recommended in children <10 years of age because its safety and effectiveness in this age group has not been established.

One limitation of this study has to do with the fact that no complete guidelines exist for the treatment of cough in children. Therefore, a combination of information from reliable organizations had to be joined. As often occurs in these situations, opinions may vary. In this case, differences with respect to the use of codeine were present. Web pages that suggested this drug were considered correct despite contrasting evidence. Another limitation of this study deals with the fact that Internet sites are difficult to compare and to judge because of the wide variation among web documents.<sup>37</sup> Therefore, it was necessary to choose certain aspects and to base any assessment strictly on those chosen.

A great deal of attention has been paid to the presentation, reliability, and accuracy of Internet content material, but without comparing content to the best available evidence directly (something that most users cannot do), it seems unlikely that any strategy for filtering sites could work. One organization, which reviews biomedical web resources and provides links to web documents that should contain quality information, bases its choices on a checklist similar to our technical appraisal checklist and states that "questions of information accuracy can often be answered only by subject experts."<sup>38</sup> A different attempt, that of creating a world wide, collaborative group specifically designed to review sites and provide ratings, seems a plausible alternative. Several groups exist at present that review sites and either provide ratings<sup>39</sup> or simply provide links<sup>40</sup> to those deemed reliable, whereas others provide a set of codes of conduct that need to be followed to display their logo.<sup>41</sup> A system of automatic downstream filtering also has been proposed in which information regarding the type and quality of information contained in web documents is added to the pages in the form of metadata.<sup>42</sup> Medically competent volunteers

would assess web page information while they navigate and then send their opinions, with the use of special browsers, to a medical database to be used by consumers. This system also seems of limited use because the medical volunteers may not be qualified.

At present, the most reliable sources of information accessible to the public remain medical professionals and information packets peer-reviewed by them. The Internet holds enormous possibilities for the future of on-line health care. Professionals make good use of it already, but, because of those individuals who take advantage of this network, the (uninformed) public will have to wait for now.<sup>43</sup> In the meantime, the challenge in producing, validating, and diffusing appropriate information may be to involve users (consumers) to guarantee quality of information, on the web as well, for all. This is the true challenge for the near future.<sup>44,45</sup>

#### APPENDIX. Keywords Used in the Internet and Medline Search Strategies

Internet	Medline
Cough	Cough
Children	Respiratory tract infections
Treatment	Child
Self-care	Drug therapy
Guidelines	Antitussive agents
Parenting	Practice guideline
Home care	Review
How do I treat my child's cough?	

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#### REFERENCES

- Maiman LA, Becker MH, Katlic AW. Correlates of mothers' use of medications for their children. *Soc Sci Med*. 1986;22:41-51
- Gadomski A, Horton L. The need for rational therapeutics in the use of cough and cold medicine in infants. *Pediatrics*. 1992;89:774-776
- Korppi M, Pietikäinen M, Laurikainen K, Silvasti M. Antitussives in the treatment of acute transient cough in children. *Acta Paediatr Scand*. 1991;80:969-971
- Stuijvenberg van M, Vos de S, Tjiang GCH, Steyerberg EW, Derksen-Lubsen G, Moll HA. Parents' fear regarding fever and febrile seizures. *Acta Paediatr*. 1999;88:618-622
- Cornford CS, Morgan M, Ridsdale L. Why do mothers consult when their children cough? *Fam Pract*. 1993;10:193-196
- Impicciatore P, Nannini S, Pandolfini C, Bonati M. Mother's knowledge of, attitudes toward, and management of fever in preschool in Italy. *Prev Med*. 1998;27:268-273
- Charnok D, Shepperd S, Needham G, Gann R. DISCERN: an instrument for judging the quality of written consumer health information on treatment choices. *J Epidemiol Commun Health*. 1999;53:105-111
- Wyatt JC. Commentary: measuring quality and impact of the World Wide Web. *Br Med J*. 1997;314:1879-1881
- Grove AS. Internet Health Day. Available at: <http://www.intel.com/pressroom/archive/speeches/ag102798.htm>. Accessed February 18, 1999
- Shortliffe EH. Health care and the next generation Internet. *Ann Intern Med*. 1998;129:138-140
- Eysenbach G, Diepgen TL. Responses to unsolicited patient e-mail requests for medical advice on the World Wide Web. *JAMA*. 1998;280:1333-1335
- Impicciatore P, Pandolfini C, Casella N, Bonati M. Reliability of health information for the public on the World Wide Web: systematic survey of advice on managing fever in children at home. *Br Med J*. 1997;314:1875-1879
- Graber MA, Roller CM, Kaebel B. Readability levels of patient education material on the World Wide Web. *J Fam Pract*. 1999;48:58-61
- Criteria for assessing the quality of health information on the Internet.

Available at: <http://hitiweb.mitretek.org/docs/policy.pdf>. Accessed July 22, 1999

15. Walson PD. Coughs and colds. *Pediatrics*. 1984;74:937-940
16. URL: <http://www.altavista.com>
17. URL: <http://www.yahoo.com>
18. URL: <http://www.excite.com>
19. URL: <http://www.infoseek.com>
20. URL: <http://www.lycos.com>
21. URL: <http://www.virgilio.it>
22. Silberg WM, Lundberg GD, Musacchio RA. Assessing, controlling, and assuring the quality of medical information on the Internet: caveat lector et viewer—let the reader and viewer beware. *JAMA*. 1997;277:1244-1245
23. American Academy of Pediatrics, Committee on Drugs. Use of codeine- and dextromethorphan-containing cough remedies in children. *Pediatrics*. 1997;99:918-920
24. Rylance G, ed. *Drugs for Children*. Copenhagen, Denmark: World Health Organization; 1987
25. Kassirer JP. Incorporating patients' preferences into medical decisions. *N Engl J Med*. 1994;330:1895-1896
26. Kassirer JP. The next transformation in the delivery of health care. *N Engl J Med*. 1995;332:52-54
27. Coeira E. Information epidemics, economics, and immunity on the Internet. *Br Med J*. 1998;317:1469-1470. Editorial
28. McClung HJ, Murray RD, Heitlinger LA. The Internet as a source for current patient information. *Pediatrics*. 1998;101(5). URL: <http://www.pediatrics.org/cgi/content/full/101/5/e2>
29. Sandvick H. Health information and interaction on the Internet: a survey of female urinary tract incontinence. *Br Med J*. 1999;319:29-32
30. Taylor JA, Novack AH, Almquist JR, Rogers JE. Efficacy of cough suppressants in children. *J Pediatr*. 1993;122:799-802
31. Irwin RS, Curley FJ, Bennett FM. Appropriate use of antitussives and protussives: a practical review. *Drugs*. 1993;46:80-91
32. BMA and the Royal Pharmaceutical Society of Great Britain. *British National Formulary*. 23rd ed. London, UK: BMA and the Pharmaceutical Press; 1992:128
33. Reynolds JEF, ed. *Martindale Extra Pharmacopoeia*. 31st ed. London, UK: the Royal Pharmaceutical Society; 1996
34. Anonymous. Adverse reactions to iodide therapy of asthma and other pulmonary diseases. *Pediatrics*. 1976;57:272-274
35. Braman SS, Corrao WM. Cough: differential diagnosis and treatment. *Clin Chest Med*. 1987;8:177-188
36. American Medical Association. *Drug Evaluations*. 6th ed. Philadelphia, PA: WB Saunders & Co; 1986:375
37. Jadad AR, Gagliardi A. Rating health information on the Internet: navigating to knowledge or to Babel? *JAMA*. 1998;279:611-614
38. OMNI: Organising Medical Networked Information. The UK's gateway to high quality biomedical Internet resources. Available at: <http://omni.ac.uk>. Accessed July 9, 1999
39. The Six Senses Review: A healthcare & Medical Web Site Review Program. Available at: <http://www.sixsenses.com>. Accessed March 1999
40. American Medical Association Web site. Available at: <http://www.ama-assn.org>. Accessed April 21, 1999
41. HON Code Principles. Available at: <http://www.hon.ch/honcode/conduct.html>. Accessed March 2, 1999
42. Eysenbach G, Diepgen TL. Toward quality management of medical information on the internet: evaluation, labelling, and filtering of information. *Br Med J*. 1998;317:1496-1500
43. Skolnick AA. WHO considers regulating ads, sale of medical products on Internet. *JAMA*. 1997;278:1723-1724
44. Bonati M, Impicciatore P, Pandolfini C. Quality on the Internet. *Br Med J*. 1998;317:1501
45. Shepperd S, Charnock D, Gann B. Helping patients access high quality health information. *Br Med J*. 1999;319:764-766

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