The Internet as a Source for Current Patient Information

H. Juhling McClung, MD; Robert D. Murray, MD; and Leo A. Heitlinger, MD

ABSTRACT. Objective. The purpose of this study was to assess the quality of information a lay person could obtain from Internet (Net) sources regarding the treatment of childhood diarrhea. It also afforded an opportunity to evaluate the awareness and compliance of the general medical community with the American Academy of Pediatrics (AAP) guidelines on the management of acute diarrhea.

Methods. This was a prospective, open, observational, literature review performed with a computer workstation and medical library. The AAP practice parameter on the management of acute gastroenteritis in young children was selected as the current standard by which to judge all other documents. The Net was searched, and all documents retrievable from the first 300 references were evaluated for compliance with current recommendations on the management of diarrhea in children.

Results. Of 60 articles published by traditional medical sources, only 12 (20%) conformed to current AAP recommendations for treatment of children. The source of the information, even if from a major academic medical center, did not improve the likelihood of compliance.

Conclusions. As demonstrated by information supplied on World Wide Web sites by traditional medical sources, recommendations for the treatment of acute diarrhea show a low percentage of concurrence with the AAP guidelines. Major medical institutions, schools, and hospitals need to devise ways to carefully monitor and establish quality control of what is being distributed from their home pages. Patients must be warned about the voluminous misinformation available on medical subjects on the Net. Pediatrics 1998;101(6). URL: http://www.pediatrics.org/cgi/content/full/101/6/e2; Internet, diarrhea, practice guidelines, gastroenteritis/treatment, education.

ABBREVIATIONS. WEB, World Wide Web; AAP, American Academy of Pediatrics; Net, Internet.

The public wants access to information on medical problems. The suppliers of information on the Internet (Net) have responded to this desire, and medical information is abundant. The question is whether the information is up to date and accurate. We have had a number of parents cite information about their child’s condition, which they have obtained from the World Wide Web (WEB). The parents perceive this information as cutting edge and present it to the physician for review and comment with the implicit hope that the information they have retrieved will help their child. The quality of the references presented to us by the parents has seemed quite variable.

We decided to do a prospective evaluation of a condition having considerable information on which to base current practice standards and for which a good recent practice parameter exists. We selected the treatment of acute diarrhea in childhood. This topic afforded us an opportunity to evaluate how well the information in the recent American Academy of Pediatrics (AAP) position paper1 on diarrhea is being disseminated to the lay public.

MATERIAL AND METHODS

Netscape, Infoseek, and Yahoo were used to conduct the Net searches. To duplicate what a lay parent might find, two broad searches were performed. We first used the key words diarrhea + treatment. This produced in >16,000 matches, and we collected addresses for the top 200. For the second search, the word child was added to the key word list for the search. Again, >15,000 matches were reported. The first 100 addresses for this search were collected and added to the first search. The second search yielded considerable overlap in references from the first search, and only four new sources were found that had not been identified previously. The number 300 for references was selected on the assumption that was a larger search than most casual browsers would evaluate. Because Infoseek is a random search, 300 references should provide a very representative selection. Other search engines such as Yahoo attempt to rank the requested references in a probable order of relevance to the search request. It is interesting, however, that a cross-check using Yahoo did not produce additional references. For the purpose of these Net discussions, we have used the words reference, matches, and sites essentially as equivalent terms.

We retrieved and reviewed every possible reference. We also sought to determine whether the information originated from traditional medical sources (medical and osteopathic physicians; registered nurses; or PhDs in traditional medical programs, such as epidemiology, pharmacology, and medical microbiology, etc) or from alternative medical sources (homeopathy, chiropractic, naturopathy, and herbal medicine, etc). If the institution and author were not evident, an additional effort was made until we could identify the source of the information and background of the author. With diligence, the author and/or the responsible organization were identified for all reference sites. CDPLUS was used for our Medline search of the National Library of Medicine.

The AAP position paper was used as the standard reference for this study. Compliance with the AAP recommendations was judged quite loosely; that is, a reference publication was judged to be in compliance if it promoted the use of oral rehydration with physiologic solutions that do not require complex compounding at home.

RESULTS

All search strategies produce some extraneous documents. In this search, unrelated documents in-
cluded eight references with information on a computer virus called diarrhea and three references to a musical group entitled diarrhea. Of the 300 sites identified by combining the two search strategies, the search engine could not access 18 sites. It was interesting that often one author (medical center, health food vendor, etc) would post several nearly identical sites. Often these multiple titles had minor differences in content but appeared to be different editing of the same document. These obvious duplications were retrieved so that they could be reviewed and not counted in the total of unique sites for this study. Such duplication of sites (different addresses but similar material) accounted for ~54% of the search (Table 1). Other unusable sites were the home pages from several major university medical centers and at least two major professional societies, which, although they listed acute diarrhea in their indices, did not provide easy access. Those home pages were so complicated or incomplete that the search was abandoned before any information related to diarrhea could be retrieved from that location.

Sixty distinctive articles came from traditional medical sources (Table 2). Of the 10 written by individual practitioners, 6 were by medical doctors or doctors of osteopathy and 2 were by registered nurses; 1 was signed by a doctor of philosophy and 1 by a registered dietitian. Included in the reports from national or local health departments was the classic report of the National Research Council regarding continuing the child’s feedings during diarrhea.2 From the 60 sites, 46% discussed the treatment of diarrhea in children. In only 20% of the 60 unique traditional medical sites, references gave recommendations for treatment of children that approximated the current published guidelines of the AAP. Of the 28 papers addressing treatment of children, 43% conformed to the AAP guidelines. Among the traditional medicine, nonacademic resources on the WEB containing information on diarrhea treatment, the news abstracting services included only 5 articles relating to children. However, of interest for chronic adult patients, they contained some of the most complete and accurate documents.

Ten additional sites were from alternative medicine sources. These included four articles from homeopathy, two from chiropractic medicine, and one from naturopathic medicine. In addition, one article was from a traditional Asian herbal medicine site with the names of the herbs listed in Chinese. Prevention magazine provided a detailed article on vitamins of use in the treatment of diarrhea. Also, there were two references from health food vendors. None of these articles met the AAP guidelines.

For purposes of comparison, a Medline search for similar topics also was performed. Searches for infantile diarrhea/therapy + child gave 69 English language articles; for diarrhea/therapy + child, 34 references; and for gastroenteritis/therapy + child, 10 references. In contrast to the WEB searches, which had considerable overlap of references for each of the searches, each of these Medline searches produced very unique lists of references with very little overlap. The AAP guidelines were not found in any of these lists. The Pediatrics reference for the AAP guidelines was only located in a search for “gastroenteritis” with no additional qualifiers. That search yielded 759 listings.

From traditional medical sources on the WEB, medical information errors abound. Several discussions of diarrhea gave explanations that are at considerable variance from the scientific literature. Many documents on the Net report incorrectly the pathophysiology of infectious diarrhea or confuse the etiology of osmolar and toxigenic diarrheas. Of greater concern are statements such as, “diarrhea is the body’s method to eliminate undesirable elements,” “diarrhea is caused by eating greasy junk food,” “diarrhea is a cause of Reye’s syndrome,” and “restrict oral intake” during diarrhea, all of which are clearly in opposition to the body of responsible opinion. There were a surprising number of documents that stressed detailed dietary guidelines on how to achieve a fat-free diet or contained complex discussions about the differences among various animal protein sources for feeding children with diarrhea. From medical sources outside of traditional medical centers came erroneous recommendations.

<table>
<thead>
<tr>
<th>TABLE 1. Analysis of the Original 300 Sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Search 1 200 Sites</td>
</tr>
<tr>
<td>Search 2 +100 Sites</td>
</tr>
<tr>
<td>=300 Site names and addresses</td>
</tr>
<tr>
<td>=96 Duplicated addresses</td>
</tr>
<tr>
<td>=204 Sites that are apparently unique</td>
</tr>
<tr>
<td>=18 Addresses not functional</td>
</tr>
<tr>
<td>=186 Documents printed for additional analysis</td>
</tr>
<tr>
<td>=4 Complex sites from universities or professional societies that indexed diarrhea but had no documents</td>
</tr>
<tr>
<td>=182 Documents for further analysis</td>
</tr>
<tr>
<td>=111 Duplications identified after reading documents</td>
</tr>
<tr>
<td>=71 Truly unique documents</td>
</tr>
<tr>
<td>=10 Alternative medicine sites</td>
</tr>
<tr>
<td>=61 Traditional medical sites</td>
</tr>
<tr>
<td>=1 Personal letter</td>
</tr>
<tr>
<td>=60 Formally prepared documents regarding treatment of diarrhea that originated from traditional medical sources. None of these sources stated “for adults only.”</td>
</tr>
</tbody>
</table>
for the use of recipes for rehydration solutions, unusual drug recommendations involving antibiotics that are not approved for use in children, and unconventional dietary guidelines restricting intake of specific foods from fat and proteins to corn products and oatmeal.

Inappropriate recommendations from university-based teaching included no distinction for the special needs of infants; several hours of fasting for infants with diarrhea; the use of decarbonated (high fructose) soft drinks; highly structured, ritualistic diets; and the use of sports beverages as rehydration solutions, as well as recommendations for bouillon, gelatin, water, and fat-free diets as treatment. Others contained warnings that aspirin exacerbates diarrhea, proposed the use of half-strength formula as a rehydrating fluid, or advocated that a pinch of salt be added to the infant’s intake. Often within a single academic institution, various departments such as Pediatrics, Family Practice, Infectious Disease, Gastroenterology, and Radiology offered conflicting information on diarrhea. On the WEB pages, it is not immediately evident that offerings from university student health services are not intended for use in young children. Unfortunately, these documents intended for use by young adults often demonstrated the same shortcomings for adult patients that we have found in the recommendations for pediatric patients.

TABLE 2. Usefulness of Articles That Derived From a Traditional Medical Background

<table>
<thead>
<tr>
<th>Source</th>
<th>Total</th>
<th>Total That Meet AAP Recommendations</th>
<th>Total Clearly for Children</th>
<th>Articles Referring to Children That Meet AAP Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching centers</td>
<td>20</td>
<td>4 (20%)</td>
<td>10 (50%)</td>
<td>4 (40%)</td>
</tr>
<tr>
<td>News services</td>
<td>13</td>
<td>2 (15%)</td>
<td>5 (38%)</td>
<td>2 (40%)</td>
</tr>
<tr>
<td>Practitioners</td>
<td>10</td>
<td>1 (10%)</td>
<td>4 (40%)</td>
<td>1 (25%)</td>
</tr>
<tr>
<td>Health departments</td>
<td>5</td>
<td>1 (20%)</td>
<td>3 (60%)</td>
<td>1 (33%)</td>
</tr>
<tr>
<td>Travel service</td>
<td>5</td>
<td>1 (20%)</td>
<td>2 (40%)</td>
<td>1 (50%)</td>
</tr>
<tr>
<td>Text books</td>
<td>3</td>
<td>2 (67%)</td>
<td>2 (67%)</td>
<td>2 (100%)</td>
</tr>
<tr>
<td>HMOs</td>
<td>3</td>
<td>1 (33%)</td>
<td>2 (67%)</td>
<td>1 (33%)</td>
</tr>
<tr>
<td>Professional societies</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Totals</td>
<td>60</td>
<td>12 (20%)</td>
<td>28 (46%)</td>
<td>12 (43%)</td>
</tr>
</tbody>
</table>

DISCUSSION

As noted by Silberg and colleagues, “The Net ... has the potential to become the world’s largest vanity press. It is a medium in which everyone with a computer can serve simultaneously as author, editor, and publisher.” The lack of peer review and oversight of submissions to the WEB were obvious in this study. Although this freedom from critical review may provide a rich and diverse cultural template, it can present bad medicine on an equal plane with good. Impicciatore and coworkers described such a problem among recommendations for treatment of fever. In a similar manner, our survey found major deviations from the AAP guidelines for the treatment of diarrhea. Most surprising was the apparent lack of critical review of many of the reports originating from teaching centers. Dates of when information sources were prepared for the WEB were not available, but several of the documents indicated having been derived from clinic handouts, which had been free from critical review for decades.

Many of the treatment recommendations found on the WEB are of questionable value or benefit. The scientific origins for recommendations for special diets have been impossible for us to identify. Recommendations to use ritualistic diets might seem to be justified as perhaps one way to give the parents something to do while the infection runs its course, but the recommendations for the use of soft drinks or sports beverages as treatment for children with severe diarrhea ignore the products’ formulation. Although wholesome for recreational intake, most of these beverages contain excessive concentrations of carbohydrate, often as high-fructose corn syrup, and non-physiologic salt concentrations that preclude their rational use for the treatment of severe diarrhea in infants and children.

The AAP probably had more than one purpose in publishing the position paper on the treatment of diarrhea. It possibly was to provide the practitioner with a concise review of and a consensus opinion about the medical literature available on the treatment of diarrhea for children. In addition, safety for the patient and ease of implementation were important goals of the recommendations. Finally, it was intended to provide the academic community with an up-to-date, concise source of research information relating to best practices.

It is possible that these variable recommendations found on the WEB sites indicate the existence of a widespread dissatisfaction with the AAP position paper. If so, the practicing community deserves a vigorous public debate about the recommendations in the AAP paper. A more likely scenario is that continued adherence to older methods of treatment for diarrhea is really a reflection that, in the United States, the outcome of acute diarrhea in children is almost uniformly favorable. Therefore, many of the different types of treatment regimens appear to be supported by the good outcomes of patients who receive them. The AAP guidelines were intended to provide a uniform treatment program that would work in patients with illness ranging from mild to severe. For the mildest illness, the guidelines provide ease and simplicity. When the guidelines are applied to the sicker patients, they provide a scientific methodology for safe, effective treatment. For the sicker children, the use of homemade recipes ignores the...
work of Finberg and others as reported in a review on the epidemics of hypertonic dehydration,\(^7\) and the work of Levine, showing the difficulty with recipes. The use of self-compounded beverages often results in serious consequences.\(^7\)

The content of the WEB sites from major teaching institutions probably reflects to a significant degree what is being taught and recommended. If so, we in academic medicine have failed to convert our good science and specialized understanding of this medical problem into information that will change practices effectively.\(^8\) This survey illustrates that our usual practice of giving some lectures and publishing a few articles is not an effective way of disseminating information in the information age.\(^9\)

We conclude that:

1. All medical practices should have handouts reviewed and updated regularly.
2. Academic departments need to monitor what their institutions present in the electronic media. If a home page is to be maintained, it must be reviewed rigorously and regularly.
3. The AAP should disseminate the information from their position papers to the public as well as to practitioners.\(^7,10\) Easier access to the AAP home page would be helpful.
4. Practitioners need to warn their patients about the need for a very critical review of all medical information obtained from the Web, even when it seems to be from a “reliable” source.

REFERENCES

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