Pediatric Pharmacotherapy

A Monthly Newsletter for Health Care Professionals
Children's Medical Center at the University of Virginia

Volume 5 Number 6 June 1999

The Internet as a Source of Pediatric Medication Information

Marcia L. Buck, Pharm.D., FCCP

Since its inception, *Pediatric Pharmacotherapy* has been available in both print and electronic forms. Because of the foresight of our late editor, Dr. Robert J. Roberts, and the ongoing support of our Production Manager, Dr. Stephen Borowitz, we have been able to reach a much larger audience than ever anticipated. In fact, many of you are probably reading this issue on-line.

The Internet has opened many new doors for pediatric pharmacology. Not only are journals like *Pediatrics* (**http://www.pediatrics.org**), the *New England Journal of Medicine* (**http://www.nejm.org**), and the *Archives of Pediatrics and Adolescent Medicine* (**http://www.ama-assn.org/public/journals/ajdc/ajdchome.htm**) available to those formerly without access to these publications, but there are a number of other useful websites for health care providers.[1-4] This brief review will focus on resources that provide pediatric medication information in a format designed for health care providers. A future issue of the newsletter will cover those sites intended to provide information directly to parents.

Organization Websites

Like the University of Virginia (**http://hsc.virginia.edu**), many professional health care organizations and academic medical centers have established websites to provide information to the public. One of the best resources for pediatric health care providers just becoming familiar with the Internet is the American Academy of Pediatrics website (**http://www.aap.org**). This site provides a number of links of interest to students, residents, and practitioners. Other useful introductory sites are PEDINFO (**http://www.pedinfo.org**) and Pediatric Points of Interest (**http://www.med/jhu.edu/peds/neonatology/poi.html**), which provide connections to dozens of other websites, journals, and newsletters including *Pediatric Pharmacotherapy*.

There are many new sites emerging from consumer and professional organizations of interest to pediatric practitioners. For example, the Institute for Safe Medication Practices has recently unveiled their website (**http://www.ismp.org**) focused on reducing medication errors. This site offers examples of recent medication errors in the news and recommended prevention strategies.

Government Websites

The Food and Drug Administration (FDA) website provides a number of useful resources. This site's homepage (**http://www.fda.gov**) provides links to internal sites such as the Center for Drug Evaluation and Research and the Center for Biologic Education and Research, as well as a listing of publications from the FDA targeted at health care providers and consumers.[5]

This site can also be used to contact the FDA's MedWatch system for reporting suspected adverse drug reactions. The MedWatch site (**http://www.fda.gov/medwatch**) describes the program, gives instructions on reporting adverse reactions, and includes a version of the standard reporting form that can be downloaded. The form can then be completed and returned via the Internet, with encryption to protect the confidentiality of the information provided, or printed out and returned by mail or fax. This site also contains a listing of all "Dear Doctor" warning letters sent by the FDA which describe potentially serious adverse drug reactions.[5]

The FDA has also recently developed a reporting system for adverse effects related to herbal products or nutritional supplements (**http://vm.cfsan.fda.gov/~dms/aems.html**). This database may be used by health care providers or

consumers to report adverse reactions or to search for previous reports.[6]

The Centers for Disease Control (CDC) can be reached at **http://www.cdc.gov**. This site highlights the wide scope of CDC activities. Users can link directly to *Morbidity and Mortality Weekly Report* as well as review current vaccination standards and recommendations from the Advisory Committee on Immunization Practices.

Additional information on vaccine adverse events can be obtained through the Vaccine Adverse Event Reporting System (VAERS) website, maintained by the Navy Environmental Health Center in Norfolk. This site, at **http://www-nehc.med.navy.mil/prevmed/immun/immunvaer.htm**, describes the VAERS program and the steps for reporting an adverse event potentially related to the administration of a vaccine. A toll-free phone number is provided for those wishing to file a report, or a reporting form can be downloaded from the site.

Other governmental publications can also be found on the Internet. The Agency for Health Care Policy and Research (AHCPR), a branch of the Department of Health and Human Services, has a website for their research updates and clinical guidelines at **http://www.ahcpr.gov**. This group is well known in pediatrics for their pain management guidelines, but AHCPR has also been involved in a variety of other disease states over the past decade. Health care providers working with smoking cessation in adolescents will find a wide variety of patient education materials at this site.

In addition to these sites, the Consumer Product Safety Commission offers a website (**http://www.cpsc.gov**) containing an extensive listing of publications related to children. This independent regulatory agency is probably best known for its information on toy and product safety, but they also provide a series of materials on preventing childhood poisonings.[7]

Pharmaceutical Manufacturer Websites

Nearly all of the major pharmaceutical manufacturers now offer websites to promote their products. These sites are typically divided into information pertaining to health care providers and direct-to-consumer advertising.[8]

The information provided on corporate-sanctioned websites must comply with the same standards for any product labeling or advertising. As a result, only those indications and patient populations approved by the FDA can be listed.

Materials for health care providers typically include not only prescribing information, but also links or references to published therapeutic guidelines, press releases, access to indigent drug programs, patient education tools, and continuing medical education materials. Some sites also include information on products under investigation or being considered for approval by the FDA. There are several directories of manufacturer-based websites.[8] Two of the best resources for this information are: **http://www.pharminfo.com/phrmlink.html#pharmco** and **http://www.pharmweb.net.**

The impact of the increasing use of the Internet to promote medications may have significant impact on how new products are marketed. Jan Leschly, CEO of SmithKline Beecham, was recently quoted in the *Wall Street Journal* predicting a reduction in the use of pharmaceutical sales representatives. He believes that the provision of information directly to the consumer on-line will increase dramatically, reducing the need to provide information to physicians and pharmacists for dissemination to patients.[9]

The use of manufacturer websites, however, must be balanced with the recognition that these sites represent the best interests of the corporation. They may not adequately address other pharmacologic and non-pharmacologic therapeutic alternatives, leaving prescribers and patients to make uninformed choices. These sites are best used as an adjunct, rather than a replacement, for an interactive discussion between health care providers and their patients.

Precautions about the Internet

As most Internet users can attest, there are websites providing information that is not complete or entirely accurate. The accuracy of medication information on the Web has become a growing concern among pediatric health care providers, as more parents are getting information from these resources.

A recent study of advice for parents on treating their children's fever at home found a variety of sources on-line. Forty-one webpages provided parent instructions, 32 were from commercial sources, and the remaining nine were produced by individual practitioners or academic

institutions. The sites were examined for the accuracy, thoroughness, and reliability of the information provided. While most sites provided accurate information, many were very limited. There were differences in the acceptable temperature ranges, the choice of site for taking a child's temperature, and the water temperature recommendations for a tepid bath. Although nearly all recommended acetaminophen as the treatment of choice for reducing fever, aspirin was still recommended on 3 sites, despite the potential risk for Reyes' syndrome. When compared to published guidelines chosen from a standard medical reference, only 4% of the websites maintained close adherence to usual medical practices.[10]

In an effort to improve the quality of web sites, an organization called the Health On the Net Foundation (**http://www.hon.ch/Conduct.html**) has issued a code of conduct for healthcare information on-line.[11] The code calls for website creators to adhere to the following principles:

- involvement of qualified health care providers in writing or reviewing the material presented
- information designed to encourage the reader to contact a health care provider directly (i. e. to support, rather than replace, the physician-patient relationship)
- support of patient confidentiality
- the use of clear references for resource information
- inclusion of the date of publication and a commitment to provide updated information in a timely manner
- the provision of only balanced, unbiased information
- inclusion of the webmaster's e-mail address or additional methods for contacting the publisher for additional information
- the source of financial support, including potential conflicts of interest, are clearly presented.

Summary

Health care providers can find a wealth of valuable medication information on the Internet. Most clinicians are aware of the availability of texts, journals, and indexing systems on-line, but fewer providers are making use of organizational, governmental, and manufacturer-based sites. The Internet offers clinicians a quick method of obtaining information; but, like all resources, websites must be evaluated for their accuracy, lack of bias, and the quality of the content they provide.

References

1. Spooner SA. The pediatric Internet. Pediatrics 1996;98:1185-92.
2. Fikar CR. The Internet and the pediatrician: Should there be a connection? Clin Pediatr 1996;35:229-35.
3. Izenberg N, Lieberman DA. The Web, communication trends, and children's health. Part I: Development and technology of the Internet and Web. Clin Pediatr 1998; 37:153-7.
4. Izenberg N, Lieberman DA. The Web, communication trends, and children's health. Part II: The Web and the practice of pediatrics. Clin Pediatr 1998; 37:215-21.
5. Cobert B, Silvey J. The Internet and drug safety. What are the implications for pharmacovigilance? Drug Safety 1999;20:95-107.
6. Generali JA. Alternative medicines: update. Drug Facts and Comparisons News 1998 (Nov):43-5.
7. Swartz MK. Access to the Consumer Product Safety Commission. J Pediatr Health Care 1996;10:300-1.
8. Flory SM, Seamon MJ. Pharmaceutical manufacturers' web sites. Hosp Pharm 1999;34:361-3.
9. Anon. Internet could diminish role of detail reps, SB's Leschly predicts. F-D-C Reports, "The Pink Sheet" 1999:61(19):8.
10. Impicciatore P, Pandolfini C, Casella N, et al. Reliability of health information for the public on the world wide web: systematic survey of advice on managing fever in children at home. BMJ 1997;314:1875-81.
11. Stevens L. Quacks or quality? Combating bad medical information on the Net. Med Net 1998 (Dec):6-12.

Literature Review

Alteplase in a newborn on ECMO

The case of a 2 day old infant receiving extracorporeal membrane oxygenation (ECMO) who developed an arterial occlusion is described. The use of alteplase (r-tPA) in the management of the patient is highlighted. Therapy was initiated within 6 hours of the diagnosis of left arm arterial thrombosis. A bolus dose of 0.48 mg/kg alteplase was infused over 20 minutes, followed by an infusion of 0.27 mg/kg/hr into the ECMO circuit for 6 hours, until reperfusion of the limb was demonstrated. The patient tolerated the infusion well, without evidence of intraventricular hemorrhage or excessive bleeding. The patient was discharged on day 24 of life with no residual adverse effects related to the arterial occlusion. This article is particularly timely in light of the current shortage of urokinase, and concerns over its sterility have led to the need for alternative antithrombolytics. Glover ML, Camacho MT, Wolfsdorf. The use of alteplase in a newborn receiving extracorporeal membrane oxygenation. **Ann Pharmacother 1999;33:416-9.**

Antiemetic guidelines

The American Society of Health-System Pharmacists (ASHP) has just issued therapeutic guidelines for the management of nausea and vomiting in adults and children during the

postoperative period or when receiving chemotherapy or radiation. These guidelines were the culmination of work from a panel of nine clinical pharmacists. The guidelines were reviewed by a number of other organizations, including the American Cancer Society, the American Society of Pediatric Hematology/ Oncology, and the Oncology Nursing Society. In addition to a stepped approach detailing which prophylactic and therapeutic agents should be instituted, the statement also contains a wealth of useful information for health care providers, such as tables of emetogenic potential for chemotherapy, risk factors for postoperative vomiting, standard dosing recommendations, and a cost comparison. American Society of Health-System Pharmacists. ASHP therapeutic guidelines on the pharmacologic management of nausea and vomiting in adult and pediatric patients receiving chemotherapy or radiation therapy or undergoing surgery. **Am J Health-Syst Pharm 1999;56:729-64.**

Phenobarbital in ECMO

Another case report of medication administration in the neonatal ECMO population was published in a recent issue of the *Annals of Pharmacotherapy*. This case describes the use of phenobarbital in the management of a 38 week gestational age infant receiving ECMO before and after repair of a congenital diaphragmatic hernia. The case focuses on the dosing requirements of the patient and highlights the potential need for increased doses to accommodate the large exogenous blood volume used to prime the ECMO circuit. Elliott ESR, Buck ML. Phenobarbital dosing and pharmacokinetics in a neonate receiving extracorporeal membrane oxygenation. **Ann Pharmacother 1999;33:419-22.**

Quinine in malnourished children

The effects of nutritional status on drug disposition have become a new focus of pharmacokinetic research. The authors of this study evaluated 40 children between the ages of 24 and 72 months in Niger. The patients were divided into groups based on the presence of cerebral malaria and their nutritional status. Compared with the children in the control group, patients with either cerebral malaria, malnutrition, or both had a reduced volume of distribution and slower clearance of quinine. This resulted in an increase in serum quinine concentrations. Malnutrition, itself, had only limited effects on quinine pharmacokinetics. The authors concluded that current quinine dosing strategies appear to be safe, even in patients with cerebral malaria and moderate malnutrition. Pussard E, Barennes H. Daouda H, et al. Quinine disposition in globally malnourished children with cerebral malaria. **Clin Pharmacol Ther 1999;65:500-10.**

Formulary Update

The following actions were taken by the Pharmacy and Therapeutics Committee at their meeting on 5/28/99:

1. Sermorelin (Geref®) was added to the formulary. This product is a synthetic agent used to stimulate the release of growth hormone. It is used both during provocation tests to determine functional growth hormone secreting capacity and for treatment of idiopathic growth hormone deficiency. Prescribing is restricted to Endocrinology.
2. A review of products for lice and scabies was done. Lindane (Kwell®) was removed from the formulary because of risks for neurotoxicity in susceptible patients after prolonged exposure. Two permethrin products (Elimite® 5% cream for scabies and Nix® 1% creme rinse for head lice) were added in its place.
3. Glimepiride (Amaryl®), a second-generation sulfonylurea for the management of Type 2 (non-insulin-dependent) diabetes mellitus, was not added to the formulary. The committee also chose to remove the first-generation sulfonylureas, chlorpropamide, tolazamide, and tolbutamide, because of lack of use.
4. Guidelines for the use of celecoxib (Celebrex®)were adopted. This information will be available on MIS within the next month.

Contributing Editor: Marcia L. Buck, Pharm.D.
Editorial Board: Anne E. Hendrick, Pharm.D.
Michelle W. McCarthy, Pharm.D.
Douglas S. Paige, R.Ph.

If you have any comments or would like to be on our mailing list, please contact us at Box 274-11, UVA Medical Center, Charlottesville, VA 22908 or by phone (804) 982-0921, fax (804) 982-1682, or e-mail to mlb3u@virginia.edu.