

Surgeons  
pocket PDAs  
to end  
paper chase

Part II

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**N**eurosurgeon David W. Lowry, MD, FACS, started using a personal data assistant (PDA) when he was a surgical resident in 1997 just because he was tired of trying to fit an unwieldy daily planner into the pocket of his lab coat. Now in a busy neurosurgical practice in Grand Rapids, MI, he's turning to the device not only to keep his calendar and address book but also to generate postoperative notes and orders at the bedside and to organize information about surgical cases. A huge utility, he says, is the ability to tap into up-to-date drug treatment data with an electronic prescription drug reference program. "It's better than having a drug reference book in private practice," he said.

Like standard drug prescribing texts, the qRx™ program from ePocrates, Inc., San Carlos, CA, lists all medications that have been approved by the U.S. Food and Drug Administration. But rather than having to wait until the next edition of the *Physician's Desk Reference (PDR)* comes out, Dr. Lowry receives regular updates about the latest additions to the lists of available medications. Instead of having to thumb through page after page of the *PDR*, Dr. Lowry can get the details about a specific drug—whether he needs the pediatric or adult dosing schedule, mechanisms of action, or side effects—in a matter of seconds. He also can check on known drug interactions for up to 30 different medications—an invaluable option for surgical specialists who see patients with concomitant chronic diseases, he says. "If you have a patient coming in the office who's already taking 10 drugs and you're going to be adding another, you can give the patient and the referring physician a bit of a heads up about the potential problems that may occur," he said.

In the not-too-distant future, Dr. Lowry expects his PDA to be linked with surgical handbooks and online journals, clinical practice algorithms and guidelines, prescription pads, and other patient care applications. "I can very easily envision having a commonly used handbook on a hand-held computer, so I'll have information available to me whether I'm in the office or the hospital or somewhere else. I can see an infrared port at a nurses' station that surgeons can interact with to transmit medication orders directly to the pharmacy," he said.

"Companies are already working on applications for handling clinical utilities through hand-holds right at the point-of-care, where individual patient care decisions are made," Dr. Lowry notes.

### **Not just a notebook**

Hand-held personal computers are ready-made vehicles for point-of-care record-keeping. PDAs also serve as convenient calculators, with programs that analyze arterial blood gas values; compute intravenous doses of medications for treating myocardial infarction, arrhythmia, and strokes; diagram the extent of burn wounds and determine the corresponding fluid requirements for a patient; and perform statistical exercises such as the chi square, Student and Fischer test, and so on.

PDAs are not merely handy notebooks or scratchpads, however. The devices organize information into databases, so quick memos about a patient, including name, date and type of surgery, and diagnosis, transform into a data source that can be searched by patient or by surgical problem. PDAs also can coalesce individual items of information about the type, nature, and location of a disease or condition, the characteristics of the patients who suffer from it, and the treatment options for addressing it and their success rates, so they can be analyzed to identify trends and begin documenting outcomes.

Also, as vehicles for evidence-based medicine, PDAs have great potential for eliminating errors, reducing variation in surgical practice, and improving patient care.

Currently, surgeons have access to software for hand-held computers that brings clinical textbooks, journal abstracts, dictionaries, meeting abstracts, and practice guidelines to their fingertips.

One company creating such software is Eureka.com, a division of the biological sciences book publisher Landes Bioscience, Georgetown, TX. Eureka.com is working with the department of surgery at Northwestern University School of Medicine, Chicago, IL, to provide an electronic handbook of surgical procedures complete with line anatomical drawings and lists of indications, operative principles, preoperative and postoperative considerations,

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and possible complications. Eureka.com software also will allow surgeons to superimpose on standard anatomical drawings depictions of their approaches to surgical procedures and to download searchable databases of algorithms for assessing symptoms, managing diseases, and meeting best practice standards of care developed by subspecialists in major academic medical centers.

JournalToGo from HealthTech Solutions, St. Louis, MO, automatically delivers selected journal abstracts and other medical news to PDAs whenever they are hot synched with a surgeon's main computer system. *Taber's Cyclopedic Medical Dictionary* from F.A. Davis, Philadelphia, PA, has 56,000 online definitions that can be retrieved with the touch of a stylus on the face of a PDA.

Electronic abstracts from medical conferences are being provided by organizations such as the Congress of Neurological Surgeons, and downloadable clinical practice guidelines and algorithms are available from professional societies, expert panels, and other sources, such as the Advanced Cardiac Life Support (ACLS) algorithms, which display treatment alternatives for monomorphic and polymorphic ventricular tachycardia and other cardiac emergencies instantaneously on PDA screens.

"One side of hand-held computing people find indispensable to patient care is applications that bring medical knowledge base to the bedside," said David Krusch, MD, FACS, Chair of the College's Committee on Informatics and director of the University of Rochester Medical Center's Informatics Division in Rochester, MN. "You've taken your reference material out of the library, to the computer workstation, and have finally put it in your pocket."<sup>1</sup>

### Photographic databases

Some surgeons are creating their own PDA utilities. Sidney F. Miller, MD, FACS, professor of surgery at Wright State University and director of the Miami Valley Hospital Regional Adult Burn Center, Dayton, OH, attaches a digital camera to his PDA to record, at least on a weekly basis, the appearance of burn wounds.

Dr. Miller explains that most burn centers have switched to digital pictures of wounds be-

cause they are easier to store than 35mm slides. The photography department at Miami Valley Hospital Regional Adult Burn Center makes 3 x 3" glossies from digital images that are placed on the patient's chart or stores the images in the central computer. Surgeons consequently can get a quick overview of patients' progress immediately before seeing them simply by calling up the images on the terminal at a nurses' station. "The digitized images are helpful for consultants, who can't always be there when a patient's dressings are coming off. But they need to have some idea of what the patient's burn wounds looked like, so they look at the digital images that were taken over the last however-many weeks the patient has been in the hospital," Dr. Miller said.

The digital images also provide a visual record for rotating surgical residents. "Some patients have been in the hospital four, five, or six weeks before residents come on the service. The digital photographs let the residents see what patients looked like on admission and get a feel for how well they are progressing," Dr. Miller observed.

What Dr. Miller adds to the digital photography program at the Miami Valley Hospital Regional Adult Burn Center is his PDA. He links a small, lightweight, inexpensive (less than \$100) digital camera to his hand-held computer, carries it to the clinic, the hospital room, and the OR, and captures high-quality pictures of burn wounds that can be transmitted directly to his computer system, saved for educational purposes, and entered into the burn registry when he hot synchs the hand-held at the end of the day.

And he doesn't have to worry about losing any of the pictures or other data. A few months ago, he dropped his PDA and had to replace it with a new one. When he hot synched the new device with his computer system, he was able to completely restore his address lists, memos, documents, and burn care database in three or four minutes. "It would have been a lot harder to reestablish that information if I'd kept it in a little book and lost that book," he said.

### Reducing errors

One of the greatest potential uses of PDAs, many proponents say, is to decrease errors, particularly in prescribing medications. According

## Companies offering PDA software packages for surgeons

**Accenture**

[www.accenture.com](http://www.accenture.com)  
617/454-4000

**Allscripts Healthcare Solutions**

[www.allscripts.com](http://www.allscripts.com)  
800/654-0889

**DigitalAssist**

[www.digitalassist.net](http://www.digitalassist.net)

**ePhysician**

[www.ePhysician.com](http://www.ePhysician.com)  
650/314-2000

**ePocrates, Inc.**

[www.ePocrates.com](http://www.ePocrates.com)  
650/592-7900

**ePhysician**

[www.ePhysician.com](http://www.ePhysician.com)  
650/314-2000

**Eurekah.com**

[www.Eurekah.com](http://www.Eurekah.com)  
512/863-7762

**F.A. Davis**

[www.fadavis.com](http://www.fadavis.com)  
800/523-4049

**HealthTech Solutions**

[www.htsolutions.com](http://www.htsolutions.com)  
314/994-3030

**iScribe**

[www.iscribe.com](http://www.iscribe.com)  
650/381-2155

**MDeverywhere, Inc.**

[www.mdeverywhere.com](http://www.mdeverywhere.com)  
919/484-9002

**Medical ChartWriter**

[www.chartwriter.com](http://www.chartwriter.com)

**Pocket Med**

[www.pocketmed.org](http://www.pocketmed.org)  
434/825-0099

**Pocket Patient Billing**

<http://pocketpa.imrac.com>

**Pocketscript**

[www.pocketscript.com](http://www.pocketscript.com)

**Skyscape.com**

[www.skyscape.com](http://www.skyscape.com)  
978/562-5555

concluded a survey of 870 physicians who used the qRx hand-held computer drug reference guide by Brigham and Women's Hospital, Boston, MA. The survey, which was presented at the annual meeting of the American Medical Informatics Association in November 2000, showed that 81 percent of the physicians felt they were making better decisions about medications, and 80 percent were better informed about medications. Forty-six percent of physicians reported that the hand-held drug reference guide influenced three or more of their drug decisions every week, and 50 percent said it prevented at least one adverse drug event a week.<sup>3</sup>

PDA programs that create and transmit electronic prescriptions to pharmacies, such as those from ePhysician, Inc., Mountain View, CA, Allscripts Healthcare Solutions, Inc., Libertyville, IL, Pocketscript Inc., Cincinnati, OH, and iScribe, Redwood City, CA, also prevent drug mix-ups due to handwriting errors. In anecdotal studies conducted by the consulting firm Accenture, Boston, MA, PDA electronic prescription services cut the number of calls from pharmacists to physicians for clarification of a medication order by 20 percent.<sup>4</sup>

Electronic drug reference programs are helpful for surgeons, who tend to prescribe a small number of specific drugs or drug classes and consequently have to look up information about unfamiliar medications, said Barklie Zimmerman, MD, FACS, a vascular surgeon from Richmond, VA. Although the *PDR* is the primary reference for determining dosage patterns, indications, potential adverse effects, and drug interactions, it

to the widely quoted 1999 Institute of Medicine report, at least 44,000 patients in the U.S. die every year because of preventable medical errors, including approximately 7,000 who die of mistakes related to ordering and dispensing medications.<sup>2</sup>

PDA-based drug information guides may prevent medication errors by increasing clinicians' knowledge about available drugs and improving their selection of appropriate medications,


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often provides more data than surgeons need, and it is not always current.

However, the ePocrates qRx program for PDAs is updated every day by an editorial board of physicians, and it includes the name, class, indications, dosage, known drug interactions, adverse events, the mechanism of action, retail price, and package/tablet description of a drug. Other drug-related software for PDAs, such as iFACTs (Drug Interaction Facts) from Skyscape.com, Hudson, MA, provides information about drug-drug and drug-food interactions for more than 2,700 brand name and generic medications in 70 therapeutic classes. The *Johns Hopkins Antibiotic Guide* from Johns Hopkins Medical Center, Baltimore, MD, and qID™, also from ePocrates, identify the proper antibiotic for a specific diagnosis and infecting pathogen.

Such programs give surgeons rapid access to comprehensive, current information about medications from a manageable, portable container. As plastic surgeon Roger Simpson, MD, from Garden City, NY, said, "If I'm in the office or at the bedside, and a patient or another physician asks about a specific medication, and I don't know the dosages, within 20 seconds I can get the dose ranges and contraindications. If a patient is on multiple medications and there may be a problem with a drug interaction, I get a 'doc alert' message as soon as I open the PDA. If patients ask whether they can take an anti-inflammatory when they're also taking asthma medications, I can pull out the PDA and look up contraindications and sensitivities."

If infectious disease specialists are recommending unusual antibiotics, Dr. Simpson doesn't have to take the time to research them all. "I can't believe it, but I can get all that information and keep it in my pocket."

Nonetheless, many surgeons have yet to discover the advantages of using PDAs within their practices. Most physicians, as well as the facilities at which they work, still use laptops and desktops to access Web portals, update records, and send e-mail messages. "The lowest common denominator is an Internet connection and a browser. Everyone has that," Dr. Krusch said. "The next logical leap is porting part of that, taking segments of the functionality of the Web, and applying it to the hand-held device."<sup>1</sup> 

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This article was generated through efforts of the Board of Regents' Committee on Informatics. Members of the committee believe that this and other articles published in the *Bulletin* will serve to alert Fellows of the College to and inform them about trends in information technology that will help them simplify the administrative burdens of surgical practice, heighten their use of online and other innovative approaches to CME, and enhance their ability to improve patient care.

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