

Joining the Personal Digital Assistant Revolution

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Personal Digital Assistants (PDAs), also known as handheld computers, are being increasingly adopted by physicians, many of whom find the PDA to be an indispensable part of their medical practice. With limited time and expense, an interested physician can choose and purchase a PDA, connect it to a computer, and fill it with useful medical software, much of which is available at little or no cost on the Internet. At its most basic, the PDA allows for the access of medical reference material at the point of care. Physicians interested in going to the next level can use the PDA for electronic prescribing, charge capture, or to customize documents or databases to meet the specific needs of their practice.

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As physicians see more patients in less time, the ability to efficiently access medical references without falling behind schedule becomes a major challenge. A personal digital assistant (PDA), also referred to as a handheld computer, can help doctors bring reference material and other clinical tools to the point of care. A recent American Medical Association survey found that there is at least one physician using a PDA in 23% of medical practices (1). Many medical schools and residency programs have begun integrating PDAs into the curriculum making them, much like the stethoscope, a required tool of the profession. Ochsner Clinic Foundation residents and fellows have recently been issued iPAQ Pocket PC PDAs. Plans are in development for integrating these PDAs with the hospital's mainframe computer system, which will allow access to nursing notes, vital signs, and laboratory/study results at the point of care. The following review will summarize how, with minimal effort and expense, a physician can choose the right PDA, load it with medical applications, and begin using it as a valuable resource within their practice.

Choosing a Personal Digital Assistant

The most important decision when purchasing a PDA for the first time is the choice of the operating system (OS). All common PDAs are based on either the Palm OS® by Palm, Inc or the Pocket PC operating system developed by Microsoft. Currently, few medical applications are available for both operating systems so the choice of OS will define the particular software that will be available for a given PDA. Choosing between these operating systems can be difficult. The Pocket PC devices are more powerful, can accommodate more memory, and can integrate more easily with Windows®-based applications. They are also bulkier, more expensive than Palm OS® devices, and may require recharging

after only several hours of use. In contrast, Palm OS® devices are lighter and less expensive, may run for up to a month on a set of batteries, and, perhaps most importantly, have more free or inexpensive medical software designed for them. A thorough comparison of the two operating systems is available at www.jimthompson.net/handhelds.

Currently about 80% of medical users choose PDAs that use the Palm OS®. Because this review is targeted to new or potential PDA users who may find it slightly easier to find medical applications and get started with a Palm OS® PDA, the remainder of this article will emphasize the use of Palm OS® devices. Popular medical applications for Pocket PC devices will also be discussed.

After one decides to purchase a Palm OS® PDA, many other decisions remain. A number of popular models with a variety of features are made by Palm, Handspring, Sony, and Handera. Most physicians preparing to purchase their first Palm OS® PDA should choose a device that has a minimum of 8 MB RAM (memory). It is also important that the PDA's connecting cable is compatible with one's desktop or laptop computer. Most computers running an older version of Windows® (i.e., Windows 95) can only accept a serial connector. Most computers using Windows 98, Windows 2000, Windows ME, or Windows XP can use either a serial or a USB connector.

With time, most physicians will quickly find more and more information to put in their PDA. For this reason, expandability is essential. Choose a PDA that has an expansion slot compatible with one of the following: Springboard module, Compact Flash (CF) card, a SecureDigital (SD) card, MultiMediaCard (MMC), or Memory Stick. Color screens are slightly easier to read but typically cost at least \$100 more and use batteries faster than monochrome

devices. To date, few medical applications have made use of the color feature. Palm OS® PDAs meeting these basic requirements range in price from \$130 to \$450. Some specific models that are ideal for first time physician users are the Handera 330; the Palm M125, M500, M505 and i705; the Visor series; and the Sony Clie PEG series. Criteria for choosing a Pocket PC PDA differ. Physicians considering the Pocket PC operating system should look closely at Compaq's iPAQ series and Hewlett-Packard's Jornada.

Getting Started

After one makes the leap and purchases a first PDA, only a few steps are required before the PDA is ready to become a useful practice tool. Every PDA is linked to a desktop or laptop computer via a cradle. This allows one to install new programs to the PDA and to keep a back-up copy of the PDA's contents in case it is lost or broken. Depending on the PDA, the cradle's cord must be plugged into either a serial or a USB port on the back of the computer. Next, the software needs to be installed. This is usually done by inserting the PDA's CD-ROM disk into the computer and following the on-screen directions. With these two steps accomplished, the PDA should be ready for use.

From the beginning, many physicians will find the built-in personal planning features to be very handy. Both Palm OS® and Pocket PC PDAs have a date book for tracking schedules and appointments, an address book, a to-do list, and a memo pad pre-installed. Other programs can be located and then downloaded from the Internet. Downloading and installing new software on the PDA can be a bit tricky the first few times. A step-by-step tutorial detailing this process for Palm OS® devices can be found at: www.zdnet.com/downloads/pilotsoftware/guide.

HotSyncing is a process of synchronizing data between a computer and a PDA. Whenever changes are made, such as updating the address book or adding a new medical program, pushing a button on the PDA cradle initiates a HotSync®. With the mechanics covered, the PDA can now be transformed into a useful tool for the physician through the installation of medical applications available on the Internet.

Something for Everyone

Some medical programs seem to be found on almost every doctor's PDA. Probably the most popular medical PDA program for the Palm OS® is ePocrates Rx™, a drug reference used by more than 190,000 physicians (Figure 1). Available for free download at www.ePocrates.com, it contains extensive drug information including adult and pediatric dosing, side effects, cost, pregnancy classification, and much more. In a recent review published in JAMA, ePocrates Rx™ was described as "indispensable," "simple and intuitive," and "so useful as to justify the purchase of the hardware itself" (2). One unique and powerful feature is the MultiCheck tool. With this, the physician chooses up to 30 drugs from the program's list and, in moments, MultiCheck lists any interactions that exist between those medications. Another excellent and free Palm OS® drug reference is the Tarascon ePharmacopoeia, a PDA version of the popular pocket book. It is available from <https://members.medialogic.com/products.tarasoa/>.

For Pocket PC users, DrDrugs™ is the most popular drug reference program. A free trial version is available for download from www.skyscape.com, but the registered version costs \$49.95. A free alternative for the Pocket PC is on the horizon with the upcoming release of mobilePDR® from the makers of the *Physician's Desk Reference*. It is planned for release for both Palm OS® and Pocket PC PDAs. Details are available at www.PDR.net.

Medical calculator software makes it easy to quickly solve most common medical equations. MedMath (Figure 2), available free from www.stanford.edu/~pmcheng/medmath/index.html for Palm OS® PDAs, can calculate 34 medically useful equations including body mass index (BMI), creatinine clearance, and predicted peak flow. Another popular medical calculator is MedCalc, also available for free at <http://medcalc.med-ia.net/>. Archimedes, a well-designed medical calculator for the Pocket PC, is available for free download from Skyscape at www.skyscape.com/download/reseller.asp?product=archimedes.

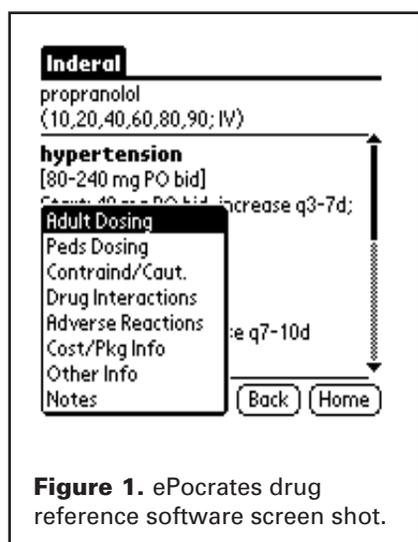


Figure 1. ePocrates drug reference software screen shot.

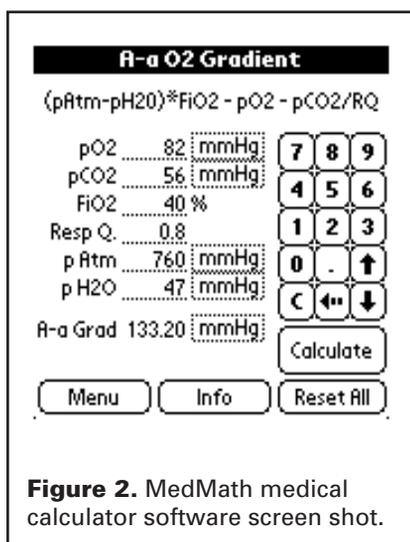


Figure 2. MedMath medical calculator software screen shot.

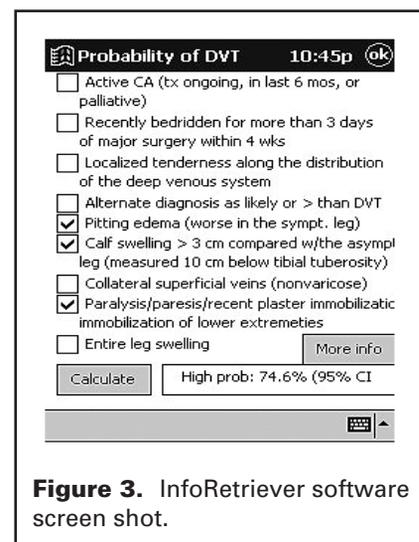


Figure 3. InfoRetriever software screen shot.

Table. A selection of Internet resources for the medical PDA user		
Ectopic Brain	http://pbrain.hypermart.net	Detailed list of quality medical software for the Palm OS® PDA
HealthyPalmPilot	www.HealthyPalmPilot.com	Hundreds of Palm OS® medical applications
FP Handheld	www.FPHandheld.com	Hardware and software recommendations
Pediatrics On Hand	www.PediatricsOnHand.com	Pediatrics resources
PDA Surgery	www.PDASurgery.com	Surgery resources
PalmGear	www.PalmGear.com	General Palm OS® PDA software site
MedicalPocketPC	www.medicalpocketpc.com	Pocket PC PDA resources
Skyscape	www.skyscape.com	Popular medical reference books for both Palm OS® and Pocket PC

In addition to programs, a number of medical references are also available for the PDA, including PDA versions of many of the most popular medical references such as the *Washington Manual*, the *Harriet Lane Handbook*, the *Sanford Guide to Antimicrobial Therapy*, and *Griffith's 5 Minute Clinical Consultant*. Unfortunately, PDA users must pay a premium for convenience; many of these PDA references cost twice as much as the print version.

Many free medical references are also available for the PDA. These documents require a PDA reader program, much like a desktop computer uses a word processor to view documents. A variety of Palm OS® document readers are available in the \$10-\$30 range. iSilo (www.iSilo.com) is one of the more popular document readers because of its unique ability to incorporate hyperlinks allowing the reader to quickly jump from one point to another within the document. Many useful medical documents for both Palm OS® and Pocket PC are available for free at www.Memoware.com in the Medical section. Pocket PC PDAs include a program called Pocket Word that allows one to view and edit Microsoft Word documents on the PDA. Similar programs are available for Palm OS® PDAs. The Table provides a list of useful Internet resources for medical PDA users.

One highly lauded reference available only for Pocket PC PDAs is InfoRetriever. InfoRetriever, available from www.info poems.com, is a source of evidence-based information for clinicians (Figure 3). It contains summaries of important articles from the medical literature, clinical prediction tools (ie. Ottawa ankle rules), and easy point of care access to Patient-Oriented Evidence that Matters (POEMs). InfoRetriever also includes *Griffith's 5 Minute Clinical Consultant* and a drug reference. This resource costs \$275 for a 1-year subscription.

Moving on to the Next Level

With the use of medical applications such as these, most physicians who begin using a PDA find it to be an indispensable tool within a few weeks. The potential uses of PDAs in medicine far exceed those described in this article. With a little additional effort, many physicians create their own medical reference documents for the PDA or design databases allowing them to track information of interest. PDA-based charge capture applications, such as MDEverywhere, report achieving 500% returns on investment by reducing lost charges and improving coding accuracy. While still in

its infancy, electronic prescribing using software from companies such as Allscripts and eMedicine allows the physician to write prescriptions on the PDA that can then either be printed or sent wirelessly to the patient's pharmacy. Many predict that electronic prescription writing will become mandated in the coming years as a mechanism to prevent medication errors. Integrated PDA/cellular telephone combinations are also becoming more widely available as is the ability to wirelessly share data between a PDA and a local area network (LAN) of computers. While some vendors promote patient charting on the PDA, small screen size and slow data entry make a PDA-based electronic medical record impractical at this time.

With little effort or expense, physicians can quickly adopt a PDA to make use of a number of quality medical applications. Most new users will soon come to count themselves among the many doctors who consider the PDA to be an indispensable tool in their practice of 21st century medicine.

References

1. AMA's 2001 Technology Usage in Physician Practice Management benchmark study as referenced in AMA News Release: AMA survey details technology preferences in physician practices December 2, 2001. www.ama-assn.org/ama/pub/article/1616-5600.html
2. R Hogan. ePocrates (review). JAMA 2001; 286:229-230.



Andrew Schechtman, MD is the Acting Program Director for the Ochsner Clinic Foundation's Family Practice Residency. He is also the founder of MeisterMed, a source for medical references designed for the PDA.