

Personal digital assistants for doctors

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A review of the use of PDAs in medicine, covering devices and operating systems, software, use in personal and patient management tasks, and sources of reference information.

Are you a doctor shopping for a hand-held device? Thinking 'do I really need to carry this gadget in my pocket?' Overwhelmed by all the different products and choices? Confused by all the changing technology? Is newer, smaller, and faster really better? The goal of this article is to help answer these questions and help you, the busy doctor, move away from your pen and paper office and into the electronic world. Still not convinced you need an expensive diary, to-do list, and the ability to play a few games? Sceptical that you can do hundreds of daily tasks better electronically? Would you prefer to keep patient records, billing notes, ward and theatre lists, as well as drug information in your pocket or do you still prefer index cards, a briefcase full of charts, and large heavy textbooks? What about the ability to access the Internet, communicate with the clinic and hospital, have access to laboratory and radiography results, and answer your e-mail when it is convenient for you?

Mobile computing has created a surge in wireless data and hand-held technologies that can save time and money. This technology provides physicians with the most cost-effective and time-saving tools available. By using a personal digital assistant (PDA) you can remain organised and connected to your office, clinic, and hospital at all times. PDAs are not just fancy diaries that contain electronic address books and calendars, but can also be Internet appliances and

information tools. This access to information and the ability to use it allows us to save time in our practice. Medical decision-making can be made easier since drug management, treatment pathways, and protocols can be available on a PDA. Patient demographics and electronic chart summaries can be placed in a PDA for easy recall, especially when on-call, and the information you need is either at the office, clinic, or hospital.

Devices and operating systems

Well, the future is now! All this, plus more, is available in a PDA. There are two main categories of PDAs based on the operating system the hand-held device uses. Additionally, a third platform is being developed called 'Smart phones' which combine PDAs with mobile phones.

The first is generically known as a 'palm' and is any PDA device that uses the Palm Operating System (OS). With their simplicity of use and large range of software, Palm OS PDAs account for 90% of the hand-held market. Companies that manufacture PDAs running the Palm OS include: Palm Inc. <<http://www.palm.com/>>, Handspring <<http://www.handspring.com/>>, Sony <<http://www.sonystyle.com/vaio/clide>> and HandEra Inc. <<http://www.handera.com/>>. The Palm OS uses a simple icon driven menu system and allows you to enter data using a form of handwriting known as Graffiti. The basic features include contacts, calendar, memo, to-do lists, and expenses, but adding specific

software, such as databases and treatment protocols, is easy via your computer.

The second important group are 'Pocket PCs' which run on the Microsoft Windows CE operating system. There are at least three companies producing Windows-based PDAs: Casio <<http://www.casio.com/>>, Hewlett-Packard <<http://www.hp.com/jornada>> and Compaq <<http://www.compaq.com/>>. This is a growing population with Windows Pocket PCs recently exceeding Palm devices in sales revenue, but not volume. Pocket PCs have the basic PDA features with the familiar look of Windows and have the ability to utilise documents in Word, Excel, PowerPoint, and Outlook. They can provide small computer functionality and allow you to play games, listen to music, view pictures, surf the Internet, and perform e-mail functions.

'Smart phones' fall into two categories: PDAs that are evolving into mobile phones and mobile phones that are evolving into PDAs. These have advantages over standard PDAs – by combining your mobile phone with your PDA, you only need to carry one device. Also, since many mobile services offer Internet access, it adds the convenience of Internet access and e-mail capabilities. Products in this line include Trium Mondo <<http://www.trium.net/>>, Sagem WA3050 <<http://www.sagem.com/>>, Nokia 9210 <<http://www.nokia.com/phones/9210/>> and Motorola Accompli 008 <<http://www.motorola008.com/>>.

Each company manufacturing PDAs has multiple products to choose from depending on your specific needs and how much money you wish to spend. Variables include size and weight, the amount of memory, size and type of display (colour versus monochrome), rechargeable versus replaceable batteries, and the ability to expand. Some PDAs offer accessories such as separate keyboards, Internet connections, cameras, and modules that add functionality.

No matter which system is chosen, they contain the basic software, are user-friendly and require little set-up time. Information can be obtained and transferred by several means from the PDA to personal computers and the Internet. Although PDAs can operate alone, they derive much of their usefulness from the ability to transfer data between the hand-held device and a desktop PC using PDA desktop software and to convert data to and from existing organiser applications. Through a process of synchronisation, often called a 'sync', data on the hand-held device are backed-up on the hard drive of the PC. The hardware that is used to carry out this operation is called a 'cradle'. While the PDA rests in the cradle, a cable runs from the cradle to the PC's hard drive. Hitting a single button initiates the synchronisation. The amount of time required to perform a 'sync' depends on the amount of data that needs to be backed-up and also on the number of applications that are running on the hand-held device. In addition to synchronising data, the cradle and desktop software can be used to add applications to the hand-held device. Users can download software from the Internet to the PC and then perform a 'sync' to load the software onto the PDA. Another way to 'sync' is via the infrared (IR) port located on most PDAs. Using the IR port, data can be transferred between two PDAs, a PDA and a computer, or from a PDA to a peripheral device such as a printer.

Software

Software remains the most important factor in selecting a PDA. Both Palm OS and Windows CE

have many software options that would be of assistance to the busy doctor. These are the nuts-and-bolts to saving you time, energy, and money. Many physicians do things by hand that could be handled electronically. This includes electronic diaries, contact lists, memos, to-do lists, and writing prescriptions and orders. PDAs can help reduce medical errors and increase efficiency in patient care by interfacing with hospital computer networks. As hospitals move to electronic charts and ordering systems, PDAs can be used to 'link' to these systems for ward-round notes, patient orders, and obtaining test results. The minimal requirements for a clinical physician include basic patient information, medication lists, important telephone numbers, insurance information, care partners, and reminders about specific tasks and clinical status.

The standard 'palm' can have its fields modified to meet the needs of a busy clinician. The fields in the address book can be customised as needed to include such things as referring physician, diagnosis, medical record number, and test results. The calendar allows for organisation of daily appointments as well as the surgery schedule and regular events such as office meetings and teaching sessions. Specific software for diagnostic and surgical codes as well as billing can be added.

Since many of the useful medical software resources consume large amounts of storage space, it is advisable to purchase a PDA with at least 8 Mb of memory. For example, installing *Griffith's 5 Minute Consult* requires approximately 6 Mb of memory. There are two primary formats for the storage of information on the Palm: document (DOC) files, and databases. To get the most out of a hand-held, a document reader and a database program are recommended.

Personal knowledge and time management

PDA devices have in-built diary and appointment systems. Automatic reminders can be ordered for special event. Notepad facilities can store

passwords. A useful resource for PDAs has been added to the Norris Medical Library Web site (University of Southern California) <<http://www.usc.edu/nml>>. The page contains links to PDA manufacturers, applications, tips, and discussion groups.

Patient information

PDAs are useful for storing patient records and location alongside clinical tasks. Hospital Information Services (HIS) and Patient Administration Systems (PAS) can be interfaced with the PDA via a wireless Local Area Network (LAN). It is now possible to pull HIS and PAS details to obtain the name, demographic details, and location of patients. Useful information from laboratory (Masterlab <<http://www.berkeleycs.co.uk/masterlab.htm>>) and radiology (PACS) systems can be accessed. Full Electronic Patient Records (EPR) is just starting to appear on American PDA devices and is sure to follow in Europe. There are applications for tracking patients, such as *Patient Tracker* <<http://www.handheldmed.com>>. Healthy Palmpilot <<http://www.healthypalmpilot.com>> is a useful repository of healthcare resources for the Palm OS. The CollectiveMed Mobile Channel <<http://www.collectivemed.com/channel.html>> is useful for keeping up-to-date on the very latest advances. Handheldmed <<http://www.handheldmed.com>> is devoted to clinical hand-held computing news, reviews, and informatics in medicine as well as selling products. pdaMD.com <<http://www.pdamd.com>> provides hardware, software, and accessories, as well as reviews, tutorials, and other resources for users of mobile and wireless technology in healthcare.

Hospital information

Basic information such as a telephone directory and bleep list can be accessed by a PDA. PDA users sending text messages or e-mail could help reduce the burden of electronic bleep messages by providing more focused

information. PDA devices could be used to make referrals to specialists within the hospital environment.

Clinical guidelines and drug prescription

Clinical guidelines can be stored on notepad or as a Word document on Windows CE (Pocket Word <<http://www.microsoft.com/mobile/pocketpc/software/features/word.asp>>) or the Palm (Document to Go <<http://www.dataviz.com/products/documentstogo/index.html>>) or as a Portable Document Format (PDF) file for use on PDAs. If the master document is updated, the original document on the PDA can be updated at synchronisation. Readability and the ability to interface with the host system will be the limitation here. There are PDA-based medical calculators such as MedCalc <<http://www.medcalc.med-ia.net>>.

Current drug information can be obtained using Epocrates <<http://www.epocrates.com/>> software. We expect it will not be long before there is a PDA version of the BNF. ePhysician <<http://www.ephysician.com>> allows the physician to order medications and laboratory tests. The data are sent to the ePhysician server via a secure Internet connection. The data are checked for conflicts and then the ePhysician server sends the request to the pharmacist or laboratory.

Research and audit

PDAs can be used for research. Software is available to organise databases, e.g. JFile <<http://www.jfile.com/>> and Pendragon Forms <<http://www.pendragon-software.com/>>. Some of these programs integrate with Microsoft database management programs such as Filemaker Mobile <http://www.filemaker.com/products/mbl_home.html> and Handbase <<http://www.ddhsoftware.com/>>. The power of these PDA tools is in the integration over a wireless LAN to keep a database up-to-date. Synchronisation using PDA devices through multiple global sites would be a significant tool to organise multicentre controlled trials.

Access to medical reference sources

PDAs can be used to access medical textbooks and reference manuals. More and more textbooks are becoming available such as *Harrison's Textbook of Internal Medicine*. The 5mOrtho, the 5-Minute Orthopaedic Consult, is excellent and can be found at <<http://www.collectivemed.com/jump/5mort.shtml>>. It is designed for rapid consultation on virtually any orthopaedic problem. Coverage includes clinical presentation, prehospital, treatment, disposition, and miscellaneous information. It explains diagnostic procedures and provides details about therapeutic and rehabilitation information. Illustrations are included. *Orthopaedic Surgery Notes* <<http://www3.pdamedsolutions.com:81/products/osn.htm>> is a complete orthopaedic textbook, including information on the diagnosis and pathophysiology of a wide array of musculoskeletal conditions. It also covers surgical techniques and orthopaedic procedures. Latest PDA journal information can be found at <<http://www.journaltogo.com/>>.

News item

Fraudulent health Web sites identified

A press release on the Australian Competition and Consumer Commission (ACCC) site <<http://www.accc.gov.au/media/mediar.htm>>, *International Consumer Protection Network Goes After Health Scams to Protect the Health of Global Consumers* (8 April 2002), describes a recent 'International Internet Sweep' by the International Marketing Supervision Network (IMSN) <<http://www.imsnricc.org>>. IMSN is a network of consumer protection authorities of 30 countries, including the UK. 'Its main objective is to take action to prevent and redress deceptive marketing practices with an international component.' The Internet sweep identified sites giving misleading or false claims about health products and fraudulent health Web sites. A link to the full report is available in the ACCC press release.

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News item

Relaunched TRIP database

The TRIP database <<http://www.tripdatabase.com>> contains over 30,000 EBP items gathered from over 70 sites of high-quality medical information. These items provide direct links to the information on the Web. The TRIP Database has been relaunched with a new look and a large new section – Clinical Areas.