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Knowledgeshare

Web alert: handheld computers in health care – resources to get you started

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What are PDAs?

Personal Digital Assistants (PDAs), otherwise known as handheld computers, will eventually become essential to healthcare practice. These devices, which have been on the market since the early 1990s, are already to be found adorning staff throughout primary and secondary care, and a US study published in the *BMJ* found that only 17% of doctors were *not* regular users.[1] So what are PDAs, and why are they so well suited to the healthcare professional?

A PDA is a small computer with a touch-sensitive screen, weighing only a few ounces, which can be used to store large quantities of information. By default PDAs come loaded with software that allows them to function as personal organisers. As a user you can store details from your address book, appointments in your diary, 'to-do' lists, email messages and favourite websites. What makes them so useful is their ability to synchronise with your desktop computer, meaning that data can be automatically transferred to and from your handheld, thus ensuring that you always have the most up-to-date information wherever you are. A PDA can alert you when it is time to attend a meeting, direct you to the right office and let you read the minutes from your last meeting on-screen. For many healthcare staff 'the organiser functions alone have been sufficient justification for buying a handheld computer'.[2]

Handheld computing in health care

However, when it comes to supporting the practice of nurses, general practitioners (GPs), medical students, consultants, and allied health professionals these administrative functions are only the start. A wide range of software applications and electronic resources have now been developed specifically for use at the bedside. These applications include patient management systems that communicate with the electronic patient record, presenting the user with the patient's previous medical history, currently prescribed medications, and clinical results, along with whatever forms it may be necessary to fill out during a consultation. These can then link into another of the more popular types of PDA applications: drug databases. Stand-alone drug databases are fantastically useful in their own right, but the more advanced handheld systems will now automatically detect possible drug interactions whenever a new medication is prescribed to a patient.

The quantity of information that can be stored on a handheld computer is such that the need to carry printed materials around for reference will eventually be eliminated. For students and junior staff there will no longer be the need to transport heavy textbooks, and for everyone the practice of evidence-based medicine will no longer be divorced from the patient encounter. Clinical guidelines, both national and local, can be accessed from any location. Providers of information, from quality-assured digests to databases of research reports, have begun to deliver versions of their products tailored to the PDA format. Systems are available that grab the latest journal references and abstracts for your PDA, allow you to browse and mark the items that look useful whenever you have a spare moment, and proceed to download the full text of these articles the next time you synchronise.

As the technology continues to develop, the value of handheld computers in terms of convenience and utility will expand even further. Many hospitals throughout the world have now introduced wireless networks that allow PDAs to synchronise with the hospital network (and by extension with the internet) without being hooked up to a desktop PC. As more hospitals follow suit it will soon be possible for staff to conduct a search for evidence and read the results immediately without needing to return to their desks. Most PDAs already have the ability to wirelessly transmit information to another PDA using infrared technology

(known as 'beaming'), which allows staff to share patient details between shifts quickly, simply and securely. And Newman suspects that eventually 'the PDA could replace the bleep completely, providing instant communication between all medical staff'.[3]

For those healthcare professionals not working within a hospital or practice (and its wireless network), PDAs are now beginning to include inbuilt phones to allow internet access. In fact, attachments are even available to turn the handheld into a global positioning system (GPS), and these are being used by ambulance services to navigate to the scene of an accident, or by GPs and district nurses making house calls.[4,5]

Challenges and opportunities

To some readers all of this will be old news, for others it might seem unnecessarily complex and irrelevant to their working life. Confidence with the use of this sort of technology still varies widely among healthcare staff, and even the adept can easily be frustrated by lengthy set-up processes and faulty systems. New technologies are notoriously troublesome, and this sort of technoscepticism is not the only cause for concern about PDAs. There are still serious issues regarding the security of these devices. Enthusiasm about the potential for effortlessly transmitting patient information is tempered by the potential for the theft or deletion of that same information. The consequences if an unauthorised user was to gain access to the hospital's secure network could be enormous, but luckily there are a variety of systems available for the PDA that authenticate users and encrypt data.[6] Other worries among current users include the possibility of frequency interference affecting medical equipment, and the scope for over-reliance on the technology (leading to tears and recriminations if and when the systems fail).

Nevertheless, the health sciences literature clearly demonstrates that PDAs are popular, and are becoming more so. It is true that the ways in which they are used still lacks some depth, with the simple personal organiser functions remaining dominant, but this may be due to a lack of awareness about the range of resources that are available.[7] The rest of this article will introduce some of the most useful resources, and provide suggestions on where to go for more information.

Getting started with PDAs

PDAs are available from a variety of manufacturers, but most will use one of the two major operating systems: Palm OS or Pocket PC. Software and resources that have been created for use on one system will not be compatible with the other, and so careful consideration must go into your choice when purchasing a machine. It is worth exploring which system is being used by your colleagues, and which resources are available from your local health library (if any), before making your decision. Some advice to help you make sense of the different options can be found in the second chapter of *Handhelds for Doctors* by Mohammed Al-Ubaydli, which can be read free online.[8]

It may not be immediately obvious whether a particular website or electronic resource has a PDA version available. If you want to check for PDA content try using the 'site map' or search facility, and typing in the various synonyms, for example: 'PDA', 'handheld', 'Pocket PC', and 'Palm'. Alternatively it is possible to browse for PDA resources, either by specialty or function, from one of the growing number of PDA-specific web portals.

PDA portals

Doctors' Gadgets: www.doctorsgadgets.com

Doctors' Gadgets is a US-based PDA web portal that focuses on handheld computing, wireless networks and other new technology. Like many similar portals it is interactive, meaning that users can become 'members' and submit their own favourite web links, PDA software, and news items (although these are still quality assured by an administrator).

There is a forum for discussion of the hardware, software, problems and advantages relating to PDAs, although this is quite a recent addition to the site and not well populated at the time of writing. The section on PDA software is subdivided by specialty, but is used by suppliers to advertise their products, and so most of the resources are available for a price. Having said that, free trials are usually available and will allow you to judge how useful the software is before you pay.

UK Forum for Handheld Computing in Medicine: www.pdaconsult.co.uk/bbs/index.php

This site represents a similar initiative that has been set up in association with the British Medical Informatics Society. There is a little more emphasis here on discussion, and forum topics include: software (electronic patient records, medical reference texts, drug formularies and medical calculators); handheld devices (Palm, pocket PC); technical support; and PDA-related projects. Users must register, but this is free.

University of Illinois in Chicago – University Library – PDA Resources: www.uic.edu/depts/lib/lhs/resources/pda/

The library staff at the University of Illinois have created a PDA resource guide for medical students that includes a guide and a variety of links to help you get started. Their 'medical resources for PDAs' link provides the user with a large number of sites containing software and information resources that are subdivided by specialty and function. As well as sections on 'dentistry', 'nursing' and 'emergency care' there are also collections of calculators, drug resources, and evidence-based tools for use on a handheld machine. You will find that some of these resources cost money, but others are available free of charge, and an indication is given of whether the software is compatible with Palm, Pocket PC, or both. There are many other metasites covering PDA news and events, and listing free and fee-based resources. There are sites that are:

- specific to the Pocket PC format, e.g. Medical Pocket PC (http://medicalpocketpc.com)
- specific to Palm Pilots, e.g. Healthy Palm Pilot (www.healthypalmpilot.com) or Ectopic Brain (http://pbrain.hypermart.net)
- specific to a particular discipline. Anaesthesia UK (www.frca.co.uk) is a good example.

For a comprehensive list of free PDA healthcare software you might like to read a paper by Li.[9]

Drug databases

A handheld version of the *British National Formulary* is available to buy from www.medhand.com, but there are also free resources available such as:

Epocrates Rx: www2.epocrates.com/index.html

Epocrates is an American product that includes references to well over 3000 drugs; references that are updated and supplemented every time you synchronise with an internet-linked PC. A variety of information is available, from adult and paediatric dosage to contraindications and adverse reactions. The user has the facility to record their own notes next to a particular medication and to search for medications by name or by the condition being treated. It is also possible to select two or more drugs and discover any possible adverse interactions between them. A drip-rate calculator and a Fahrenheit–Centigrade temperature converter are also included.

Patient management

For those using the EMIS (www.emis-online.com/palmgp.asp) system to keep track of patient information there is already a free upgrade available that will allow you to access data on the move using your handheld computer. However, the system is currently only available for those handhelds that use the Palm operating system.

Patient Tracker: www.patienttracker.com/product_patienttracker.htm

For those not using EMIS, a piece of software called Patient Tracker is available and can be downloaded to your desktop and your handheld (either Palm or Pocket PC), although it is no longer free. The software allows you to begin with basic information about each of your patients, for instance age, contact details, diagnosis, and allergies. You can then record which tests have been performed on the patient, and what the results were, list medications that they are on and track their progress. Obviously the different healthcare professionals using the system can easily share patient information, and those visiting patients on wards or at home can take all of the information with them on their handheld machine.

Evidence-based practice

Using a PDA for evidence-based practice means having access to critically appraised, quality-assured research information at your fingertips, wherever you are.

Clinical Evidence: www.clinicalevidence.com/ceweb/products/PDA.jsp

This resource contains summaries of the current state of knowledge and uncertainty related to specific conditions, and includes information about the evidence or lack thereof for various treatments. The articles are based on evidence from good-quality randomised controlled trials and systematic reviews, and can be found by browsing the various specialties from child health to mental health. The information from Clinical Evidence can be found online via the National Library for Health (www.library.nhs.uk) or in print form at your local medical library, but software that allows you to upload this information to your PDA can also be purchased relatively cheaply from the site given above. The PDA version replicates the full version (updated with any new material when you

synchronise), telling you what are likely and unlikely to be beneficial treatments for each condition.

InfoPOEMS: www.infopoems.com

POEM stands for 'patient-oriented evidence that matters' and InfoPOEMS are short articles summarising and evaluating recently conducted research. The site explains that over 100 medical journals are reviewed and roughly 1 trial in 40 makes it into the InfoPOEM database. As well as giving access to the complete collection of POEMS, the handheld application InfoRetriever gives access to abstracts from the Cochrane Database of Systematic Reviews, guideline summaries and clinical decision rules. The resource is more expensive than Clinical Evidence, but the quantity of material is larger and the range of resources is more varied.

Ebm2go: www.ebm2go.com

Ebm2go is a free resource produced in Canada and includes similar resources free of charge. There is a guidelines database, as well as an 'evidence' database that summarises well-respected studies in a PDA format, and a cardiac risk calculator. However, it is worth noting that the collections are not as extensive as the subscription resources, and nor is there much detail about who selects items for inclusion or how they are appraised. The site is sponsored by various drug companies.

Other free PDA-applications that support evidence-based practice include the EBM Calculator (www.cebm.utoronto.ca/palm/ebmcalc) which helps you calculate relevant statistics such as sensitivity and specificity, relative risks, number needed to treat, odds ratios and more, and the PICO Maker (www.library.ualberta.ca/pdazone/pico/index.cfm) which allows you to store questions by patient, intervention, comparison and outcome (both are available for Palm OS only).

Journals and books

PubMed

PubMed is the National Library of Medicine's MEDLINE interface that allows you to search the abstracts of thousands of medical journals. It is available on Pocket PCs and Palm Pilots in two ways. The 'PubMed for handhelds' page (http://certif.nlm.nih.gov:8080/nlm) is a basic web page that has been optimised for viewing on the small screen of a PDA. Assuming that your PDA is connected to the internet (perhaps through a wireless network) you can access this page and search MEDLINE with ease. Alternatively you can buy and download 'PubMed on Tap' from http://archive.nlm.nih.gov/proj/pmot/pmot.php, which is an application that allows you to save and share certain abstracts on your handheld device, enter more complex searches, and save searches for later retrieval.

Medical textbooks are available for the PDA from a wide variety of suppliers. Some are free, such as *Medical Approaches* (www.medicalapproaches.com) which was designed for junior doctors by junior doctors, but most cost money. You may find that your local healthcare library already subscribes on your behalf to a collection of electronic books that includes PDA content, for example:

- *MDConsult* (www.mdconsult.com)
- *The Oxford Handbooks of Clinical Medicine and Clinical Specialties* (www.oup.co.uk/academic/medicine/handbooks/pda).

Finally it is worth mentioning *Dr Companion* (www.drcompanion.com/products/uk/index.html) which is a compilation of many key texts, including the *BNF*, the *Oxford Handbooks*, NICE guidelines, medical calculators and *Instant Pictorial Anatomy*, and can be purchased as a memory card to make installation on your PDA extremely easy.

Conclusion

A recent study conducted in Leicester provided participants, including nurses and GPs, with handheld devices and asked them to rate how useful they found them. The response was overwhelmingly positive. There were indications that more detailed enquiries could now be answered that would previously have been referred to specialists, and that although 'a GP is at their desk during consultation so doesn't need a PDA . . . it becomes very useful for visits'.[5] Academic institutions have begun buying PDAs in bulk to hand out to medical students for the duration of their course, and although there has been little evidence that they improve patient care, this is probably due to the relatively short time that they have been around. For further reading on the subject, you can read a bibliography of PDA-related articles published before 2003,[10] or use the Medline heading 'computers-handheld' for more recent publications.

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