

Personal digital assistant (PDA): Putting radiology in your pocket

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Introduction to the personal digital assistant (PDA)

A busy radiology practice makes demands on time and requires radiologists to have a large amount of information at their fingertips, more so than many other clinical specialties. Juggling all the scheduling and information-retrieval and storage tasks can be a nightmare. Do not despair! Such a problem-solving tool is available in India, in stores near you, for Rs. 15000/- onwards. It is called a personal digital assistant (PDA) and yes, it can change your life!

Most of us in radiology are familiar with computers. We routinely use them for searching the Internet for references, for word-processing functions, for viewing diagnostic images, and for entertainment.

A PDA is nothing but a pocket-sized computer. Passing instructions and data into a PC is accomplished using a keyboard and mouse. Most PDAs use a keyboard that may be integrated or a small folding attachment, along with a pen-like device called a 'stylus' that is used to write on a touch-sensitive screen, which is present in all PDAs [Figure 1]. The PDA can convert most scribbled handwritten text into clear legible typewritten text, so that those who are not expert typists need not worry! PDAs can link up to PCs, usually through a USB cable, and can exchange programs and files with it. This allows work done in one device to be transferred to the other. The data is stored in hard drives or removable memory cards.

Types of PDA

In 1996, US Robotics introduced the first Palm Pilot, which featured 128 KB of RAM and a 160 × 160-pixel touch-sensitive



Figure 1: Typical PDA (Palm type and Pocket PC).

gray-scale screen. At present there are three main types of PDAs. Information about them is summarized in Table 1.

Utility of a PDA

It was estimated in a 2003 article that nearly 50% of physicians would be using a PDA by 2005.^[1] That has certainly not happened in India, but is probably an underestimation of the situation in the USA! A study from 2006 states that of 1501 physicians interviewed, 39% of the respondents said they used their PDAs in more than half their patient encounters.^[2]

So how can a PDA help a radiologist and in his day-to-day activities? To give an illustration, let us run through an imaginary day: At work, as you report a difficult case,

Table 1: List of commonly available PDAs

Device Type	Operating System	Features
Palmtop	Palm OS	<ul style="list-style-type: none"> • The oldest • Does not run MS Office applications • Has similar applications • Closed system
Pocket PC	Windows CE	<ul style="list-style-type: none"> • Looks and works much like personal computers • Provides basic MS Office apps like Word, PowerPoint • Open system
Smart Phone	Windows Mobile	<ul style="list-style-type: none"> • Similar to Windows • Automatically synchronizes current Windowsbased computers on connection
Blackberry	Blackberry OS	<ul style="list-style-type: none"> • Communicator with PDA features

you use your PDA to look up the criteria for diagnosis of multiple sclerosis. A patient comes in with an unfamiliar clinical condition and you look it up on your PDA. A case that is part of your ongoing research project comes up and you enter the details in a database on your PDA, which is synchronized with a copy on the PC at your office or home.

You also use the PDA to send an email to a journal about an article that you had submitted and also to check your mail while on the move, via a WiFi network. You play back music or video files on your PDA when you need a break. The evening conference talk can be downloaded on to your PDA and presented from your PDA itself by linking up with an LCD projector. Reports can be dictated to your PDA, which can also function as a voice recorder. For the uninitiated, a small list of useful online PDA resources is offered in Table 2.

To understand this more objectively, the several functions can be grouped as below:

1. Organizer functions
 - a. Appointments / anniversaries
 - b. Reminders
2. Office functions
 - a. Write letters, documents
 - b. Create and play MS PowerPoint shows, including multimedia
3. Medical / radiology references
 - a. Reference documents/ books (like protocols, differentials etc)
 - b. Drug references
 - c. Searchable textbooks
4. Database functions
 - a. Personal financial data
 - b. Patient data
5. Calculator functions
 - a. Medical calculators to calculate creatinine clearance, scores etc.
6. Audio functions
 - a. Record voice memos and lectures
7. Internet access
 - a. E-mail

Table 2: A few useful internet resources and links for PDAs

1. PDA hardware comparison table
http://www.healthsystem.virginia.edu/internet/library/wdc-lib/services/computing/pda/pda_compare.cfm
2. David Conger's PDA comparison online tool
<http://www.davespda.com/resources/compare/>
3. PDA Learning Centre
<http://www.pdamd.com/vertical/tutorials.xml>
4. The Doctor's PDA and Smart Phone Handbook
<http://www.doctorsgadgets.com/the-doctors-pda-and-smartphone-handbook/>
5. Albert Einstein College of Medicine Biomedical PDA Resources
<http://library.aecom.yu.edu/resources/pda/pdabiomedical.htm>
6. The University of Western Ontario PDA Resources
<http://www.lib.uwo.ca/taylor/outreach/pdaresources.shtml>
7. Ectopic Brain Palm Medical Applications Reference
<http://medicalpda.net/medapps.html>
8. Healthy Palm Pilot Health Care Resource Index
<http://www.healthypalmpilot.com/Interventions/>
9. Medical iSilo™ Depot PDA Medical References
<http://www.meistermed.com/isilodepot/index.htm>
10. Andrew Yee's Medical Eponym and Palm Pilot page
<http://eponyms.net/>
11. Healthy Palm Pilot: Medical Interventions Resources
<http://www.healthypalmpilot.com/Interventions/>
12. MedRules
<http://pbrain.hypermart.net/medrules.html>
13. MedCalc
<http://www.med-ia.ch/medcalc>

- b. Journal tracking with abstract and full-text articles

This is by no means an exhaustive list, and how you use a PDA is limited only by your imagination. Almost any and every function of a PC or laptop can be performed by a PDA, albeit with some limitations.

Issues with PDAs of Relevance to Radiologists

Many radiology-specific reference texts and software, for use in PDAs, are available through the Internet [Table 3]. These include the RadRevMnl™ (Radiology Review Manual, 5th Ed.) and the Gamut™ 10.0.7 (Reeder and Felson's Gamuts in Radiology), which are PDA versions of well-known texts. There is a free tool called 'Normal Values in Radiology v1.0' that is self-explanatory. In their PDA formats, these texts are

searchable and can be carried in your pocket.

The million-dollar question is: 'Can we look up DICOM images on a PDA?' There is no DICOM viewer at present available for a PDA, but the processing power and memory of PDAs is rapidly growing and, as of now, it is probably possible to review a CT scan on a PDA. Routine clinical use however would require more work on standardization of resolution and image compression issues. Most current devices do not support the 512 × 512 display matrix that is required by most DICOM images.

Since wireless networks can be accessed through PDAs, they have a potential use as access devices to interface with the HIS (hospital information system), the RIS (radiological information system), and the Picture Archival and Communications System (PACS) networks. There have been published articles detailing experimental deployment of RIS over a wireless link, using handheld computers.^[3,4] Download speeds on available WiFi networks are too slow to allow routine use currently, but this is sure to change once

WiFi becomes faster in the future.^[3]

No discussion of PDAs can ever be complete without talking of 'smart phones.' These are simply devices that combine the capabilities of a mobile phone and a PDA, offering a user the best of both worlds. A smart phone reduces the number of gadgets you have carry, but is considerably more expensive than a PDA or a mobile. The Blackberry is perhaps the best known example of this, but there are many more models now available from companies like Palm, Samsung, and Sony, to name a few. These tend to be bulkier than the usual mobile phone but do provide enhanced functionality. The commonest operating system on these devices is Windows Mobile which offers the familiar Windows environment that all of us deal with. Furthermore the new Windows Vista operating system has a built-in 'Windows Mobile Centre' that automatically transfers data to and from any smart phone or PDA using Windows Mobile.

Conclusion

The future is mobile and it would be safe to say that the majority of us may be using one of these devices within the next few years. These gizmos are not only fun and handy, but can considerably enhance our professional lives and make many routine tasks easier.

References

1. Bertling CJ, Simpson DE, Hayes AM, Torre D, Brown DL, Schubot DB. Personal digital assistants herald new approaches to teaching and evaluation in medical education. *WMJ* 2003;102:46-50.
2. Rothschild JM, Fang E, Liu V, Litvak I, Yoon C, Bates DW. Use and perceived benefits of handheld computer-based clinical references. *J Am Med Inform Assoc* 2006;13:619-26.
3. Busch JM, Barbaras L, Wei J, Nishino M, Yam CS, Hatabu H. A mobile solution: PDA-based platform for radiology information management. *AJR Am J Roentgenol* 2004;183:237-42.
4. Nakata N, Kandatsu S, Suzuki N, Fukuda K. Mobile wireless DICOM server system and PDA with high-resolution display feasibility of group work for radiologists. *Radiographics* 2005;25:273-83.

Table 3: Common radiology-related software for PDAs

1.	Normal Values in Radiology v1.0: Normal Values. Freeware http://www.freewarepalm.com/medical/normalvaluesinradiology.shtml
2.	CHORUS: Collaborative Hypertext of Radiology: Radiology Hypertext http://www.meistermed.com/isilodepot/isilodocs/isilodoc_s_chorus.htm
3.	RadRevMnl™ : Dr. Dähnert's Radiology Review Manual http://www.skyscape.com
4.	Gamut™ 10.0.7: Reeder and Felson's Gamuts in Radiology http://www.skyscape.com
5.	PDA Application for ACR Appropriateness Criteria® Anytime, Anywhere™
6.	http://www.acr.org/SecondaryMainMenuCategories/ACRStore/FeaturedCategories/QualityandSafety/ac_pda.aspx
7.	Basics of Chest X-ray Interpretation: A basic text http://www.meistermed.com/isilodepot/isilodocs/isilodoc_delaney_cxr.htm
8.	Radiographic Contrast Material http://www.meistermed.com/isilodepot/isilodocs/isilodoc_rad_contrast.htm
9.	Pocket Radiologist PDA http://www.us.elsevierhealth.com/medicine/radiology
10.	PDA Software Installation for RadioGraphics http://highwire.stanford.edu/pda/?jcode=radiographics
11.	PDA Software Installation for Radiology http://highwire.stanford.edu/pda/?jcode=radiology
12.	PDA Software Installation for American Journal of Neuroradiology http://highwire.stanford.edu/pda/?jcode=ajnr
13.	PDA Software Installation for American Journal of Roentgenology http://highwire.stanford.edu/pda/?jcode=ajronline

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