Which hand-held computer is better for doctors?

Part 1: Comparing models with Palm operating systems

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Personal digital assistants (PDAs), or hand-held computers, are rapidly growing in popularity. The PDA market has been growing so quickly it is already hard to follow all new models. Recent product releases boast bigger memory, better displays, and numerous add-on features (such as the ability to play music files or act as a voice recorder, cell phone, or digital camera).

Among the few reviews of hand-held devices for medical use, none provides a useful buyers' guide. This paper attempts to provide an algorithm for choosing a PDA suitable for medical professionals. We have also created a website (**www.freewebs.com/webhelpdoctors**) where we will update information on PDA models regularly. We hope this article will be useful both to physicians who are looking to purchase their first PDAs and to advanced users who are considering upgrading.

Palm or Windows?

The first step is to choose between different operating systems: Palm OS and Pocket PC (**Table 1**).

At the time of writing this article, Palm PDAs were smaller, much cheaper, and simpler to use. More medical software is written for Palm OS. Pocket PCs are certainly catching up in all parameters, however, and many useful applications already exist for both systems. In this paper we discuss Palm OS–based PDAs. Another article will concentrate on Pocket PC–based hand-held computers.

The next step depends on whether you are satisfied with black-and-white display or whether you would like colour. **Table 2** summarizes the most popular basic monochrome Palm devices that satisfy most requirements of medical professionals: reasonable price, small size, Palm OS operating system, and an option to expand memory.

Table 1. Comparison between two popular types of PDA: *Palm vs Pocket PC*

FEATURES	PALM	POCKET PC
Operating system	Palm OS	Windows CE
Brands	Palm, Sony	Toshiba, Hewlett Packard, Dell
Price for basic PDA	$200-$250	$300-$450
Size and weight	Smaller and lighter (112-168 g)	Bigger and heavier (224-280 g)
Display	Most colour (resolution 320x320)	Most colour (resolution 320x240)
Expansion slots	Bigger variety	Some have built-in SD slots
Connection with desktop	Synchronization much slower	More convenient
Multimedia	Some come with MP3 player, voice recording	Screen and sound are better, all models have MP3 player, earphone jack, voice recording, may be stereo, OS is versatile
File organization*	Less convenient	Windows-like
Medical software	More available	Less available
Pros	Lower price, smaller size, energy efficient, more software, simpler to use	Versatile, more convenient
Cons	Less versatile	Higher price, bigger size, energy consuming

OS—operating system; SD—secure digital card, available in 8, 16, 32, 64, 128, and 256 MB.
**Note that 1 MB of memory in Palm OS is approximately equivalent to 2 to 4 MB of memory in Windows CE (ie, 8 MB of Palm OS = up to 32 MB of Windows CE).*

Table 2. Most important features of popular basic monochrome Palm PDAs

FEATURES	PALM M500*	SONY CLIÉ PEG SJ20
Price†	$250	$200
Memory expansion slot	SD or MMC	MS
Price for optional memory card	$69 for 64 MB	$80 for 64 MB
Battery	Lithium polymer	
Connection port	USB, infrared	
RAM	8 MB	16 MB
Operating system	Palm 4.0	Palm 4.1
Office‡	Yes	
In box	USB Cradle, Soft	USB Cable, AC Adapter, Soft
Pros	Can work with Windows 95 on desktop or higher platform	Big RAM, high resolution, low price; MS is compatible with other Sony devices
Cons	Small RAM, old OS, slow processor	Old OS, slow processor, requires Windows 98 on desktop, MS requires software support, no Macintosh compatibility

MMC—multimedia memory card, available in 8, 16, 32, 64, and 128 MB; MS—memory stick, available in 8, 16, 32, 64, and 128 MB; OS—operating system; RAM—random access memory; SD—secure digital card, available in 8, 16, 32, 64, 128, and 256 MB; USB—universal serial bus connection.

**Not manufactured any longer, but still can be found in some stores (like* www.compusmart.com*).*

†Based on price lists of Futureshop and Compusmart before taxes.

‡Office is a software bundle that includes at least a word processor and a spreadsheet compatible with Word and Excel for Windows 95, 97, 2000, and XP. It also supports Corel and Lotus software.

Syncing

The PDA needs to communicate with your computer to load programs, make updates, and back up files. A USB (universal serial bus) connection is much faster than the older parallel type and is more convenient for users. Most modern computers have at least two USB slots, sometimes located on a front panel. Infrared (IR) ports are even more convenient because there is no need to connect the PDA to a computer at all if your computer has an IR port too. Simply placing one against the other enables exchange of information. If the IR port is powerful enough, you can use the PDA as a remote control for your television or home entertainment system.

Operating systems

Palm OS version 4 provides easy-to-use features and long battery life. The newest Palm OS, version 5, has recently entered the market and allows for a Palm OS version 5 processor (200 MHz vs 33 MHz). Speed improves performance up to 300%. It also supports 320 X 320 pixel screens (quadruple the resolution) and allows videorecording, sound recording, and playback. Palm OS version 5 supports the "Bluetooth" networking standard, making wireless communications easier than ever before. Palm OS version 5 includes 128-bit data encryption for Internet browsing and secure transactions. The system has a component that tries to run older software designed for earlier versions, but some current programs do not work on it.

Battery life and options

Some PDAs come with disposable alkaline batteries, which provide power for about a month. After that you need to buy new batteries (or use alkaline or metal hydride rechargeable). Others work on lithium batteries, which are good for 2 weeks of work (30 minutes a day on average), but can be recharged right in the sync cradle.

Memory expansion slot

Medical professionals need a lot of memory to run multiple drug databases, textbooks, and medical calculators. Today PDAs usually come with 8 to 16 MB on the main memory, which might not be adequate. It is essential to be able to add extra memory to your PDA. This is done through small memory cards. The SD, MMC, and MS are different types of memory cards. They all have the same purpose: storing programs and information. They are not interchangeable, however. They employ different types of connectors and software for managing files. Some are compatible with digital cameras and videocameras, and some come with MP3 players and laptop computers. Some types, such as Sony's Memory Stick media, are more expensive than others.

The space on memory cards is not exactly equivalent to the PDA's internal memory. Some applications cannot be copied to memory cards or will not run well there. Be sure to look for memory card compatibility when you buy software.

Table 3 lists some of the most popular software, which might influence your decision on how much memory you need on your PDA.

Table 3. Software most popular among physicians

APPLICATION	PRICE	MEMORY REQUIREMENT (MB)
Drug databases		
• Epocrates Rx	Free	3.0*
• Epocrates Rx Pro, which includes ID (infectious diseases protocols, connected to Epocrates Rx), Alternative Meds, Tables, Med Math	Commercial	3.0*
• Lexidrugs	Commercial	Up to 5.8*
• Tarascon Deluxe	Commercial	3.3*
Clinical reference		
• OCM-Family Medicine	Commercial	4.2
• Merck Manual	Commercial	4.9
• 5-Minute Clinical Consult	Commercial	4.3
• 5-Minute Emergency Medicine	Commercial	3.0
Evidence-based medicine: Inforetriever	Commercial	2.0 of internal + 64.0 on expansion card
Calculators		
• MedCalc	Free	0.3
• MedRules	Free	0.35
• EBM calculator	Free	0.05
• Preg Dates	Free	0.1
Miscellaneous		
• Documents to go (Office)	Free (**Table 2**)	2.0
• Noah Lite (English dictionary)	Free	5.1

**These databases are updatable, ie, require more memory with every update.*

Also you must keep in mind that most applications are databases and need various database readers. The most popular are HanDBase, Isilo, Reader, and Jfile. These readers take 0.5 to 1.0 MB more memory for themselves. It is also recommended to leave about 1 MB for personal records (telephone book, calendar, things to do, and memos) and at least 2 MB free of software for normal functioning of the PDA. The total required memory is often above 10 or even 20 MB.

Colour

Those who prefer colour must compare basic colour PDA models (**Table 4**). They all have Palm OS version 4.1 or 5, lithium batteries, and expansion slots. Also, they all have standard USB connections, 16-bit display (16 bits=65 536 colours), and IR ports. Office software comes as a gift add-on application.

Again, there is no single best model. You might prefer the Palm m515 with its reliable and readily available memory card, or the excellent display and fast processor of the Sony Clié PEG TG 50.

There are some more attractive but more expensive PDA models. The newest Sony and Palm devices run on the new Palm OS version 5. They have fast 144- to 400-MHz processors, high-resolution screens, and many add-on devices—everything from cellular telephones to global positioning systems (price range $650 to $1300). Their biggest differences from the described models are add-on devices. For example, the Sony Clié PEG N70V has a digital camera, thumbpad, and MP3 player ($700). The Sony Clié PEG-UX 50 has the biggest screen with a resolution of 480x320, integrated keyboard, built-in camera, and most modern Palm OS version 5.2. The Sony Clié PEG-NZ90 also has a built-in keyboard, Bluetooth, and 2-megapixel camera with flash, and costs $1299. The most powerful Palm, Tungsten C, has an ultrafast 400-MHz processor with Web browser and superfast Wi-Fi wireless connection technology, as well as mega memory of 64 MB ($730). The Handspring Treo 270 and 600 combine PDAs with cellular telephones and have built-in modems as well. Your choice in this category of devices will depend mostly on what features you would like to have on your PDA and how much money you are willing to spend.

Conclusion

Today's market offers many choices of PDAs. When choosing, it is important to check the following features: operating system, price for the device and price of an optional memory expansion card, RAM size, batteries, colour display, free add-on software, and options for other add-on devices. Novices could probably start with a monochrome PDA with 8- to 16-MB RAM (eg, Palm m500 or Sony Clié PEG SJ 20). If you are interested in a PDA running the new Palm OS version 5 with colour high-resolution display; built-in keyboard; digital camera; voice recorder; MP3 player; remote control for TV, VCR, and DVD, and wireless communications slot in one device, consider one of the Sony Clié high-end models.

It is challenging to choose the right model. Rather than waiting for the next new feature, jump in and take the plunge. Plan on getting an upgrade before long. Models change very quickly; average PDA life expectancy is about 2 years.

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Table 4. Main features of colour Palm PDAs

FEATURES	PALM M130	SONY CLIÉ PEG-SJ 22	PALM M515	SONY CLIÉ PEG-SJ 33	ZIRE 71	PALM TUNGSTEN T	SONY CLIÉ PEG-TG 50
Price	$250	$250	$350	$350	$430	$500	$500
In box	USB cradle, software	Adapter, cover, manuals, CDs	USB cradle, software	Adapter, stylus, cover, software, headphones	Case, cradle, adapter, software, manual	USB cradle, manual, CD, software	Cradle, adapter, stylus, cover, headphones, software
Memory	8 MB	16 MB	16 MB	16 MB	16 MB	16 MB	16 MB
Processor	33 MHz	33 MHz	33 MHz	66 MHz	144 MHz	175 MHz	200 MHz
Operating system	Palm OS 4.1	Palm OS 4.1	Palm OS 4.1	Palm OS 4.1	Palm OS 5.2.1	Palm OS 5.0	Palm OS 5.0
Keyboard	On-screen	On-screen	On-screen	On-screen	On-screen	On-screen	Thumbpad
Pros	Low price	High-resolution, colour screen, rechargeable and replaceable batteries, low price	Compact design	Built-in MP3 player, high-resolution screen, slick clamshell design	Integrated camera, MP3, ultrasharp display, 5-way navigator	Built-in Bluetooth, voice recorder, 5-way navigator button for one-hand operation, high resolution LCD, secure digital and universal connector	Excellent design, fast processor, built-in mini-keyboard, speakers, microphone, integrated, hard flip cover, Bluetooth, MP3 support, digital voice recorder, virtual graffiti, generous software package
Cons	Small memory, small low-resolution screen	No Macintosh software, MS needs software support, no free Office,* old OS, slow processor	Higher price, low-resolution screen	No Macintosh software, wimpy scroll buttons, old OS, no support for newest 1-GIG MS	No Bluetooth, not upgradable	High price, short battery life if used continuously	No Macintosh software, relatively small internal memory (only 11 MB are available)

CD—compact disk; LCD—liquid-crystal display; MS—memory stick, available in 8, 16, 32, 64, and 128 MB; OS—operating system; USB—universal serial bus connection.

**Office is a software bundle that includes at least a word processor and a spreadsheet compatible with Word and Excel for Windows 95, 97, 2000, and XP. It also supports Corel and Lotus software.*