



## Hand-held computers in medicine

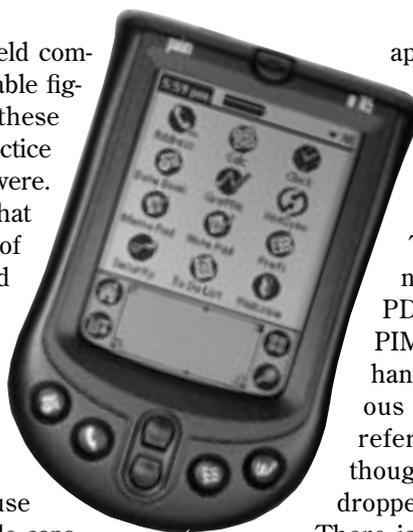
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Physicians are embracing the use of hand-held computers with notable enthusiasm. While reliable figures are lacking, there are indications that these devices are being incorporated into medical practice at a faster rate than full-sized computers ever were. A recent *New York Times* article<sup>1</sup> suggested that 20% of American physicians used some type of portable computer, while another source<sup>2</sup> said that 15% of physicians use hand-held computers daily. While not yet as common in the pocket as stethoscopes, it is safe to say that hand-held computers are more than just a gadget-lover's fad. There are several possible explanations for the phenomenon.

Most hand-held computers are easier to use than full-sized computers, but have considerable capability nevertheless. They are also much more reliable and do not crash with the frequency for which full-sized units are renowned. The portability of hand-held units is attractive, as is the extensive array of available software. Many users welcomed the elimination of keyboards. The devices are also inexpensive, and viruses are nowhere near the threat they represent to full-sized computers.

### First in sales, first on market

Hand-held computers have had remarkable sales among both consumers and businesses. Some industry analysts expect that sales of hand-held devices will surpass those of personal, laptop, and notebook computers in the next 3 years.<sup>3</sup> Several organizations also expect savings and reduced error rates from prescription-writing



applications that are rapidly becoming integrated into medical school and residency programs. They show promise of providing portable wireless point-of-care access to electronic records.

The units are known by several names and acronyms. They include PDAs (personal digital assistants), PIMs (personal information managers), hand-holds, Palms, and even by the piteous "personal companions." Some still refer to them as "Palm Pilots," even though the company that made them has dropped that model name.

There is debate about which device holds the honour of being the archetype. Although portable electronic organizers first appeared in the mid-1980s, true hand-held computers came much later. The real start of the era is cited as the 1996 release of the Palm Pilot by networking company 3Com. This pocket-sized unit featured several functions that defined a new class of portable device.

Palm devices had a touch-sensitive screen, which allowed users to select and execute programs by tapping with a stylus. They also had an area that could recognize a modified form of handwriting. The screen of Palm devices was quite modest and greatly limited what could be displayed. However, two buttons on the front of the unit permitted scrolling up and down the screens. Other buttons launched one or another of several programs.

Palm units typically came with several basic programs: a contact organizer, an appointment scheduler, a calculator, and a notepad and “to do” list. The unit also usually connected with a personal computer through a cradle device. This permitted easy installation of new programs and synchronization of information with a personal computer. Palm units were capable of exchanging programs and files by infrared “beaming” from one device to another.

These devices employed a simple yet robust operating system called the Palm OS. The Palm company issued licenses to other companies, who created Palm compatibles. Newer models added enhancements, such as expansion ports for programs, memory, and a variety of accessories.

The popularity of the Palm Pilot resulted in an explosion of software. Developers, both professional and hobbyist, have created a huge library of applications. These programs cover an amazing spectrum of interests literally from astronomy to sailing. Programs became available as free-ware, shareware, or by purchase, on CD-ROM or over the Internet. Available applications still dwarf what is offered in any other hand-held operating system. The devices have also spawned a number of websites for aficionados, as well as users’ groups.

In the years since the original Palm Pilot, a huge number of additional features have been added. These include colour screens and audio capabilities (such as recording and playback of voice, music, and even video). Wireless telephone, computer network, and Internet connectivity are becoming available now.

### Some limitations

A basic unit can be purchased for as little as \$200, while full-featured units can top \$1500, which verges on the price range of a full office computer. While hand-held units will take some punishment, they are sensitive to water damage, the screens will break, and they are expensive to repair.

Palm OS hand-held devices currently do not come with the ability to read or edit the files that are most commonly used on a desktop computer. Word-processing documents, presentation programs, spreadsheets, and graphics can be imported and edited with additional software, but not with the full functionality of the original programs. Unlike personal computers, it is impossible to upgrade the operating systems of many current Palm devices.

### Integration

The popularity of hand-held units among physicians has resulted in several reference texts being made available, including such standards as Griffith’s *5 Minute Clinical Consult*, the Washington Manual, and a version of *Harrison’s Principles of Internal Medicine*. Numerous drug resources are available also, and these are currently

the most popular applications of Palm devices in medicine. EPocrates Inc reports that it has more than 100 000 physician users of its popular drug database. In early 2001, Duke University Health system announced that it would provide free hand-held computers to its affiliated physicians with ePocrates installed.<sup>4</sup> A good summary of applications can be found on the American Academy of Family Physicians’ website.<sup>5</sup>

Hand-held computers are finding considerable acceptance at medical schools. They offer great potential for students and faculty beyond the applications mentioned. Database programs permit residents to keep track of patient contacts, to submit evaluations electronically, and to keep copies of training manuals with them. Students can synchronize their PDAs with medical school information systems to get updated schedules they can carry with them.

The functional lifespan of these devices might be considerably less than the 4 or 5 years typically allotted to a personal computer. It could well be that physicians will be investing in new PDAs every 2 or 3 years as new enhancements are developed. For this reason, cheaper units could well be feasible.

The Microsoft Corporation has designs on this market. They entered with their own operating system called Windows CE. Windows CE attempted to capture some of the popularity and functionality of their dominant desktop operating system. Units employing the latest version of Windows CE appear to be finally making inroads into Palm’s market share. While more capable, Windows CE and Pocket PC units are more expensive and require considerably more memory. Other companies have introduced proprietary systems of their own, and there is already talk of a Linux OS hand-held device.

Over the next few months, *Canadian Family Physician* will provide more detailed articles on current and emerging applications of these devices. The accompanying article by Michelle Griever (page 43) documents one physician’s use of a hand-held computer. ♦

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### References

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