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Title: The right information at the point of care - library service delivery via hand-held computers.

In this paper I aim to provide an overview of the influence that personal digital assistant (PDA) technology may have on the practice of librarianship. To do this, I'll look at the effect these devices are having on the work practices of our clients – library users – and how their expectations are, in turn being changed. I hope that this paper will give an insight into the evaluation of the library material suitable for migration to, or use with, hand held devices and an understanding of their advantages and limitations.

Background

The library in which I work serves two institutions: the Royal Adelaide Hospital and the Institute of Medical and Veterinary Science. The Royal Adelaide Hospital is a large teaching hospital of approximately 1000 beds affiliated with the University of Adelaide. (www.rah.sa.gov.au) The Institute of Medical and Veterinary Science is a pathology and research institute providing the State pathology service and the largest pathology service for general practice in addition to undertaking research, primarily in cancer and spinal medicine. (www.imvs.sa.gov.au) Our users are clinicians, laboratory workers, academics and researchers. Their information seeking patterns and hence their demands on the library service vary, and would be familiar to health / medical librarians. Academics and researchers perform complex searches of the published literature and often request large numbers of journal articles via our document delivery service to supplement that which we can supply from our own collection. Laboratory staff and clinicians use the library to find answers to tricky clinical questions or problems which may present. Clinicians working in areas where quick responses are needed, such as the intensive care unit or accident and emergency department, use the library services for only minutes at a time, but the answers they find can be life-saving.

Technological developments

Most of the core information they need is available electronically – a fairly standard trend in the area of information delivery. The intranet rollout and information delivery via the internet represented a major change in the way our patrons used our services. Information is available at their desktops, in the office, ward, laboratory, or at home. The library has been using the intranet/Internet as the delivery medium for its services for some years now, and the immediacy and ready accessibility of the service has been enthusiastically received by the staff.

While the technology has provided enormous advantages, it has also created some problems. Since our patrons no longer needed to come to the library to use our electronic services, we could no longer spot someone having difficulty with an online search, or not finding an item they were seeking from the library's collection. We relied on them to contact us if they needed help, and were aware that this didn't always happen.

The advent of the hand-held computer has given them another platform through which to get at the information they need and is set to bring major changes. Hospital clinicians are starting to use hand-held devices to look up information at the patient's bedside. Initially used as a stand-alone device with downloaded information, live wireless connection to the patient record is now possible. This brings increased flexibility and ease of work for the clinician, with fewer medication errors reported, and a higher level of documentation, especially on the part of junior doctors, has been noted.

The information imperative

Another important trend in health care which has emerged in recent years is the push toward evidence-based clinical practice (evidence-based medicine – EMB; evidence-based nursing – EBN; Ref 1). There is now a requirement in Australia for clinicians to make informed decisions at the point of care. Although it is not yet mandated by law, the Federal Minister for Health has made it quite clear that practice based on the best possible evidence is expected. Seminars, information sessions and training programmes are being held, often also attended by or facilitated by librarians.

One thing is quite clear – it is not always possible or even feasible to do literature searches, even of databases like Cochrane (Ref 2), at the bedside. The PDA screen is not the best vehicle for reading large quantities of text, and the response times for live database searching are too slow. In any case, the patient's bedside is not the place to conduct a literature search on a database such as Medline. What are needed there are quick look-up tools, which provide immediate answers to clinical problems.

The role of the library.

Our task has been to find out what type of "library" owned information is best suited for the hand-held device.

The questions we have asked are: where does the library-'owned' information resource or product fit into this? Which are suitable for use with PDAs? We identified our resources as comprising:

- drug databases
- prescribing aids
- dictionaries
- textbooks
- databases such as Cochrane and Medline
- full-text linked to the above
- electronic subscriptions to individual journals

Of these, the first four we felt would be suitable for use with a PDA at the bedside.

Literature Review

We have conducted searches on Medline, Embase, PsycLit and Cinahl on the use of wireless connections and PDAs, including proprietary names (e.g. Palm, iPaq) in the search strategies. The majority of the search results were descriptions of specific tools such as cardiac output monitors or prescribing tools, along with articles dealing with the use of wireless network ports and loaned network cards with laptops. Searches on specific tools such as Micromedex failed to find any reports of look-up tools being used with wireless Internet connections. We found no reports of look-up tools being downloaded onto a PDA. We did, however, find references to the Micromedex database on CD being mounted on LANs for searching. It is clear that there is a delay in the latest technologies being reported in the literature. The library literature is beginning to consider the implications of the use of PDAs by users. (Refs 3 & 4)

The Internet was searched using Google, Northern Light, AltaVista and Yahoo! search engines, so the search results are not claimed to be comprehensive. The searches found many sites dealing with the devices themselves – technical specifications and so on –and a large number of sites dealing with the clinical applications of PDAs. Vendors' web sites provide information about specific knowledge products – for example, information about Ovid@Hand can be found at the Ovid web site. Several sites described tests of PDAs in the clinical setting. Regular searches of both the databases of journal articles and the Internet are recommended due to the rapid rate of development in the field.

We have looked at the technology and how it is being used and tested in the hospital. That means comparing computer use with use of laptops and hand-held devices. The hand-held has shown to have several advantages for bedside use:

- easy to use;
- small and portable;

- wireless connection to a network possible;
- databases/books downloadable for quick look-up.

On the other hand, the disadvantages are:

- slow connect times for wireless;
- security problems for data;
- the devices themselves are easy to steal – with patients' records if downloaded;
- culture change requires re-training;
- resistance to change;
- cost of implementation.

The probable model that our hospital will adopt is to get the clinicians to buy and own the devices and to install docking stations in each ward to enable downloading of data or insertion of network cards for wireless access to the patient records. The logic behind this is that the doctors will not leave the devices lying around to be stolen, and the removable network card should ensure security for the patient record. It would also enable the doctor to have 'favourite' references on the device, to be used regardless of location. This is important where the doctor moves between hospitals, which is common in South Australia where most of the large hospitals are state funded. I foresee that doctors will readily buy their devices, but I feel nurses and allied health professionals will find this more difficult to accept because of the expense involved.

Our study

We hoped to run a wireless trial of at least one look-up database such as a drug database in conjunction with the trials of the electronic patient record system on PDA. Initially, we planned that the database would be downloaded onto the PDA from the web at the ward docking station. Our ultimate goal is to go completely wireless with live database searching, but not until speeds are good enough to cope with online searching. Our study aimed to test the ease of use and acceptance of the technology by the clinicians.

At the time of writing (late August 2002) we have not yet started a trial. The hospital conducted its trials of the electronic patient record using iPacs, and none of our products are available in this format as yet. The second reason for delaying a trial is logistical: we decided to wait until the e-patient record trials were finished before starting ours in order to avoid causing user confusion by having more than one trial running at once. At the conclusion of the wireless trial the State IMS (Information Management Services) decided to concentrate on full implementation of the e-patient record throughout the state hospitals before introducing wireless networking.

Although a wireless trial in the ward environment is not possible, we have begun planning for a wireless trial within the library. Our goal is to test the usefulness of web-delivered services via the PDA compared with downloadable products. At the same time, we will test our web pages which have been specifically designed for PDAs and which will be needed when a wireless service is finally implemented throughout the hospital.

Conclusions (so far)

We feel that the adoption of PDAs in the clinical setting is a question of 'when' rather than 'if'. Much health material has already been adapted for Palm Pilots. My US colleagues tell me that doctors have bought Palms largely because of all the free downloads it is possible to get for them. But most of the materials currently available are not knowledge products, with some notable exceptions such as OVID@Hand and Micromedex. I have been told that some teaching hospitals in the USA are beginning to move away from the Palm OS to a Windows-based one, as it is easier to adapt existing products for a Windows environment. In Australia, the Windows OS seems to be winning, as our trials and others are being done using iPacs or other Windows systems.

We seem to be at the stage where no single operating system has the upper hand, and product developers are either opting for one system or waiting to develop a hand-held interface until one or

other comes out on top. It may be that other operating systems will be developed for PDAs, and that we may have to work with multiple operating systems. Since the devices only have a life expectancy of two or so years at most, by that time the whole scene will be different. Librarians are in a position to be able to suggest to vendors that a PDA interface be developed for specific products during purchasing negotiations. Libraries could also co-ordinate trials of PDA information resources which would have the political advantage of keeping the library at the forefront of technological developments.

The type of reference that is suitable for use with a hand-held device seems to be the quick look-up database rather than Medline or full-text articles. Reading on screen is slower than reading from a paper copy and the small screen of a hand-held would be even less comfortable for a long stretch.

Our research indicates that there are certain features that are *sine qua non* for a successful PDA: long-life rechargeable batteries, a clear display on the screen which is easy to read both in artificial and natural light, plenty of memory and a fast processor. Easy docking and network connection is also necessary to enable quick downloading and uploading of data when required.

Hand-helds have great potential for use in rural and remote areas and also in developing countries, if the costs of the unit can be kept down. Many of our Australian country GPs are taking them up as they can have a virtual library of downloaded reference aids with them when they are away from networks and reliable Internet connections. As the technology develops, the PDA will become as much a part of the clinicians' armoury as the stethoscope, and the library will be ensuring that they have access to the right information via the device at the bedside, when they need it.

References:

[1] More information about EBM can be found at the SchARR site:
www.shef.ac.uk/~scharr/ir/netting.

[2] For more information about the Cochrane Collaboration on Evidence-Based Medicine, see www.cochrane.org.

[3] Peterson, Mary – "Using wireless technology – where does the library fit in?" FreePint No 104, Jan 2002 <http://www.freepint.com/issues/240102.htm#feature>

[4] McGowan, Jessie and Michael Sidlofsky – "Medical and health applications for PDA" *Bibliotheca Medica Canadiana* 23 (4) : 128-130 Summer 2002