

Clinicians at Hammersmith Hospital

obtain electronic access to cardiology records with Xerox

Although Hammersmith Hospital still has a long way to go to build and implement electronic patient records that are truly patient centred (as requested by the national program for IT), Xerox has recently helped to significantly improve the clinicians' working environment as part of an innovative development undertaken in partnership with the cardiac sciences and ICT Directorates at Hammersmith Hospital, London.



An existing Xerox customer, the directorate was looking to implement a system that would reduce the paper-handling burden associated with non-invasive tests carried out by its cardiology department. These include routine tests such as ECG (electrocardiogram) recordings, exercise stress tests, ambulatory monitoring and so on. Crucially, all of these investigations produce graphical hard-copy results, as contrasted to numerical data that can be more readily converted to digital electronic form. Together with clinical notes, this information can rapidly mount up and, in paper form, take up huge amounts of space, which is always at a premium in NHS hospitals. That not only leads to problems in terms of storage, but retrieval too, which takes considerable time and effort with the real possibility that vital pieces of information could be misfiled or lost altogether.

With that in mind, clinicians at Hammersmith Hospital wanted to adopt a more efficient, electronic, method of storing these records. They considered several approaches. Most, though, were based on standard desktop hardware, which, in a hospital environment, proved both slow and difficult to use, and lacking in robustness. Moreover, in order to maintain the clinical quality of the records, most of the associated software solutions resulted in very large sized electronic files. These would have required huge and expensive amounts of online storage to make them available on demand, and even then, graphical records would be slow to transmit and download due to the file sizes.

The Xerox solution addresses all these issues by combining straightforward, yet extremely robust, scanning/printing hardware with back-end software optimised to suit the specific requirements of the project. The end result, according to Lee Lewis, is "an excellent way of turning diagnostic paper recordings - produced by a plethora of equipment, from many different manufacturers - into compact electronic records that can be retrieved by clinicians anywhere in the hospital from a single archive system." Lee Lewis is a Cardiovascular Physiologist by profession, who now manages Cardiac Services at the Hammersmith Hospitals NHS Trust.

Crucially too, there's no loss of clinical quality. In fact, after an initial period of co-existence, the electronic system has now totally superseded paper records. "We get diagnostic quality results on the screen and can re-produce equally good printed material whenever we need it," comments Lee Lewis, "and that's something that proved very hard to achieve using alternative products."

It is also a very simple solution, as he explains. "You just walk up to what looks like an ordinary photocopier, key in the patient number then feed in the documents to be scanned. Everything else is done automatically, and retrieving records is equally straightforward using a simple Web interface."



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Of course, a lot of hard work has gone into making the new electronic records system easy to use. Moreover, as Ian Newman, the Xerox pre-sales analyst responsible for the project explains, the "everything else" described by Lee Lewis actually involves a number of components, behind the scenes.

The first of these is Xerox Document Centre, a multi-function network laser printer/copier which provides scanning facilities and, where required, hard copy print-outs of stored records. "Hammersmith had already established that Document Centre was the best way of copying thermally printed ECG graphs and other patient records," says Ian Newman, "we simply pointed out that it could also be used to scan and store those documents." In addition, savings made in halving the volume of expensive specialised thermal printer paper that the department buys each year largely offset the rental cost of the Xerox scanning equipment itself.

The fact that Document Centre is a very robust product, with its own built-in user interface, also appealed to the Hammersmith team. "A PC scanner would do the same job," explains Lee Lewis, "but Document Centre is better suited to the hospital environment with no need for a separate desktop PC, screen or keyboard. It's also a faster and more rugged solution, whilst easy for staff to understand. At most it takes just an hour for new staff members to get to grips with our system."

The back-end system to which the Document Centre scanners are attached is based on DocuShare, the Xerox Web-based document management, workflow and collaboration application. It is this software that stores the scanned records using simple workflow rules. In this case too, it's integrated with Acrobat software from Adobe, which, among other things, converts any printed text into machine-readable format for use in document indexing.

As a result, clinicians can search by any field for similar records and cross-reference results, as well as going straight to the individual records using the patient hospital numbers, which make up the primary index. More importantly, this combined system enables the scanned, stored documents to be over-read, and reported directly onto the actual record by Consultant Cardiologist Dr Peter Bourdillon. Dr Bourdillon is also the system manager, or 'gate-keeper'. There are different levels of passworded security available for various groups of users, fully satisfying the Patient confidentiality demands of Data Protection, Clinical Governance and Caldicott Guardians.

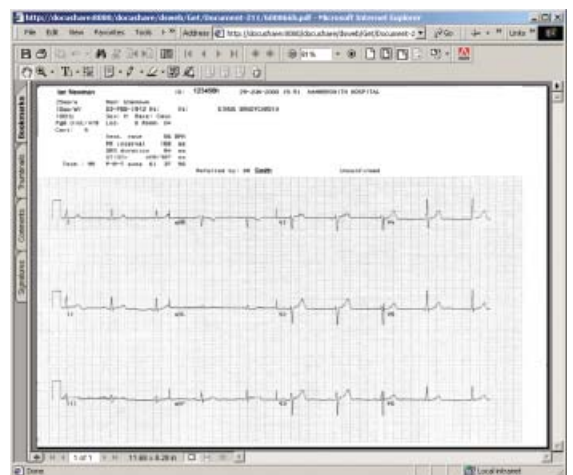
The small sized electronic files created by this combination of Xerox and Adobe software are another major selling point compared to other solutions. Not only do these make for fast retrieval, but Lee

Lewis also estimates that up to 10 years of patient records can be stored by the new system using standard PC server hardware. Two servers are involved with everything stored on the primary system and mirrored by the other to further add to the robustness of the solution. Even then the whole solution costs just a fraction of the millions of pounds spent on medical imaging systems used, primarily, to store X-rays, CT, MRI and ultrasound scans and so on.

While explaining the process of the concept's development, Lee Lewis commented. "We didn't initially ask Xerox to develop an electronic records system, we were just interested in the Document Centre as a copier, but we're delighted with the results." So much so that although the initial implementation was limited to the Cardiac Services department, with an additional Document Centre in the A&E department, there are plans to eventually extend its use more widely in the Trust.

Other hospital Trusts looking to digitise patient records will be interested in the platform independence of the Xerox solution. DocuShare, for example, can be hosted on a range of industry standard servers running a variety of operating systems from Windows through to Linux and proprietary implementations of UNIX. The Web interface too is a key element, allowing records to be retrieved by any device with browser access to the network, from a desktop PC to handheld PDA. Similarly, this interface will also, in due course, make results of requested investigations conveniently available for GPs to access in their surgeries.

Indeed the day may not be far off when all doctors and medical staff will be able to access electronic patient records, on-demand, using wireless devices carried on their person. Backed up, of course, by Xerox technology, as demonstrated in this pilot project at Hammersmith Hospital.



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