



Use and Benefits of Clinical Information Systems in Ophthalmology

an interview with
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Coping with administration as well as medical matters has never been an easy juggling act for many hospital doctors, particularly in state-run healthcare systems where there is not a lot of spare cash for administrative staff. Clinical information systems aim to ease some of that burden by organising the workloads of medical practitioners and lifting some of the more humdrum chores from their shoulders altogether. This article investigates the birth of one such system and how it has developed to fill its niche.

The ophthalmology clinical information system at Guy's and St Thomas' hospital was developed in partnership with one of its ophthalmology consultants, Denise Mabey. She started working on the project in 2000. "The reason I started was because I was appointed as a consultant, but I did not have a secretary. I was doing all my clinics, but nobody was typing up my letters. That was the first main driver for me to investigate information systems. I wanted to be able to generate my own letters quickly and easily, so I looked around for software companies that might be able to do this."

At the time there were no such systems available. However, at the hospital there was a grant-funded research group working on developing a system to cover treatment and scheduling of diabetes patients, called Diabeta3. "This system was also being used for diabetic eye screening, and I thought it might be possible to add on an ophthalmological examination," Mabey explains. "This would then give me the tools to write down my basic examination and generate letters."

With Mabey's help, the research group secured further funding and, in 2002, began work on applying Diabeta3 to general ophthalmology.

Eyeing up the Differences

"One of the major considerations that needed to be taken into account was the fact that eye doctors deal with two eyes, not one person," Mabey explains. In other words, unlike a disease or a condition, a patient can have two different diagnoses – one for each eye. The presentation of the information is also unique to ophthalmology. "We work so that the information for the right eye is

shown on the left side of the page, and the left eye is on the right. It is as if you were holding up a sheet of paper to the patient's face."

In general ophthalmological consultations there are a limited number of data points to collect and, once the left-right differential diagnoses are sorted, the ways in which the remaining data are displayed are

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relatively flexible. "When I started this phase of the project, it was initially a very personal configuration," Mabey added. "The screens were personalised – my individual 10 most-common diagnoses were available as pop-up options."

The result is a program specific to general ophthalmology, now called Vector Ophthalmology, on which Mabey can record all her findings, for example from visual acuity, field tests, examination and diagnosis, all on the screen. Retinal images can be brought straight into the system and data from the patient information services can also be pulled through, including the name and address of the patient's general practitioner (GP) and the patient's personal details – address, phone number, etc. Even in the operating theatre, Mabey can access the system and enter operating data. The whole system is underpinned by the Read Clinical Classification codes.

"At the end it generates a letter for the patient's GP. Furthermore, the next time that patient comes in to see me I have an electronic copy of his or her record," she comments. In the ideal world of the paperless office, this would be enough for the official records. "However, because of the way the National Health Service hospital systems work, this cannot replace the hospital 'note' system." Nevertheless, a copy of the GP letter can go straight into the notes, without creating additional work.

In the Eye of the Beholder

The benefits of Mabey's application of Diabeta3 to ophthalmology did not go unnoticed by her colleagues. Thus, the next step was to refine the program and create modules for the sub-specialities – general examination, cataract surgery, glaucoma, orthoptists, low



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vision aid, primary care and vitreo-retinal surgery, for example. "Overall, I have access to everybody's modules, and they pull through to my primary care clinic."

All these separate modules meant that additional functionality needed to be added. "The major things that people wanted were a tool to enable them to draw pictures of the back of the eye, and the ability to import data – for example, to scan in new images in addition to the retinal scan already incorporated," she explained.

The front page can still be customised for each individual or group; however, this has to be done by the program's developers rather than by the user. In terms of the output, the letter is a standard text document, and data are displayed in a normal spreadsheet. For audit purposes, the data can be displayed in graphs or different formats. The system can be tailored to match different clinical practices. In general, this is done by the supplier, although hospital staff can be trained to do it. In terms of the output, the letter is a standard text document, with data displayed in a tabular format for easy reading. For *ad hoc* queries and audit purposes, data can be extracted using the built-in query generator and displayed graphically where required.

Mabey elaborates: "I had been using the system for about two years when I was asked to become one of the centres participating in the endophthalmitis trial [organised by the European Society for Cataract and Refractive Surgery (ESCRS)]. I had to export data to the University of Strathclyde where the data monitoring service was. Therefore, we had to work on developing a way to export the necessary data from my database to the University's while maintaining confidentiality." Strathclyde was not running the same system, but this was not a problem for the team as the program was quite adaptable and had already been configured to fit in with other hospital/university systems.

In terms of security, Vector Ophthalmology is currently accessible only through the hospital's own system, making it as secure as other hospital programs. The system is backed up every night to an on-site server.

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Seeing the Improvements

A properly installed and set-up system, such as Vector Ophthalmology, saves more than just time, although the time-saving is important in itself. "Without a regular secretary I would have an awful backlog of correspondence, which would take a whole day to clear," Mabey recalls. "Now I do my own letters, and the only thing I really have to do is tick boxes. The visual acuity, intraocular pressure, diagnosis and examination are pop-up boxes, and there are free-text boxes in which I can type a short personal note for the GP. I do this after every patient and before the next one. Then all I need to do is print it for the GP and

for the hospital notes. I can even give the patient a copy while they are sitting there."

The ability to update the patient's notes immediately is invaluable. From Mabey's point of view, the consultation is concluded and she does not need to worry about catching up with the administration at a later date. With the results on file, the hospital appointments system can move forwards straight away, and the patient can get a date for surgery, if needed. From the patients' perspective, they feel more in

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command of their healthcare. "Patients like getting their letter on the spot, particularly if there is something that needs to happen next – for example, if they are going to be referred to someone else and they are nervous about getting their appointment. Hospitals are big and can appear chaotic, and it is not unknown for appointments to get lost. If the patient knows who their letter is addressed to and what the plan is, they can follow it up. This system saves more than time – it improves the quality of the service for the patients."

Opening up to New Possibilities

Such a simple and useful solution was never going to be confined to just one hospital. The first modality – diabetic retinal screening – has been especially popular, and the system has been installed in other hospitals in the UK. The research group that developed the initial idea has now transformed into a company called Health Information Systems (UK) Ltd (HISL), which has received visitors from as far afield as New Zealand and Bahrain to view the system.

The next step for clinical information systems is to enable them to capture more data from a wider variety of machines, "particularly in glaucoma," Mabey adds. "I would like to have the ability to take data directly from, for instance, the Heidelberg retinal tomograph and the Humphrey Field Analyzer, and we are now in discussions with HISL to achieve this."

The Vector system is intuitive to learn and use. Although it can support a 'paperless office' approach, with the NHS in its present state this could be some way off. "Vector is tailored to each hospital's own needs," she notes, "but as the rest of the office is decades away from being paperless, a locally configured, easy-to-use solution would be most people's preference."

The Vector Ophthalmology system already links to the Trust's patient administration system (PAS) for patient demographic details, and can be linked to other systems, such as laboratory results. "The next phase is definitely to look at linking the other hospital machines into Vector, which will give us a single source of clinical information for each patient," Mabey concludes. ■