

## View from the front line: Data storage

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### *Problems with preserving medical records in digital storage media.*

Computers in the medical field have come a long way over the last 25 years and have contributed hugely to both clinical practice and research. After all, one of the main advantages of computers is the ability to store and sift large volumes of information. As media like hard drives, DVDs, CDs and memory cards get larger (in storage capacity) and cheaper, it becomes even easier to move towards a paperless working environment.

So far, so good – replacing paper with digital technology seems to be the way ahead for all sorts of reasons. However, there are drawbacks and that is what I want to look at. Paper records have their disadvantages – they can get lost (and if no copies are available then that could be catastrophic), they can fade over time, they can be bulky to store, and vital information can be 'lost' in a large volume of paper notes. But they also have their advantages – if preserved, they can be read again and again over many years, and we don't need any technology to decode them, we just read them.

The same cannot be said for computer-stored data. When I started in computing – and it was not yesterday – a common way of transferring data and installing programmes was using 5.25-inch drives. They were eventually replaced by the more familiar 3.5-inch diskette – the 'floppy' – used for transferring and storing data as well as for installing software onto a computer.

Nowadays, most new computers don't have a floppy drive (unless requested as an optional extra) and it is getting harder to find floppy disks themselves.<sup>1</sup> The reason? Their formatted storage capacity of 1.44 Megabytes is simply not large enough. Other storage media with greatly expanded capacity have taken over. So the message seems to be, if you have valuable data that you want to be able to access in the future then transfer the data from floppies to a more modern storage medium. Interestingly enough, the floppy disk icon for saving a

word document to disk is still present in the latest version of Word 2007!<sup>1</sup>

For medical data, this has huge implications in the medicolegal field. For many years, we have relied on predictable paper and, assuming that the records are not destroyed in a catastrophe, such as a flood or fire, or simply lost, then they are available for probably a life-time. This may not be the case if they are stored on a digital medium which may not be accessible in a few years time. Furthermore, they may be stored in a file format that will become unreadable in a few years as software is updated or replaced. Potential hurdles such as out-of-date storage media and file formats are issues which may not be a significant problem now. However, in years to come, your precious data may become unreadable and unavailable. As well as medicolegal problems, there could be impacts on clinical practice as old notes you need to read become inaccessible or impossible to integrate into future medical record systems.

Additionally, don't assume that your data storage medium will physically last forever. CDs (the CD-R format) have been quoted as having a life-span of about 75 years; however, that could be an overly generous forecast.<sup>2</sup> Even if they did survive, you would need a kindly museum to allow you access to the hardware and software to read the data on the CD. Have you got family movies on a Betamax video? Can you still play them? Don't forget that in 1983 it was the most popular video format, but where is it now?<sup>3</sup>

Okay, so you get the message, you can't store valuable information such as patient data and clinical records in a digital recording medium and then forget about it. Not only can file formats go out of date and your data become locked into a file format that no-one can read (unless you have access to legacy software) but the medium they are stored in can become redundant or simply suffer a mechanical or electrical failure. So there should be multiple backups of essential clinical data,

recorded in different media and stored in geographically different and secure sites. These media could include hard drives, optical facilities such as DVDs, memory cards or online storage. Also that data should be 'refreshed' by being transferred to new media on a regular basis and by checking to make sure it still works and is stored in file formats that are current. So this is a long-term commitment to review the status of such data. It is not like paper where you can store it, leave it and forget about it.

What of the future? Where will we be storing data then? Your guess is as good as mine. The ultimate storage medium is the DNA that lives in the centre of our cells. This stores the unique genetic coding, forged by evolution and handed down by our ancestors. This seems to be a robust and reliable way of perpetuating and advancing both humans and other organisms. So it was with great interest that I read that scientists are trying to store data in the genetic make up of micro-organisms, who can breed and pass down this archive for an almost infinite number of generations.<sup>4,5</sup> So, as well as passing down to our children and their children our unique genetic makeup, it may be possible that they could also get a bonus of all the digital data that we accumulate in our lifetimes, including our medical records – stored in our DNA. That could be the ultimate back up!

### References

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