Computerised databases in infection control

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Summary

The use of databases in health care is expanding. Systems are now available specifically designed for the management of infection control information. This article examines the expanding role of such databases and looks at the advantages and disadvantages for nurses.

Key words

- Infection control
- Information technology
- Computer networks

These key words are based on the subject headings from the British Nursing Index. This article has been subject to double-blind review.

This article sets out to examine the potential uses of computer software in infection control, and also discusses the advantages and disadvantages using computers to enhance infection control in hospitals. The role of the infection control nurse is broadly categorised into one of advisory, education, research and surveillance (Law 1993, Worsley 1988). These categories are explored in relation to the opportunities for the use of software in collecting and analysing data.

Kelsey (1991) said that we should no longer ask: ‘What can a computer do?’ but ‘what do we want it to do?’ Information technology (IT), although used throughout the healthcare environment for some records, is not used to the full and handwritten records are common. The view that IT is not used to its maximum potential in health care is reiterated by Hays et al (1994): ‘In the healthcare system, inefficiencies in managing and processing information have been identified as a major problem and a significant component of inflated costs. Although nurses are the largest group of professionals that generate healthcare information, until recently they have contributed only minimally to system design and have had little access to the information generated by their practice.’

With the increase in the number of individuals who are HIV positive, the increased incidence of tuberculosis and the increasing resistance of organisms to antibiotics, the role of the infection control team has never been more important. An ongoing role of the infection control nurse is advising all healthcare workers and patients in good infection control practice. Law (1993) identifies that keeping records of any clinical advice given is one of the tasks carried out by the infection control nurse. Many still use outdated handwritten notes for this documentation. Lists of patients with organisms which require the patient to receive special care each hospital admission are again often handwritten. Any results from a database must justify the probable extra work of inputting the data. However, as users become more familiar with these databases, they might prove quicker than handwritten notes. Databases such as Access provide the facility for adding, editing, viewing and printing reports for everyday data.

Some data collection tools would also be useful for other aspects of the advisory role of infection control nurses. Reagan (1997), for example states: ‘A simple computer-based surveillance system can search departmental databases (such as radiology) at night, and print reports on the infection control program’s printer (for example, all patients whose chest radiographs were reported to be consistent with possible or probable pneumonia).’

For infection control, the main link required is from a microbiology database. The difficulties in using computerised administrative and departmental data is that they can lack a common interface, making data transfer between these diverse systems difficult or impossible’ (Reagan 1997).

Some companies are already marketing software, which not only establishes this link, but is solely designed for the infection control specialty. Desai et al (1991) developed a precursor to this in the form of a patient computerised record card as a database, which did have the capacity to interface with other software. It is important that data are downloaded from the laboratory as it would be extremely time consuming in software requirements for data entry, even if the analysis only takes minutes. It is essential for infection control staff to receive details of ‘alert’ organisms – that is, those requiring healthcare workers to receive infection control advice. These organisms can be easily ‘flagged up’ on the microbiology database. This can also be useful for microbiology medical staff, when discussing patients’ general results with the clinicians involved.

Purchasers and hospital administrators frequently request summary reports of infection control/ microbiology activity. These are quickly and easily produced by using databases, for example, a daily summary of all positive cultures and annual review of trends. This system also serves to warn the infection control team of any clusters of particular organisms in the same department or ward (Feldman and Ridgway 1988).
Pestotnik et al (1990) developed and evaluated a computerised system to monitor therapeutic antibiotics in hospitals. This database linked up antibiotic sensitivity patterns from microbiological specimens (in vitro sensitivity data) with antibiotic therapy, and the user was alerted to any inconsistency between the two. This approach would be useful for a number of reasons. Bacteria and viruses are developing increasing resistance to many antibiotics, restricting treatment regimens (Kunin 1985 in Mandell et al 1995). Pestotnik et al (1990) also cites difficulties such as adverse drug reactions, cost issues and therapeutic failures. The monitoring of antibiotic use goes some way to overcoming these difficulties. Garibaldi and Burke (1991) also advocate that for an effective antibiotic monitoring programme (essential for overcoming these difficulties), a database defining prescribing patterns is required.

‘The classes of antimicrobial agents that are available to clinicians and the individual formulations within classes are rapidly growing’ (Garibaldi and Burke 1991). Taking the tool of Pestotnik et al one step further, Scott Evans et al (1993) developed an automated antibiotic consultant. By holding information concerning antibiotics and microbiological results with sensitivity patterns, it was able to indicate appropriate therapy to clinicians. In 94 per cent (717) of cases, the program suggested an antibiotic regimen to which all the pathogens isolated were susceptible. However, no explanation is offered as to why the program suggested regimens to which the pathogens were not susceptible (44 cases).

**Networked databases**

Patient information systems, where one can look up, for instance, laboratory results and operating room/surgery information are already available in the US (Friedman 1996). Some of these networked databases are available now in the UK, such as pathology databases. As more are added, the challenge will be to integrate all these databases. It is easy to see the advantages, however integration is extremely difficult. With the increasing use of completely computerised medical records, nurses and doctors would benefit from having the facility of infection control policies ‘flagged up’ when entering in practice documentation on ward-based computers.

Infection control nurses spend a considerable amount of their time teaching formally and informally. In the current trend of moving away from traditional teaching methods, McGuire (1995) advocates the use of CD-ROM as ‘using a database allows the researcher to view related studies collectively and so provide a sounder knowledge base than taking one study in isolation’. CD-ROMs are already widely available in UK medical libraries. Healthcare workers could use computerised educational tools (for example, AIDS education programs, Wood 1992) in addition to those already used. However, as verbal communication and interactive skills are of paramount importance in these members of staff, traditional methods will need to continue. Computer programs will not sufficiently test these skills alone. McGuire (1995) also highlights that there is a requirement for more research, comparing traditional teaching methods with computerised tools.

Staff should be aware of the full benefits of manual and computerised information systems (Strachan 1997). The training and education of students and existing staff could, however, be a drawback in database implementation. This will undoubtedly result in more time spent on these educational needs than there has been historically spent on manual information systems. Healthcare workers regularly move to different workplaces, especially medical staff working in rotational patterns. It is vital that common software is established in hospitals, in order to decrease time wasting in the training of staff and also for the software to be used to its full capacity all the time.

Although research is regarded as being a role component of the infection control nurse, few nurses have the time to do it (Worsley 1988). Time may be saved by using databases to record and collate data. Some basic statistical analysis can also be carried out on some spreadsheets, as long as the data is entered in a format organised for this purpose (for example Excel).

While it is acceptable for practitioners who are involved in the clinical care of patients to concurrently use the same data for research purposes, Hays et al (1994) suggest that nurse educators and researchers have no legitimate claim to clinical databases. Presumably, the difference here in computerised records is the relative ease of access to large volumes of data by such individuals. However, access restrictions may be used to restrict these individuals to only data which has been sanctioned for that use, for example, by local ethics committees. Haley et al (1985) proved that: ‘The establishment of surveillance and control programs was strongly associated with reductions in rates of nosocomial urinary tract infection, surgical wound infection, pneumonia, and bacteremia.’ By having both surveillance and infection control practices in place, infection rates were reduced by one third.

Perhaps the area within infection control where the use of information technology can be fulfilled to the greatest effect is surveillance. Already the analysis of data is performed in this country using Epilno – a statistical/epidemiological piece of software, which has a database constituent. The software consists of a series of computer programs designed for survey design, statistics, sample size calculations, data entry, data checking, data analysis, questionnaire design and report writing.

While health service indicators use some results from hospital data collection for comparative information in the NHS (Wheeler 1993), the same principles must be applied with caution to infection control surveillance data. Comparing different hospitals’ statistics, when they will
undoubtedly have different specialties and populations is unjust as it does not compare like with like. These patient populations will also have different infection control risk factors in themselves. Therefore, use of these data for comparative purposes must be carried out with care.

Feldman and Ridgway (1988) identify a further feature, which would be of particular interest to the infection control specialty: instantaneous graphical representation of any epidemiological query. This is achieved due to the improved high resolution colour screens.

**Automatic reporting to central organisations**

The Communicable Diseases Surveillance Centre (CDSC) could be updated without human intervention. If this was carried out UK-wide, the notification system (involving notifiable diseases) would be very much more efficient and reliable. At present, the notification system represents only a small proportion of the actual notifiable diseases (Wall et al. 1996). However, if this system is to identify illness, it would only be useful to transfer these data to CDSC electronically from microbiology databases for organisms that are always pathogenic.

Many organisms require clinical signs and symptoms before the diagnosis of disease can be made, and if no disease is present, the organisms are not worthy of notifying – colonisation versus infection needs to be considered.

Computerised outbreak management is also identified by Feldman and Ridgway (1988) who point out that if all the patients on one ward needed to be screened, the system could instantly obtain the names from the bed list.

There are two problems with this. First, as is the case with most information obtained via databases, this does rely on regular inputting of data to make the data up-to-date and therefore accurate. If the bed list is not properly and regularly updated at set times in the day, infection control teams may be using inaccurate information from which to manage outbreaks.

The second problem is one of linking up systems within the same healthcare environment, in order for such information to be used within another system.

**Conclusion**

There are many areas within the specialty of infection control that lend themselves to using more computerised software in the form of databases. Broadly, the advantages outnumber the disadvantages. However, any software used must be capable of saving the infection control practitioner more time than manual documentation. For this to happen, systems need to be compatible in the hospital environment for downloading of data to take place. Care must be taken to ensure that there is some uniformity between hospitals in the systems and software that is used. For infection control, more and more software is being written, and authors are seeing more areas within the specialty where information technology can enhance the service.

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