A brave new world of information and communication for infection control professionals

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Information management. These two words describe the major role of infection control professionals (ICP)—we manage information. Surveillance, outbreak investigation, policy development—all have information management as a significant component. How we manage information will assist us in our continued improvement as health care professionals. Computers and the Information Superhighway, as noted in the articles in this issue of AJIC American Journal of Infection Control, will support us in our goals.

Some of us (dare I admit it?) began our infection control careers using McBee "keysort" 5-inch by 8-inch cards. Holes around the edge of the card could be "opened" to correspond to a characteristic of interest—say a urinary tract infection (UTI). If a patient was determined to have a nosocomial UTI, the hole corresponding to UTI was "opened." One card was prepared for each patient. The cards for all patients could then be lined up, a knitting needle placed through the UTI holes, and those cards that dropped out identified patients with UTIs.

Line listings were then developed "by hand" or on a typewriter. All analyses were subsequently calculated "by hand." Graphs may have been drawn. A large percentage of an ICP’s time was spent on these activities. Even an early effort at a computer-based system used Hollerith cards, which had to be key-punched and sorted.1

Well, no more! Computers and the age of information technology have opened up an exciting world for ICPs. Almost any aspect of our job can be enhanced through the application of current technology systems.

Surveillance (including monitoring, outbreak investigation, special studies)

Databases. All nosocomial (and community-acquired) infections can be tracked by various programs designed for a personal computer (PC). The Centers for Disease Control and Prevention’s (CDC) National Nosocomial Infection Surveillance (NNIS) study has one such database (see Lilia Manangan’s article in this issue). Institutions may participate in NNIS, purchase commercial products such as AICE (Infection Control & Prevention Analysts, Inc., Austin, Texas) and Q-Logic (Epi-Systematics, Inc., Fort Myers, Fla.), or develop their own system.2-4 These systems can assist an ICP in organizing and analyzing data. In addition, you can easily store vast amounts of surveillance information.

Other products to assist in epidemiologic studies are Epi Info (USD, Inc., Stone Mountain, Ga.)—a system containing word processing, database management, and epidemiologic statistics—and Epi Map (USD)—a program that produces maps from geographic boundary files. Both of these products may be downloaded from the CDC World Wide Web (WWW) site (see Andrew Friede’s article on the CDC’s many opportunities).

These databases help stratify patients and make adjustments for severity of illness. In addition, data encompassing many years can be kept in a computer and analyzed. These are all activities that were very time-consuming in precomputer days.
Data display. Use a spreadsheet to develop charts or keep track of data; use a word processing application to prepare a great report; use graphics/presentation software to make slides (or use the computer itself to project computer-generated slides). All of these programs may even interrelate so that information can be shared and transferred between programs. The uses for these computer applications are unlimited.

Statistics. Use a statistical package to compute your $\chi^2$ data (and other statistics) for special studies and data comparison. There are many different types on the market, including general purpose statistical packages, those with specific applications, and those combined with database management packages.

Patient information systems. You can look up laboratory results, pharmacy data, radiology results, operating room/surgery information, and census information from your computer. Facilities are networking databases, so all these systems are available from everyone’s computer.

At the University of Michigan Health System, hospital patient summary reports and ambulatory care visit notes are “on-line.” We can access this information from our office personal computers. Other facilities are developing computerized medical records, which will be exceptionally useful as a source of data for epidemiologic activities. Bedside entry of this information will also make it timely and easily captured.

In addition to straightforward access to these patient information systems, programs can be developed to integrate information from two or more systems. Surveillance of antibiotic use practices can be performed with a microbiology laboratory interface to pharmacy data. Microbiology laboratory results can be evaluated for antibiotic susceptibility trends in your facility. Pharmacy records may also be used to identify patients for whom antibiotics have been prescribed greater than 72 hours after admission, or those who have had a significant change in their antibiotic regimen greater than 72 hours after admission.

Identification of clinical problems. Interfacing institutional computer systems can assist the ICP in identifying patients at high risk for development of a nosocomial infection. The HELP (Health Evaluation by Logical Processing) system at LDS Hospital in Salt Lake City interconnects various hospital computer systems and has virtually replaced the paper medical record. It receives input from many clinical areas, reviews patients’ microbiology laboratory results, and evaluates census information such as previous admissions and surgery. The computer system can detect nosocomial infections as determined by preset criteria by use of a knowledge base of algorithms to analyze patient data. These types of systems can help direct an ICP in efficient chart reviews.

Policies/procedures

Need to obtain information regarding policy changes? Susan Sparks outlines various methods of using the computer to obtain information from numerous resources, including gopher, telnet, and the WWW. The WWW can be used to access CDC’s site and obtain reports, such as prevention guidelines and the Morbidity and Mortality Weekly Report. APIC’s site (see Joe Harr’s article) can be accessed to obtain information on APIC’s guidelines and other publications. APIC’s site also provides links to government, professional, and commercial sites of interest to ICPs. It also has a section containing abstracts from APIC conferences. You can access APIC’s or ProMed’s discussion groups to ask specific questions of your peers.

Research

Information retrieval. A wonderful advantage of computers is their use in keeping current with the medical literature and performing literature searches. Twenty MEDLARS (the MEDical Literature Analysis and Retrieval System, sponsored by the National Library of Medicine) databases can be accessed. The most useful literature database for ICPs is MEDLINE (Medical Literature Analysis and Retrieval System On Line). It contains
more than 6 million references to biomedical journal articles and is available 24 hours a day. You can even purchase database management programs to let the computer keep track of all these references. Paradigm (Applied Epidemiology, Sidney, British Columbia, Canada) is an annotated index that specializes in hospital epidemiology. It contains commentary about the articles it covers but not the abstracts or text of the articles. Additionally, electronic journals are now available from many companies.

Information sharing. A word processor will assist you in writing your manuscript. It has spell check (yes!), automatic indexing, and footnote capabilities. You can even add tables or charts from a spreadsheet or graphics program.

Education

Computer-assisted instruction materials are currently available to educate staff or yourself. They allow students to work at their own pace and provide immediate feedback. And an ICP does not need to be present during the training session.

Outlines and handout materials can be developed and updated easily with a word processing application. Information from other programs, such as a graphic, can be readily incorporated into these materials. Newsletters can be developed, created, even distributed through use of the computer.

CD-ROMs, multimedia versions of a compact disc, of textbooks, reference materials, and medical practice are now available. These systems don’t just include text, they integrate graphics, animation, photographic images, music, and video. They can be used for your own education or to train others.

Communication

Where would we be without the ability to discuss our problems (and successes) with our colleagues? A great way to do this without actually speaking with someone is through electronic communication. You can send documents over the Internet, distribute a survey to find out how often intravenous dressings are changed, discuss the latest APIC guidelines, or just “chat.” Meetings might be eliminated because e-mail messages along with document exchanges will replace them!

APIC’s Web site is discussed by Joe Harr in this issue. It provides a forum for information access and exchange to encourage communication among ICPs. Want to share your infection control manual, internal newsletter, or infection control tips? Virginia Saba outlines how to start by setting up your own home page on the WWW.

The future

According to Kelsey, computers are such advanced tools that we no longer should ask “what can a computer do?”, but “what do we want them to do?”

Computers are now available in every setting—gathering and generating data. Communicating with computers is easy and increases productivity and creativity. You can do it from work, home, airplane, boat, or car. To paraphrase Bill Gates, forward-looking ICPs will have lots of opportunities to perform better in the years ahead.

In the future, you will be able to link up with another ICP or hospital epidemiologist through the computer. You will speak in “real time” about a problem, review data in your database and discuss solutions. (See “Reaction and Response” for more insight into future possibilities.)

In the future, your computer will sense when you enter your office and turn itself on. A flat screen monitor that hangs on your wall like a painting displays the human face of your computer assistant. Your computer assistant tells you who called while you were out and what each call was about. You tell the assistant which call to return first. While it’s dialing, you ask for the latest infection rates for (insert any infection site here) in intensive care units at peer facilities. As your assistant displays the data on your screen, your colleague across the country answers the phone. Her face appears on your monitor, and you begin a conversation about the infection data as though she were in the room.

In the future, a desktop on your personal computer screen or television (by pushing your Web key on the television’s remote) will have icons representing the most used applications for ICPs. These will include MEDLINE, CDC, APIC, SHEA, an electronic journal, practice guidelines, patient education information, an “expert” hospital epidemiologist, database of patient records, and e-mail. Our opportunities will be endless!

References


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