Barriers to the Implementation of Clinical Systems

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A year ago in this journal, I wrote a commentary about how to move ahead with clinical computer systems in the face of physician resistance to computerization. I recommended that the planners of these programs move past the small but vocal number of physicians who opposed computerization. I felt then, and still do now, that system planners should not expend too much energy trying to convince the doubters and the "computer-phobes" of the benefits inherent in computerization. Development and innovation move at a much faster rate than do physicians' attitudes to new and somewhat difficult changes in their method of day-to-day practice, even when these changes promise to make their work more efficient and cost-effective.

Despite my admonition to move ahead in the face of objection, there remain some very significant barriers to physician computerization. An understanding of these barriers is important for planners as they interpret why people do certain things that don't seem in line with their expectations. The barriers to advancement can be grouped into four categories: education, technology, economics and politics.

Education
Medical education faculties in Canada have access to departments of medical computing (now commonly known as medical informatics).

However, the greater part of the medical curriculum that would expose a resident to computing systems takes place either in a hospital or in community clinics, which have variable penetration of integrated computing for clinical practice. Given that only 12% of community-based clinics have fully integrated documentation systems, and virtually none have computerized physician order entry (CPOE), there will be difficulty relying on the exposure residents will get as they move away from the medical school and into the broad community where most of their clinical training will take place.

Given that the clinical training ground will be scantily supplied with these fully integrated computer systems for the next while, it will be up to the vendor community to provide much of the experience and training for the new physicians. We have seen this scenario before! For years, physicians have received much of their information about new additions to the drug formulary from the pharmaceutical industry. Many regulators think that this is deplorable. Whether it is in fact deplorable is debatable, but continuing medical education in medical informatics will be a shared process between the academic centres and the information technology industry. The Canadian provinces need a viable and robust informatics research base to support physicians. There is too little medical informatics

research going on in the country to move the whole sector ahead dramatically. This is not the case in the United Kingdom, where there are numerous centres for research in medical informatics. The same is true in the United States. It is encouraging to see the beginnings of this movement here in Canada.

There are universities that are interested in developing departments devoted to research and training in medical informatics. They are in the early stages of their development and do not have a great deal to offer the graduate physician or resident at the moment. A physician who goes out to find the best system for his or her office requires advice about what to look for, as doctors have limited hands-on experience with these systems. The vendors are a tremendous source of information but they are motivated to sell their products, not unlike the pharmaceutical sales reps. Without knowing what questions to ask and what other information they must have to make this important selection, physicians are at the mercy of the vendors.

There is a paucity of good training programs in Canada to help physicians gain the information needed to make informed decisions about computerization. This will change with the development of departments of medical informatics in centres like Toronto, Victoria and Waterloo. The pace of this development is slow and physician uptake is likewise slow. Residents coming into the clinical workplace in Canada are looking for automated centres in the community and they will start favouring those areas where there is good penetration of computerization.

I urge educators to get interested in medical informatics and start providing either formal or informal opportunities to allow physicians to understand and keep abreast of the developments in the field. Doctors need sources of advice that they can trust – sources which will make them as current as possible. This generally means that physicians with a solid understanding and ability to use the systems will have to get involved with these programs to share their experience and skill with their peers. Physicians need reliable sources, guidance and information before they make costly investments in hardware and software. Our own experience

in Chatham-Kent, an early pilot of an application service provider (ASP) – hosted eMR designed for Ontario doctors, indicated that the implementation problems varied depending on whether there was someone in the office who was comfortable with troubleshooting computing problems. Those offices that had such a person – or could train one – had a much easier time dealing with the numerous access and print problems that any pilot of this sort will encounter. In the early implementation phases of these systems, it will be learning on the job and physicians do not tolerate much interference with the patient encounter before they abandon attempts to computerize. A source of ready assistance is a valuable asset to any office.

TECHNOLOGY

The current state of technology presents both barriers and solutions to computerization for physicians. It is often difficult for the physician to seize the opportunity and make the leap into the digital world rather than wait for the right combination of software and hardware to become available. The pace of computer development is such that better solutions will always be available next year. Voice-recognition technology is a good example of this developmental trend. Voice is probably the ideal interface method for getting the data into the system, but there are a number of problems peculiar to electronic medical records that must be solved before this approach is widely applicable.

There are two basic types of eMRs and their difference depends on whether the record is fully structured data or based on free text files. The fully structured systems are mainly template- or menu-driven and one can readily search their databases using SQL-type programs such as Microsoft Access. The free text-based programs are currently more popular due to ease of use, but are not capable of a Boolean-type search; this is a distinct disadvantage for their use in population health problems. This important distinction between the two types of medical records has a significant impact on the physician, who will have to select a hardware configuration to match the software that he or she has chosen first. The problem now becomes the difficult inter-

face between the physician and the machine.

The most common interface is the keyboard, but few physicians are proficient enough to make this a usable solution. Most physicians are barely able to use the QWERTY keyboard so they then turn to voice-recognition software. The developments in voice recognition are considerable in the last several years, but they are not able to deal with a program with multiple menus such as fully template-driven records in use today. Pick-lists are critical to the creation of a structure for the record, and voice recognition has yet to deal well with pick-lists or menus in the software programs in any convenient fashion. There is no doubt that voice-recognition software will be perfected, but this is not the case today. All eMRs, even those with a predominance of text entry, rely to a degree on menus to enter structured data. The full template programs demand a data-entry system that can manage pick-lists. Once voice recognition is able to handle the menu problem, I suspect that it will be the interface of choice. The physicians in our pilot project have had to learn this the hard way. They have chosen to put voice recognition aside until modifications are made.

Doctors are looking for systems that do not require typing skill, but they are then faced with records that have difficulty capturing the nuances of the patient encounter. If they cannot type then they will look for voice recognition to help them create a note that adequately reflects the details of the clinical situation.

Our experience proved that some of the advantages promised by computerization did not materialize for various reasons. We felt that our solo practice patterns would be brought into a virtual network of physicians through rapid and secure connectivity. However, when we installed our systems, we found that we were still relatively isolated as the remainder of the healthcare community had not connected and those that had were not the ones with whom we needed to share data. Secondary-care physicians are an example of this; most do not have access to the secure network so we print referral letters and fax them.

Another important aspect of technology for physicians is the need for continuous ready access to the system. Lack of access can be an impediment that affects how the record system will be supplied to the physician. Certain medical records are being offered as ASP solutions. These have a distinct advantage over stand-alone systems, which require the purchase of a server and frequent software upgrades which have to be loaded on each server the physician uses. The ASP solution also offers better security since the thin client infrastructure allows the data to reside on servers in a data centre far more secure than the physician's office. The initial expense of the ASP is generally high, but once made, the cost of upgrades is less and security is maintained mainly by the provider of the service and not the physician. However, the accessibility of the system is dependent on the reliability of the infrastructure provider and the speed of the medium used to connect to the Internet. Generally one uses DSL or cable as a medium for high-speed delivery of the program. During certain times of the day, our experience has been that response times vary considerably. The cause of the daily variability could be due to choke points at the data centres or traffic on the Internet. The system we use connects to a Toronto-based data centre by VPN over the Internet. This makes timely access to our data somewhat unpredictable.

There are other issues in the area of technology that will be a challenge to physicians. These problems will be solved in time, but they continue to inhibit the rapid uptake of computerization for documentation in community clinics and in hospitals alike.

ECONOMICS

Physicians are continually asking about the economics of computerization and they express their concern about the cost of putting these systems into their offices. Concerns relate to possible cost overruns and whether there will be a return on investment within a reasonable time. One can generally bank on the fact that computerization of an office will cost more than the initial estimates. A curious fact about computerization is that hardware continues to become cheaper and more powerful, yet software costs continue to escalate. In our experience in

Chatham-Kent, it was not until we stopped using charts in the workflow that we were able to free time from chores such as filing and note-taking and devote it to activities that might generate the income needed to pay for the computerization. Time is money in a fee-for-service environment. We found that computerization has given us more free time, whether it be secretarial time to do other activities or physician time to get us out of the office earlier and with more work accomplished.

We have learned that computing in medical practice is costly at the outset in terms of both time and money. But once the pains of early implementation are passed, there is often more time available for the physician and the staff to devote themselves to other activities that are remunerative such as achieving preventative medicine targets which the Ministry of Health and Long-Term Care in Ontario is now willing to pay for. This is both good medicine and good economics in medical practice.

A fundamental economic problem remains for physicians in Ontario and other provinces who pay for their medical services by the fee-for-service method. This form of payment does not recognize computer-aided services in the fee schedule. Automation allows a large number of tasks to be shifted quickly from the physician to other office personnel. But in a fee-for-service environment, the physician must continue to have direct patient contact to receive payment. If, as a family doctor, I provide patient education by electronic means such as a dedicated website, I am not paid for this valuable service unless I discuss the issues with the patient in person. This is a disincentive to physicians interested in extending their computerization beyond the basics of results viewing and documentation. There is a cost in time and training for this sort of advanced computerization and if the fee schedule or method of payment does not recognize these efforts, physicians will be hesitant to incorporate them into their practices.

POLITICAL

There are a number of political issues that may present impediments to rapid acquisition of computerized records. Governments are very interested in automating healthcare and providing some incentives to improve the uptake of electronic systems. Obviously, the systems that governments are sponsoring or recommending will have some advantage for the governments themselves. At times, this may be seen as not being in the best interests of physicians and it may dissuade them from joining government-sponsored programs. Other vendor systems that are not endorsed by the government sponsor might be favoured by the physicians and thus compromise the choices. But to achieve some standardization in Canada, we may well have to tolerate this interference. The point here is that physicians who have knowledge about these systems, including their advantages and disadvantages, should be part of the vendor selection and system-design process. It is inevitable that governments which sponsor healthcare systems will see the need to be involved in facilitating clinical computing as a means of improving both quality and accessibility. Clinical computing promises to improve both of these vital aspects of health.

The move to computerized medical records, data storage and finally to computerized physician order entry is an enormous change for the healthcare system. It will have significant impact on disease patterns and the health of populations. Physicians will eventually join this wave of innovation but not until the various barriers are lowered and physicians have a better level of comfort with the software and hardware that will be such a significant part of their lives once they have made the move. An understanding of the barriers and their various solutions is critically important and should guide those responsible for moving the agenda ahead.

About the Author

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