Legible charts!

Experiences in converting to electronic medical records

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A functional medical record is an essential component of family practice. In July 1998 our six salaried rural family practitioners and one resident, serving a northwestern British Columbia community of more than 7000 people, had serious concerns about legibility, sharing medical records, and overall office efficiency. We decided to implement an electronic medical record (EMR) system.

Although none of us had experience with office computerization, we followed a generally accepted approach.[1,2] We first addressed the need to computerize, selected hardware and software, and then devised and implemented a system of maintenance. Our approach was not novel, but it did reveal the many challenges of day-to-day implementation of the system. This paper will not reiterate this process, but will describe lessons learned from a practising physician's perspective.

Site description

Our practice consists of six rural general practitioners providing comprehensive care to people living in the Hazelton, BC, area. The population of our primarily fishing and logging community is approximately two thirds Pacific Northwest First Nations. The practice has a GP anesthetist, GP surgeon, and others with extra training in community medicine and mental health. Hazelton is the rural rotation for the second-year Prince George regional family practice program. We have trained one of our nurses to provide well-woman examinations. We are currently funded through salaries by the Alternative Payments Branch. Our clinic is physically attached to the hospital.

Assessing needs

The initial step in considering medical office computerization is determining whether it is needed. Frequently, EMRs are portrayed as efficient and cost-effective,[3] yet nothing seems faster or more economical than writing in a paper chart. It is important to appreciate the differences between EMRs and paper charts (**Table 1**).

Implementing EMRs is complex, and benefits must be clearly recognized by those who will use the

Table 1. Comparison of paper and computerized charting

PAPER CHARTING

Inexpensive to install

Minimal staff training

Limited maintenance necessary

Most physicians already familiar with this approach to records

Power outages have minimal effect on access to charts

COMPUTERIZED CHARTING

Legible record

Easily accessible patient information

More difficult to misplace a chart

Research possibilities

Access at a distance

Simultaneous access to many users

Economical billing

system. If they are not, inevitable frustrations associated with system implementation will overshadow any advantages. In our office, legibility of notes was a great concern. As computerized notes began to accumulate, it became clear that EMRs were helping to achieve one of our goals. If we had not had concerns about illegible handwriting, perhaps the problems associated with EMR conversion would have far outweighed the benefits. We have worked through several questions informally that have guided our computerization of medical records (**Table 2**).

Equally important in deciding to computerize medical records is involving all staff in planning. Involvement fosters a team approach toward EMRs and lessens possible staff resentment. Similarly, physician consensus is essential, as change is often easier for office staff than it is for physicians.[4]

Hardware

Once needs are assessed, hardware and software must be considered. It is paramount that computers have enough processor speed to retrieve charts quickly. For hardware, we initially chose inexpensive Pentium II

Table 2. Useful questions while considering computerizing office medical records

- Is the current charting method efficient and useful?

- Are charts shared with other physicians?

- Are there aspects of current medical records that would be desired in an electronic medical record (a problem sheet, medical list, etc)?

- Is simultaneous access to a patient chart by many users necessary?

- Are present charts legible?

- Does staff spend an inordinate amount of time moving, handling, or searching for charts?

- Do you have a desire to analyze your practice?

- Do involved physicians want to enter data (ie, through typing, dictating)?

- Are *all* physicians interested in computerized medical records?

- What do you hope to accomplish by changing to electronic medical records?

processors and found that excessive repairs meant we needed to move to more expensive models.

Since physicians do the bulk of data entry in an office setting, they should have a good concept of how they wish to enter clinical information. In our office, some physicians enter information from a desktop computer while others work from wireless "pen tablets" with handwriting recognition (eg, Fujitsu 2300) that can be carried and used anywhere. Although they are more expensive and batteries have to be changed every 3 or 4 hours, these computers allow better physician-patient interaction, as physicians can face patients, enter data, and carry on interviews all at the same time.

Use of wireless computers has, in many ways, enhanced patient-doctor interactions. We have received many compliments on the speed and legibility of our prescriptions. In addition, patients are impressed with the ease with which an emergency visit report or scanned copy of a recent consultation can be reviewed. Further, wireless computers have, in some cases, allowed physicians more time with patients. Their portability frees up the time it would normally take to input data on a desktop computer because data can be entered at the time of the interview. In addition, wireless computers are roughly the same size as a paper chart; as information is entered via a stylus, physicians' attention is not distracted by a monitor or keyboard. Physicians' individual preferences in computers should be supported, however, providing that they do not compromise the EMR's performance.

We operate with a combination of good-quality desktop and wireless computers. We are currently using a Dell PowerEdge 2400 server (Pentium III, 533 MHz). Our workstations are Pentium processors of various speeds in an Ethernet network. Each physician has a workstation. There are five workstations for the six physicians in our office as well as two more for the nurses. There are four in our adjoining hospital, two at the villages we visit regularly, and our four wireless computers. Four of our six regular physicians work from wireless computers while the other two prefer desktop computers. Our medical students and family practice residents rarely use the wireless computers largely because it takes practice to use the stylus.

Software

There are essentially three groups of EMR software: the older DOS types and those that are Windows- or Macintosh-based. The first is quick and reliable, but has limitations (DOS types lack a user-friendly interface, flexibility, and ease of data extraction). The other two groups can be divided into two types: variations of word-processing programs that contain various templates and those with more active screens that allow you to customize history, examination results, diagnoses, and treatment to a particular style of practice. Generally the second two groups cost more and are more challenging to implement, but can be the most efficient.

Regardless of choice, ensure that the salesperson provides a detailed demonstration of the "real" program and not a demo or prototype. We learned that the highlighted options in the prototype are often unavailable on the current version of the software. Further, demonstration software on stand-alone computers does not give any indication of how the program will perform in a multi-user, networked environment. Certainly the ideal situation would be for all physicians to try out the desired software in a similar live situation; practically, this is difficult.

The EMR is often portrayed as saving money by reducing staff. Although we did reduce our office staff by one person, the responsibility of those remaining has not so much decreased as changed. Further, we continue to pull paper charts and so have not been able to capitalize on that potential saving. In addition, our hardware expenses have been approximately $90 000 and our software expenses $35 000 with annual support fees of $2000. We estimate that expenses can be recovered in 5 years,[1] and we will likely meet that target. One less office person could potentially save $125 000 over 5 years.

This covers the initial $90 000 and leaves $35 000 for upgrading. We are estimating a $7000 upgrade this year. We were fortunate to receive a $49 000 Health Infrastructure Support Program grant initially to aid in initiation of the project. (Wireless computers were extremely costly: almost $9000 each.)

Implementation

Before an EMR can be implemented, two important decisions need to be made. First the paper chart must be considered. Because of financial and practical problems associated with entering old information, our clinic elected to have a start date from which all notes would be entered on computer. Before this date we encouraged our physicians and staff to use the EMR as much as possible. We have elected to introduce the EMR gradually, so use of paper charts will continue for some time. Second, we agreed to establish someone as an EMR specialist whose primary responsibility is to ensure the overall effectiveness of the EMR. This enables other staff to focus on patient care.

Second, we found it necessary to establish a computerization timetable in order to go completely paperless. We gradually incorporated computerized elements into the EMR so that staff could slowly gain familiarity and confidence with the components as they were introduced. We found it easiest to do the following: Clinical notes were initially written in the EMR. Our radiologist's reports were incorporated next, followed by letters, consultation reports, and Pap smear results (all of which are scanned). Inclusion of results from our laboratory has been delayed until it is computerized.

Maintenance

After working with the EMR, we discovered its shortcomings and devised a system to address them. First, physicians conduct regular chart reviews to ensure information is being entered and stored usefully. We are able to share more efficient ways of charting and further develop a team approach toward the EMR. Second, staff members are familiar with "disaster recovery." If computers crash or hard drives are corrupted, it is imperative that staff be comfortable with EMR backups. This necessitates an uninterruptible power supply and that a copy of all information be stored off-site in case something happens. Having the ability to save an office's medical information is perhaps the biggest advantage of EMRs.

Discussion

Implementation of EMRs has required a great shift in the way office members think and work. Records are accessed in a different manner, physically appear different, and are stored in a different format. We have had to overcome many obstacles, which have caused us to reassess our objectives in order to persevere through this process. Many of the problems we encountered were in keeping with much of the literature on EMRs. For example, we found that the initial cost of implementing an EMR is considerably more than that of implementing a paper chart and that instructing on the system's use takes time and can be repetitive. Adding to this are the constant changes within the computer industry, which often result in support inconsistencies.

Unfortunately, the literature does not emphasize the aspect of implementation we have found most challenging—change. Each component of transition to the EMR involved changes in thinking and process, notwithstanding retraining for staff and physicians. We have spent considerable time discussing when to initiate a step toward a complete EMR, which has required diplomacy and compromise on everyone's part.

Evaluation

Our assessment of the EMR has been largely positive. Our staff has adapted enthusiastically and recognizes the efficiency of the system. The time spent looking for charts has dramatically decreased, and legibility is no longer a concern. Diagnoses are automatically coded and statistical summaries are easily produced. Although our investigation and consultation reports are not received electronically, the time spent scanning them is the same as was spent on paper filing with the advantage being that they are available for multiple uses. All our physicians use the EMR and have adjusted well, although there is no consensus on whether writing clinical notes is faster. One physician prefers paper charting and another believes that the EMR has enabled him to see 25% more patients.

A recent review found that computer use during consultation lengthened the visit.[5] We have found that this is sometimes the case with residents and locum tenens who are not present long enough to get past the learning stage and thus tend to be less positive about EMRs.[6] Ease of transition can be difficult to predict. It seems to depend on physicians' attitude, aptitude, personality, and acceptance of change in note making.

Conclusion

Computerization of office medical records is exciting and challenging. If planned appropriately, frustration and expense can be minimized. The goals of computerization must be clearly delineated, understood, and

reasonably attainable. Progress in implementation requires change in charting practices, which is simplified by a unified staff working toward the same goal. We were greatly aided by one physician, who was thoroughly adept with computers, who smoothed many of the wrinkles out of implementation. We have yet to conclude the process of going paperless and do not have a predicted date of completion. As technology continues to change, so too does our ability to improve the EMR. We are frequently asked if we would computerize again. We would, but only after confirming that there were legitimate concerns about the present charting system that could be improved by EMRs. ❦

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