their concerns and views seriously then it just might succeed—for all our sakes.

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Beyond the gadgets

Non-technological barriers to information systems need to be overcome too

Someone once said that the only person who welcomes change is a wet baby. To be most comfortable with the status quo, unless it is inflicting discomfort, seems to be part of the human make up. Probably every doctor has experienced the feeling of being overwhelmed with medical information, whether about a patient or with the ever increasing amount of information in the literature. Most doctors have recognised that integrating information systems into their clinical practice is not just a good idea but has become mandatory. Yet, major issues need to be overcome—not just technological ones—which if not considered for a new information system will lead to a "system failure" (box 1). It would be wonderful if we could create the new electronic medical environment with a "big bang" and avoid all of the issues outlined. Unfortunately that is not possible. The first requirement is to become comfortable and assured that an information system is important. To reach a "yes" conclusion, most people go through several stages to reduce their personal resistance and to reach a level of comfort with using information technology actively in the daily workflow of a medical practice. This editorial introduces these stages and makes suggestions for overcoming an issue with each stage.

The following stages are adapted from the transtheoretical model, which is one way to look at the process that individuals go through in a change process (box 2).[2] Doctors might be familiar with this model from smoking cessation programmes.[3]

Pre-contemplation could also be called the denial stage. "My practice is working just fine." "Using a computer will take more time." "Placing a computer in the patient examination room will be a barrier between the patient and me." "My office practice is quite well organized and eveyone is happy." "How can I see as many patients as I do in one day and still use a computer?" "You are asking me to do the clerical work that others do and every time I type it costs me time and money." At this stage you might read about what others with similar practices are doing.

The contemplation stage is when a doctor acknowledges that a problem exists but is not yet ready to invest in the change. "I went home late again last night, I just cannot seem to get everything completed in a timely manner." "Have you located Mrs Smith's chart yet? I need to see the results of her last test and she has been waiting for more than an hour." "I wonder if technology could help with my practice." At this stage you might talk with your colleagues or visit an exhibit area at a medical conference.

The preparation stage is about getting ready to make changes. To deal effectively with the reality of change, the person desiring to make the change and the staff need to be involved in any change process. Everyone wants to feel that they are needed and their ideas are appreciated. This carries over to the workplace where workers want a chance to get actively involved with their work and show their competence and value to their work group. Thus you must prepare yourself and your staff to accept the changes that you will make in patient care. Providing the opportunity for staff involvement will help reduce their resistance. If they have ownership in the process they will help to ensure the system's success.

The action stage is actually implementing the system or making the desired change. No single strategy can be used in every situation, but the leader must develop appropriate strategies and plans to help facilitate the implementation of any changes—both the technological ones and the corresponding issues involving people and workflow. While the resistance at the earlier stages might have rested with the doctor leader, at this stage resistance most likely would be from the staff if they have not been properly prepared to accept the new system and if the information system will alter their workflow practices. Strategies for effective communication and involvement are crucial at this stage.

Maintaining the change can be very difficult for action oriented people. Once a new system is

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Box 1: Non-technical issues that need to be overcome[1]

- Underestimating the complexity of the new system and the changes that it will cause in your practice
- Not having a clear vision for the changes you are proposing
- The requirements for your new system continuously to expand, but you fail to renegotiate deadlines or resources to support the expanded criteria
- You have management and organisational issues, and you are trying to solve these by installing an information system
- Ineffective listening and communication with both vendors and your staff
- You become so technology oriented that you seek the newest system (whether it has been tested or not)
- You do not invest enough time in training on the system
- You become so emotionally committed to your system that people will not tell you when it is not on track for fear of your reaction
- You fail to have your staff "own" the system

Box 2: Stages that individuals go through in a change process

- Pre-contemplation (not yet acknowledging that a change needs to occur)
- Contemplation (acknowledging that there is a problem but not yet ready or sure of wanting to make a change)
- Preparation (getting ready to change)
- Action (making the change)
- Maintenance (maintaining the change)

implemented, everyone has great expectations for immediate improvements in productivity. However, as the implementation begins the staff's productivity goes down abruptly.[4] Not only does productivity decline, but possible conflicts could arise. Various reasons exist for the temporary losses in productivity such as the time spent on training and self learning on the new system, adjusting to new procedures and working relationships, dealing with unrelated pre-existing problems surfaced by the change, calming the anxieties and fears of loss of security, autonomy, control, or respect and self esteem if the system is not quickly mastered.

These issues might cause some people to stop using the new system and revert to the "good old way" of doing things. Assuming that adequate communication and training were completed earlier, you need to maintain your sense of perspective, be very visible to the staff, have good communication, and provide some end stage fun—possibly a celebration for the implementation process and where you are today.

Since more than 50% of information systems either fail or people fail to use the system to its full capacity, the preparation, action, and maintenance stages need to be completed properly. If not, frustration may result and lead to a higher probability of failure. Unfortunately, we have no magic dust to make the transition to ehealth applications easy. But if the issues outlined here are ignored, you might end up continuously reinventing the wheel.

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Will e-learning improve clinical judgment?

Not until doctors build collegial learning into practice

At the turn of the 20th century, when "modern" medical education was just getting up and running, a clarion call of the reformers was to reduce the overload on students' minds. "Medical educators of the latter nineteenth century were the first physicians in history to feel the real shock of the information explosion."[1] But wait a minute, that's just what the problem seems to be today, and so it was in the 1980s as described in the famous report on "the general professional education of the physician," and in the1960s when an earlier study of medical education in the United States was published.[2 3] This complaint about overload by medical students and their teachers seems to be a constant one and may reflect a tendency to complain rather than the sudden emergence of an unbearable weight of knowledge that needs to be absorbed. The real problem is the matter of selection, and the tenacity of the complaint serves to remind teachers of our poor performance in the first and probably hardest role of the teacher—helping students to learn how to separate the wheat from the chaff.

The problem is even more difficult when the "student" is a practising doctor. At first glance, selection of material for practitioners should be less of a mysterious enterprise. For medical students, by necessity, describing the nature of their "practice" is a theoretical task, but the practice of doctors is by definition a given so that the curriculum for their ongoing educational programmes should be easily knowable. If doctors were to keep proper records of what they do, for example by entering and tracking their work on computers, the geniuses who brought us the likes of Amazon.com or GroceryGateway.com should be able to put together a demand based "smart data" system that could create an accurate depiction of any doctor's practice, as quickly as Amazon.com can remind book buyers of what their favourites are. A next step might prove more complex, but once a doctor's pattern of practice has been established empirically, smart searches (for example, Google or Inktomi) could be done to direct the most relevant available material to their desktops to ensure that no breaking news will be missed.

The difficulty, however, is that all of this available information, helpful though it may seem at first, will serve only to exacerbate the problem of overload. Doctors will now be overwhelmed not just by the availability of information in general but also by the availability of an excess of information that now may be actually relevant to their practices. This brings us back to the issue of selection.

Ironically, information itself, even sufficiently integrated into what might be called knowledge, is a necessary but not sufficient requirement for correct action. The needed ingredient is that hard won dimension of expert action known as judgment; what sociologists call "knowing in action."[4] Despite the hugely increased public availability of information about health, there seems to be no parallel decline in demand for the judgment of doctors. Patients may now come armed with data, but they are still searching for meaning and right action. Patients come to doctors to pose difficult, contingency laden questions—typically,

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