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THE MACHINE AT THE BEDSIDE

CAMBRIDGE

THE MACHINE AT THE BEDSIDE

Strategies for using technology in patient care

Edited by

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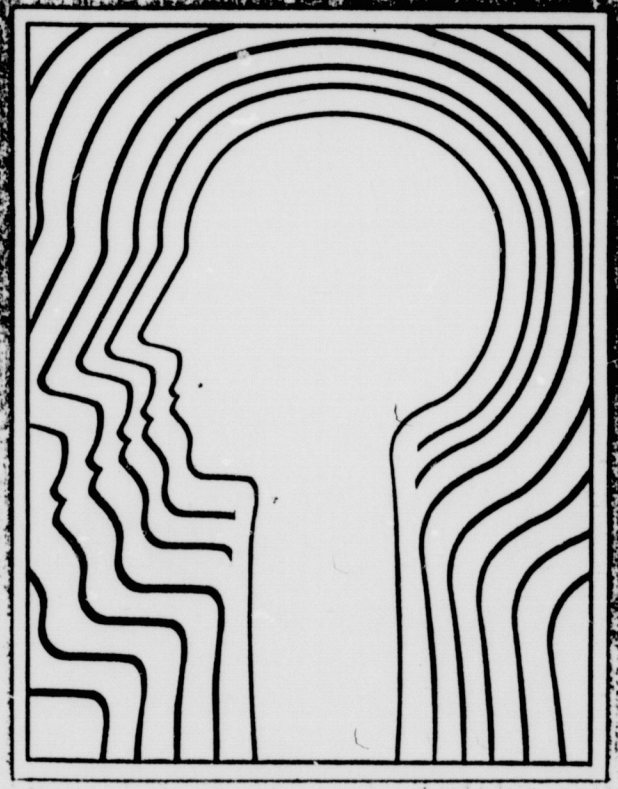

SECTION B

TECHNOLOGY AND THE HOSPITAL

CASE 4

COMING TO TERMS WITH THE COMPUTER

EDWARD H. SHORTLIFFE

You are asked to assist a major teaching hospital in the assessment of a large computer system that was installed 3 months ago to help with doctors' orders, laboratory test reporting, nursing schedules, and bed control. Because of mixed reviews of the system's effectiveness, the hospital has decided to bring in outside experts to assess the computer's strengths and weaknesses.

The computer system was installed by a vendor of large-scale hospital information systems (HIS). The company had developed the programs over several years, but this is its first major commercial installation. The HIS has several capabilities that, taken as a whole, have had an impact on almost all aspects of the hospital's operation. Because most of the concerns that have been raised have come from those who are involved with patient care, you have decided to focus your analysis on features of the system that are designed for clinical use. Every nursing unit in the hospital has video display terminals for use by medical and paramedical personnel. There are also printers on each unit so that the computer can generate reports for the patient charts and worksheets for use by nursing and paramedical staff. The system is dependent on a large dedicated computer housed in the hospital complex and staffed by several full-time personnel.

Several system capabilities are particularly pertinent to your analysis:

1. The pharmacy system. This component of the HIS allows physicians to order drugs for their patients and to have the request immediately displayed in the hospital pharmacy. Pharmacists then fill the prescriptions and affix a computer-printed label to the bottle. The drugs are delivered to the ward by a pneumatic tube system. The computer keeps a record of all drugs administered to each patient and warns the physician about possible drug interactions at the time that a new prescription is ordered.
2. The laboratory system. Like the pharmacy component, this system permits the physician to order laboratory tests for a patient. The request is displayed

in the clinical laboratory, and worksheets are created to assist laboratory personnel in planning their blood-drawing schedule as well as the actual performance of the test. When results are available, they can be called up on the screen of any system terminal. Paper summaries are also printed on the wards for inclusion on the patients' charts.

3. The bed control system. The admissions office of the hospital, in conjunction with the various ward administrators, uses the system to keep track of the location of patients within the hospital. When transfers occur, the computer is notified so that physicians, telephone operators, and others can locate patients easily. The system is also used to identify patients who are ready for discharge; this helps the admissions office plan the bed assignments of new patients.
4. The diagnosis system. To help physicians reach correct diagnoses regarding their patients, the system includes a clinical consultation program. Physicians can enter the signs and symptoms, laboratory abnormalities, and x-ray results for their patients, and the system will suggest a list of likely diagnoses.

Although the HIS has several other components not mentioned here, you decide to focus on these four when interviewing hospital staff. After a few days of conducting taped interviews, the following responses are among those that you choose to have transcribed.

STAFF RESPONSES TO HIS

From a nurse on a medical floor

"I like the system a lot. It was hard to get used to at first (I never have been a very good typist), but once I got the hang of it, I found that it simplified much of my work. I use it to chart medications when I have given them, and also to log nursing notes. The worst problem has turned out to be dealing with doctors who don't like the system; when they get annoyed, they tend to take it out on us, even though we're using the system exactly as we've been trained to do. For instance, I can't log on the computer as a physician verbal orders in someone else's name, and that makes some of the doctors furious. The only time I personally get annoyed with the computer is when I need to get some work done and the other nurses are using all the ward terminals. As for how much I use it, I guess I might spend a total of 45 minutes at a terminal during an 8 hour shift."

From a medical resident

"I wish they'd rip the darn thing out! It is totally unrealistic in the kinds of things it asks us to do or won't allow us to do. Did the guys who built it have

any idea what it is like to practice medicine in a hospital like this? For example, the only thing that used to keep our morning ward rounds efficient was to bring the chart rack with us and write orders at the bedside. With the new system, we have to keep sending someone back to the ward terminal to log orders for a patient. What is worse, they won't let the medical student order drugs, so we have to send an intern. Even nurses aren't allowed to log orders in our name (something to do with the 'legality' of having all orders entered by a licensed physician, but that was never a problem with paper order sheets so long as we eventually countersigned the orders!). Some of the nursing staff are following everything by the book so much now that they seem to be obstructing efficiency rather than aiding it. And the designers were so hung up on patient confidentiality that we have a heck of a time cross-covering patients on other services at night. The computer won't let me write orders on any patient that isn't 'known' to be mine, so I have to get the other physician's passwords from them when they sign out to me at night. And things really fall apart when the machine is down unexpectedly for some reason. Everything grinds to a halt, and we have to save our management plans on paper and transcribe them into the system when it finally comes up. I should add that the system always seems to be about 3 hours late in figuring out about patient transfers. I'm forever finding that the computer still thinks a patient is on the first floor when I know he's been transferred to somewhere in the intensive care unit.

"In addition, the 'diagnosis system' is a joke. Sure, it can generate lists of diseases, but it doesn't really understand what the disease processes are, can't explain why it thinks one disease is more likely than another, and is totally unable to handle patients with more than one simultaneous disease. I suppose the lists are useful as memory joggers, but I no longer even bother to use that part of the system.

"And by the way, I still don't really know what all those buttons on the terminal keyboard mean. We had a brief training session when they first put the system in, but now we're left to fend for ourselves. Only a couple of the house staff really seem to know how to make the system do what they want reliably. As for the best part of the system, I guess it is the decrease in errors in drugs and lab tests and the improved turn-around time on those orders – but I'm not sure they're worth the hassle. How much do I use the system? As little as possible!"

From a third-year medical student

"I've enjoyed using the system most of the time, although I've noticed that some of the house staff seem more grouchy now compared to before the system was installed. I don't think they're really very eager to learn about it or to adapt to it; all they know is that it has disrupted their usual routine. Personally I can see it will have a lot of real advantages once they get some of the bugs ironed out. I particularly like the diagnosis system. Before I do a 'student writeup' for

a new patient, I always run his data through the system to see what I might be missing. A couple of times the computer has changed my entire assessment of a case. I can't hope to remember all the stuff they're trying to teach me, so it is nice to know that we may be able to turn to computers for help with keeping track of all this medical knowledge in the future. As for the frequency with which I use it, I guess I sit at a terminal for an hour or so a day while I'm on a ward rotation. That varies, of course, depending upon whether I can find a terminal free or can avoid getting booted off by an intern in a hurry. They ought to have a few more terminals scattered around."

From a hospital pharmacist

"The HIS has been a real boon to our pharmacy operation. Not only can we fill new orders promptly because of the improved communication, but the system prints labels for the bottles and has saved us the step of typing them ourselves. Our inventory control is also much improved; the system produces several useful reports that help us anticipate shortages and keep track of drugs that are soon to expire. The worst thing about the system from my point of view, though, is the impact it has had on our interaction with the medical staff. We used to spend some of our time consulting with the ward teams about drug interactions, for example. You know, we'd look up the relevant articles and report back at ward rounds the next day. Now our role as members of the ward teams has been reduced by the system's knowledge about drugs. Currently a house officer finds out about a potential drug interaction at the moment he is ordering a treatment, and the machine even gives references to support the reported incompatibility."

From a member of the HIS computing staff

"Frankly, I think the doctors have been too quick to complain about this system. It has only been here for 3 months, and we're still discovering problems that will take some time to address. What bothers me is the gut reaction many of them seem to have; they don't even *want* to give the system a chance. Every hospital is a little different, and it is unrealistic to expect any HIS package to be immediately right for a new institution. There has to be a period of 'breaking in.' We're trying hard to respond to the complaints we've heard through the grapevine. Hopefully, they'll be pleased as the new features are introduced and they see that their complaints are being attended to."

QUESTIONS FOR DISCUSSION

1. What problems would be the focus of your report to the hospital?
2. Do you feel that the benefits of the HIS outweigh the problems that have been cited? What are the principal advantages of the computer system de-

scribed? Are there equally good noncomputer solutions to the problems with which the HIS was designed to help?

3. It is clear that the physician quoted is the most strongly opposed to the new system. How would you summarize this doctor's chief complaints? Can you propose design changes that would overcome some of the problems outlined? Try to compile a list of physician concerns that you feel must be addressed in the design of an acceptable hospital computing system. Why do you think the physician is less tolerant of the system than the other persons who were interviewed?
4. In addition to the hospital staff already noted, you interview a patient, and an attending physician practicing largely outside the hospital, about their reactions to HIS. What do you think they might say about the system?
5. Consider the psychological barriers to successful implementation of computer systems in clinical environments. What are their roots? Do you believe they can be overcome?
6. Discuss the impact of the computer system on relationships among physicians, nurses, and other paramedical personnel.
7. How would you change the system? Among the topics you might address are hospital staff training, computer staff training, computer reliability, effect on hospital routine, terminal availability, and the role of diagnostic aids.
8. Are there ways in which courses in medical school, nursing school, or training programs for paramedical personnel could help alleviate some of the problems that occur when hospital staff encounter computer systems for the first time? What effects might the increasing availability of computer-based clinical tools, especially those designed to help with decision making, have on the quality and content of medical education?

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