

Changing practices: Computing technology in the shifting landscape of American healthcare

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Executive Summary

This paper reports on a short ethnographic research project, conducted in Spring 1999, to understand the daily lives of doctors and to identify new opportunities for computing technology in the healthcare setting. About 100 healthcare practitioners from a dozen clinics in the Pacific Northwest as well as Boston were interviewed, observed, photographed and videotaped in their natural settings.

Key findings focus on three areas:

1. Doctors feel increasingly powerless in the midst of the changing organizational and business environment of medicine. This sense of powerlessness extends even to daily scheduling.
Technological implications:
 - Better tools for sharing information on treatments and outcomes, allowing doctors and managers to reach consensus on optimal practices.
 - Tools for sharing patient loads and communicating accordingly, including triage systems.
 - Better tools for automating such routine tasks as patient referral status, patient eligibility, and other tasks that typically occupy medical staff for hours on the telephone.
2. Doctors feel that administrative overhead, especially paperwork, has sharply reduced both the time and the quality of interactions with patients.
Technological implications:
 - Computing power which will allow practitioners to create, access or manipulate digital information more “naturally” in the course of patient encounters. This means new form factors, new modalities including voice input or audio output, and new means of connecting technologies and integrating data.
 - New types of services, including such things as Internet transcription services, or research and reference services to place the right content at one’s fingertips at the right time.
3. Doctors are unable to access the people, information or other resources they need in order to provide quality care in a time-constrained environment.
Technology implications:
 - A secure, reliable system whereby patient records can be shared among appropriate practitioners, particularly needed are standards for data sharing and security systems for ensuring patients rights of privacy.
 - A means for physicians to identify and/or locate experts, specialized providers or others with whom they need to collaborate (both short term and long term) to provide better quality of care.

Introduction

Health care in America, we are told, is in a state of crisis. In newspapers and professional journals, on the television and over the radio, stories and articles convey a growing sense of frustration. From patients to payers, from physicians to pharmacists, everyone seems to agree that changes are needed. However, that is where the agreement ends. As quality of care becomes an ever greater concern, as more Americans move to managed care programs, and as alternative approaches to medicine continue to proliferate, strong differences of opinion, sometimes mutual distrust and even blame, have arisen among the various participants in the American healthcare landscape.

Statistics Brief: Number of Americans in managed care, 1984: **15 million**
Number of Americans in managed care, 1995: **50 million**
Number of Americans in managed care, 1997: **67 million**

(Source: Agency for Health Care Policy and Research, and National Center for Health Statistics)

This paper reports on a project undertaken in Spring 1999 by a team of researchers at Intel Corporation to better understand the delivery of health care in America. Our goal was simple: observe life in medical clinics “on the ground” to put a human face on the rhetoric and statistics, and to understand the context, in order to begin to identify ways in which computing technology might alleviate some of the problems and enhance the quality of patient care. Thus, as our culture begins to rethink health care, we are taking that opportunity to rethink what exactly computing can become.

Ethnographic Research – Delving into the Everyday

The research team was composed of members of two groups within Intel, the Internet Health Initiative, which works with the health care and technology industries to help bring the benefits of the Internet to health care providers and consumers, and the End User Driven Concepts group, composed of anthropologists, psychologists, communication scholars and engineers whose mission is to identify new uses and new users of computing power through real-world, qualitative research. Such research is often referred to as “ethnography,” a set of methods coming from the field of anthropology. Ethnography emphasizes understanding real people “in the wild,” in the midst of their daily lives and activities, and, as much as possible, from their perspectives. In this case, we set out to examine the point of health care delivery to observe for ourselves the rituals of morning rounds, waiting rooms, examinations and paperwork.

The focus of this project was on medical providers in their clinical settings. The goal was not to quantify or statistically document doctors’ problems, complaints or activities – all of which have been done thoroughly already – but rather to delve more deeply into daily life, to understand problems and activities in the context of the clinic. The ultimate aim of such an endeavor is to find innovative ways to bring technology to bear on the problems we discover. Ethnography in technological design is as much about inspiration as it is about documentation – the stories doctors told us and the observations we made of clinic life served as the basis for thinking about technology and its impacts. Obviously, to be sure our insights are accurate, we check our observations against whatever statistical information is available from other researchers. But we must emphasize both the exploratory nature of this research and the purpose it serves – this report is not intended as any definitive treatment of either the complex landscape of medicine in America today nor of the exact roadmap for or consequences of technology in that landscape.

Our research team examined more than a dozen medical sites, from high-tech teaching hospitals to low-tech clinics, from urban complexes to the simplest rural settings, from primary care providers to specialists including obstetricians, oral surgeons and ophthalmologists. The team interviewed nearly one hundred health care workers, including physicians (who constituted the largest single group of subjects to be interviewed and observed) nurses, medical assistants, administrators, front desk staff, insurance plan managers and even janitors. Beyond interviews, the team engaged in prolonged observation in clinic settings. We captured over a thousand digital photographs, recorded video, and logged detailed notes on many aspects of clinic life: from patient encounters to hallway conversations, from the broadest physical layout to the more minute uses of the telephone, from doctors’ scribbles on paper charts to their (sometimes pleasant, sometimes painful) use of personal computers. Following are a few of the key issues which emerged in the midst of this detailed study.

Key findings: Quality, power, technology and the frustration flashpoint

Why is the frustration in the medical community so acute right now? What are the key issues facing doctors? Though there are many and the interrelationships are complicated, we have focused on three key issues affecting health care providers in their daily work lives: A growing feeling of loss of control over their practice of medicine; a sense of being buried under administrative overhead; and a sense of being poorly connected to the people and resources they need to help them do their jobs better. The following points explain the relationship between changing paradigms and practices in more detail.

1) Increasing patient loads, decreasing face time lead to both doctor and patient frustration

Physicians find themselves feeling increasingly powerless as the health care industry undergoes dramatic changes in organizational structure and business operations. This powerlessness affects everything from the quality of care physicians feel able to provide to the structure of their daily schedules. "Our doctors are being squeezed from both sides," reported one administrator, "on the one side by litigation if they fail to do enough, and on the other by insurance companies and payers if they over utilize." Thus, doctors feel no room to maneuver within the politics of practicing medicine.

While studies disagree on the exact time doctors spend with patients, there is a strong perception among both doctors and patients that face time is decreasing.

Statistics Brief: Consumers Opinions of Doctors (percent of U.S. adults who agree with statement)

- Doctors spend less time with patients now than 10-15 years ago ---- 77%
- Most Doctors are hurried --- 65%
- Not satisfied with duration of doctor's visit --- 47%

(Source: Yankelovich Monitor, 1999)

No less than patients, the doctors we encountered voiced concern about the lack of face time. One doctor called the daily routine of patient visits "the frenzied fifteen minutes of factory line frisking." Doctors in independent clinics are also concerned with the increased numbers of patients they must see in order to operate profitably. "A few years ago, we saw twenty-some patients per day. Now we're seeing well over thirty. We have to, just to pay the bills. That's the way the industry's going." Thus, in both managed care and fee-for-service settings, their desire was to somehow extract more time from their day to either see more patients or spend more quality time with the patients they already have scheduled.

Increasingly, clinics are using systems to triage patient needs. In one obstetrics clinic we observed "phone nurses" as they dealt with a steady stream of patient inquiries, both in person and over the telephone. While this solution was helpful in handling more patients more efficiently, there were still problems when nurses needed to escalate problems to the rest of the clinic. Furthermore, as one administrator put it, "The advice nurses burn out fast--it is such a stressful job that we try not to leave any nurse in that predicament for too long or we'll lose them."

Technology needs

1. Physicians need more tools and information to help them manage workloads with more efficient managing of patient concerns. Many clinics already make use of triage desks, phone nurses, and other means, allowing doctors to spend more time with the patients who really need them. Many of these triage systems would benefit from better integration and messaging capabilities, and better logging of and access to patient histories, allowing an easier and more integrated escalation process.
2. Doctors and clinics need better access to information to develop a more broadly shared set of best practices among peers, and a better system for determining agreed upon standards for the delivery of care. As one clinic CFO told us: "If we could install a system whereby our own doctors could review treatments and outcomes, and develop both standards and cost recommendations based on that knowledge, we would have a system that everyone could start to feel good about."

2) Paperwork – doctors cite the distraction of paperwork as one of the key reasons why the quality of patient care is suffering.

One of the most recognizable images of clinic life is the doctor holding the patient's chart. In fact, paper charts represent decades of evolution in the practices of documentation and record keeping. In some respects, paper works very well: it is easily visible, it is easy to share among people around the local environment, and it is portable – doctors can carry it from their office to the examination room with ease.

In addition, collaboration and the accumulation of a patient's history can happen on the chart, as doctors and nurses add notes and additional records to a pre-existing chart.

But as the industry is changing rapidly, the long evolution of paper use in the clinic now creates many problems. One problem is the sheer duplication of work that paper use entails. Consider the simple task of prescribing medications.

Statistics Brief: A recent Agency for Health Care Policy and Research (AHCPR) study found that just one type of error—adverse drug events (ADEs)—caused 1 out of 5 injuries or deaths per year to patients in the hospitals studied.

Part of the blame for such errors lies in the mire of paperwork involved in prescribing. When writing a prescription, many doctors must typically engage in up to four different kinds of paperwork activities, often with four different types of paper:

- 1) **Researching:** Doctors must consult a handbook listing drug interactions before writing a prescription. These books are updated monthly, and contain thousands of pages. Then there are other references, including standard laboratory request and diagnosis codes (the “ICD-9”), the physician’s desk reference, and others.
- 2) **Chart consulting:** Physicians must know the history and record of prescriptions already given to the patient (as listed in the chart). Even finding a chart can be a time consuming task, as discussed below.
- 3) **Documenting:** The physician typically writes the prescription for the patient on a letterhead pad. Beyond this simple act of documentation, of course, is the task of documenting the entire consultation, through a combination of form filling and dictation.
- 4) **Coding:** The physician must document the fact that a prescription was given in a report for the clinic’s records, which usually involves filling out forms with specific codes for the type of consultation, the patient’s condition, and, of course, the prescription.

And that’s just the physician! When patients want to re-fill a prescription, other members of the clinic staff must go through additional document hunting and paperwork just to make it happen. This paperwork load is multiplied by the number of patients seen during a day, and by the number of different types of research and record-keeping activities that occur in each clinic (e.g., referral to specialists, lab requests, x-rays, the use of supplies such as bandages, and simple admittance and scheduling).

With all this paper, there are many places at which mistakes can be made. Without automatic drug interaction checking and subsequent recording, physicians consistently run the risk of accidentally failing to catch important drug interactions.

Technology needs

1. Doctors need the tools to create, access or otherwise utilize information resources in the midst of daily workflow. Specifically, doctors should be able to spend more time with patients if some of the administrative work were handled automatically in the midst of patient encounters, rather than “after the fact” (as is the case with form filling, dictation and other current administrative tasks). This means going beyond the PC in the examination room. A handful of physicians have already experimented with PCs in the examination room, and many of those point out that the PC engages the patient more actively in their own care by making their records visible. “It makes the patient feel like a more active participant in the process when he or she can look at their patient record with me,” reported one doctor.
2. Other physicians, however, have argued that the PC would be disruptive in the examination room. Given the many different types of clinics, doctor’s interaction styles, and other variables, it is clear that new types of interfaces will be needed to digitally record information as it unfolds in the patient encounter. This means new form factors, such as tablet style computers, new types of connectivity, including radio frequency networks, and new modalities, including voice input or audio output.

Through careful integration, many of the duplicated or time-consuming steps, which now distract doctors, can be eliminated.

- If, when preparing a prescription, for example, a physician could simultaneously access patient history, drug interaction information, an on-line prescription order form (saving the patient the task of carrying the prescription note to the pharmacist) and the clinic records, the act of writing a prescription could be made both far more efficient and, in fact, far safer.
- As a second example, consider the case of dictation – written transcripts are still a legal requirement in the industry. Imagine if a physician could have her standard reporting of patient status automatically captured in the midst of a patient encounter, converted to text (in a “best fit” approach given current technological capabilities) and then sent over the Internet to a transcription service. The physician could spend that much more time with the patient, rather than scrambling down the hall to give transcription before the next encounter or, worse, being forced to recreate transcription from scanty notes at the end of the day.

3) Health care providers lack access to the people, information or other resources they need in a timely fashion. Seamless collaboration does not currently exist in the industry.

There are other problems with paper for patient record keeping – perhaps the most obvious is that paper is a very poor medium for centralized data storage. This is true for a number of reasons.

- 1) Paper charts take up valuable real estate. Clinics put chart racks wherever they can fit them, in electrical closets, bathrooms, and even examination rooms. Many of the clinics we visited had rented space at nearby self-storage facilities to keep all charts older than two years.
- 2) Paper charts can easily be lost. We watched a medical assistant at one clinic search for well over an hour for a lost chart. In the course of this search, she recruited the help of another MA, two nurses, and a physician, all for short periods of time, to help her locate the chart. She also inadvertently upset a stack of unused charts, which spilled onto the floor scattering papers everywhere. She eventually found the chart she wanted at the clinic’s admissions desk.
- 3) Paper charts do not support collaboration at a distance. Although faxes and courier services are common in the industry, paper simply can’t travel fast enough to meet the complex, real-time needs of doctors. Doctors across the country or even across town need better systems to support real-time sharing of patient information.

Our research showed that one of the most common sources of inefficiency within clinics was time spent waiting on the telephone. Whether for checking the status of patient referrals, checking patient eligibility for treatment, attempting to reach a colleague or specialist for consultation, or simply updating prescriptions, significant amounts of staff time were spent “on hold” with various institutions and agencies.

“We have a medical assistant who spends fifteen hours per week on the telephone just calling around to the different emergency wards around the city, checking to see if any of the patients in our plan had been treated there.... That’s just insane.” (CFO at a small clinic in the Northwest).

Technology needs:

1. A secure system for storing and sharing information accessible by all relevant and permitted health care providers, regardless of time or location. Such a system implies far more than simply “electronic medical records” as those have currently been imagined. Systems must be both open and secure, so that interconnecting networks of care can interact freely, while at the same time preserving the privacy and confidentiality due the patient.
2. Better identification and location tools. Doctors complain of wasting time on the telephone looking for colleagues, specialists or others on whom they depend both for long-term and short-term collaboration. By providing doctors who are geographically separated with the means of easily, quickly and unobtrusively communicating with each other, the timeliness and therefore the quality of patient care can be improved.

Conclusion: Demands and opportunities for new technologies

Signs of hope

Amidst the often bewildering changes now facing medical practitioners, there are definitely reasons to be hopeful about the potential benefits of new technologies. As mentioned, many physicians have already begun to include PCs in examination rooms, and have attested that, by sharing information on-screen with the patient, they have changed the doctor-patient relationship for the better. There are other signs of improvements as well: an integrated electronic medical records system at a large HMO in Oregon, for instance, provided medical staff with the ability to check on many aspects of a patient's status quickly, easily and from the physician's desktop computer. By integrating lab results, radiology and other imaging results, and the information on what all providers are doing with a patient, physicians can provide much more integrated and responsive care to their patients. "Ultimately it's about the quality of care," noted one physician. "With (an integrated) system, we're able to provide better coordinated care to our patients, and also control costs."

The costs of changing systems – bit by bit or all at once?

But, of course, there is a long way to go in the process of leveraging the power of computing, particularly the Internet, in the improvement of the quality of care. As new technologies become available, doctors realize that their practices and systems need to change, but they also feel overwhelmed about where to start. Do they bite off a small chunk of technology, knowing that it will not integrate into current systems, or do they overhaul their entire practice? New technologies require major investments of capital and, perhaps more importantly, time. Every clinic expressed a common concern: "How do we innovate our information systems when we can't stop the flow of patients to figure it all out?"

While nearly all of the clinics in our study did include multiple computers, few enjoyed the kind of integration necessary to truly provide seamless care. By implementing a sort of "piecemeal" approach to computing technology adoption, practitioners in many clinics are left to learn a variety of different user interfaces, passwords, and other protocols just to accomplish the simplest tasks. In such cases the power of computing is not being utilized to its full potential, and it causes as many disruptions as it solves problems. Most importantly, Internet use among physicians is still surprisingly low.

Statistics Brief: Percentage of physicians using the Internet at the start of 1999: 43%
(source: Cyberdialogue, 1/99).

Most common physician uses of the Internet (source: American Medical Association)

- 83% access sources such as Medline
- 72% travel information
- 65% product information
- 59% professional association communication
- 58% surf the web/entertainment
- 57% drug information
- 56% financial information
- 53% business news

Our research has shown that, indeed, there is tremendous potential for the Internet in the health care industry. Doctors, payers, and patients, among others, are all calling for a system whereby all participants can share information more readily. This would have the effect of both improving the quality of care, and controlling costs more effectively and more equitably. The problems, however, are many. Our research, as described above, has identified two technology issues that must be addressed before computing power can really begin to serve the medical community. These are (a) a crippling lack of standards for sharing information and legitimate concerns about patient privacy and data security, and (b) the fact that the PC use is, at least in many cases so far, just another administrative overhead task which disrupts, rather than enhances, the doctor patient relationship.

This research is preliminary and is as much about identifying the right questions as exploring the right answers. It is our hope that further research will begin to focus on these two problems of integration – integrating "natural" work better into digital systems and integrating diverse digital systems better with each other. In the end, we hope to

integrate quality computing into the clinical environment -- in new form factors, in new devices, and through new services--so that doctors can pay less attention to the technological tools that serve them and focus first and foremost on delivering the best possible quality care to their patients.

Eric Dishman recently joined the End User Driven Concepts group at Intel Architecture Labs after six years at Paul Allen's think tank, Interval Research Corporation in Palo Alto, California. He conducts "real world" fieldwork and creative brainstorming sessions to inspire new products, services, and businesses that fit naturally into the lives of consumers. As a communication scholar, he specializes in analyzing interpersonal, small group and cross-cultural communication patterns. Eric can be reached at eric.dishman@intel.com.

John Sherry received his PhD in anthropology from the University of Arizona in 1995. After two years at Microsoft Corporation, he joined the End User Driven Concepts group at Intel Architecture Labs in November 1996. Like other members of the EUDC group, he specializes in observing and interviewing real people "in the wild", at home, at work, at play, with the goal of identifying new uses and new users of computing power. John can be reached at john.sherry@intel.com.