Symposium ■

The Future of the IAIMS in a Managed Care Environment: A Call for Private Action and Public Investment

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Abstract A national public and private "grand challenge" initiative should be undertaken to assure the American public that the telecommunications and computing revolutions improve health care, health education, and biomedical and health services research, and secure accountability for cost, quality, and access. The initiative should focus on meeting the needs of the patient and society at large. It needs to be a national vision, but it also ought to have regional focus. A plan for action would include a health-infrastructure strategy, a service strategy, an education strategy, a research and development strategy, and an international-linkages strategy. Without this type of initiative, health care will lack the basic building blocks it needs to more effectively deal with the transformational forces that have already been unleashed. These forces will strengthen or weaken health care in the next century depending on whether and how the nation—including the leadership in health care and the informatics community—responds to this challenge.

■ **J Am Med Inform Assoc.** 1997;4:March–April Supplement:S65–S71.

Stead asked me to begin by responding to two questions on the future of Integrated Advanced Information Management Systems (IAIMSs) in a managed care environment. First, will health care organizations or integrated delivery systems actually build IAIMSs in a managed care world? Second, can we overcome barriers related to costs and past failures to produce? Quite succinctly, my answer to the first is no, unless we become organized enough to accomplish the second. Before explaining my rationale for this response, I provide three caveats. First, an important variable in the analysis of the future of IAIMSs is how broadly or narrowly we define the IAIMS concept. In light of the forces that are described below, I encourage a broad and bold definition of the IAIMS in the future. Second, although most of my comments refer to academic health centers (AHCs) because they are the birthplace of the IAIMS and have been the primary focus of IAIMS activity, I consider the concept of the IAIMS not only applicable, but also vital to all of health care. Third, it is difficult to distinguish the impact of one of the major forces shaping the health care environment (i.e., managed care) from the impacts of other forces that will also contribute to the development of health care in the next century. Thus, I briefly discuss the set of forces that will affect the future of the IAIMS.

Transformational Forces

When individuals and organizations face major challenges with great opportunities, they need to leverage them against emerging social and technological forces. AHCs became the creatures they are today because they rode the wave of National Institutes of Health research in the 50s and early 60s and then Medicare funding in the 70s and 80s. So, too, today there are mutagenic forces in modern health care that will either shape or break AHCs and other health care delivery organizations. These transformational forces include: managed care, public accountability, demographics, biomedical and biotechnical research and innovation, and informatics and communications.[1]

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Presented at the IAIMS Consortium Symposium, Vanderbilt University, Nashville, TN, September 27, 1996.

While the first three forces are particularly difficult to respond to, all five create enormous opportunity for us. The good news for those of us interested in integrated information systems is that such systems have significant potential to help individual institutions and health care in general survive the tumultuous times ahead. As I describe below, however, potential alone is not sufficient to achieve success.

Managed care, the most dangerous of the forces for AHCs, is spreading. According to 1995 data, only 35% of the population is still covered by traditional indemnity plans.[2] Managed care is a complex concept that sounds relatively harmless at face value. As identified by the Institute of Medicine, features of managed care include: complex organizational relationships, more explicit financial incentives for both providers and members or enrollees than is typical in a fee-for-service arrangement, coordination and integration of services, defined access to the physician panel and services, strong controls on utilization, and accountability for an enrolled population and quality of care.[3]

The metaphor that best describes what is happening today with managed care in this country is a strip mine. Essentially, we are strip-mining our health care system. To switch metaphors, there is an Indian proverb that says, ''No one should test the depth of the river with both feet.'' That is essentially what we have done as it relates to managed care and capitation and our health care system.

The focus of managed care to date has been on price, price, and price. In a few markets it looks like there is an increasing attention to value, which ultimately you would hope would turn to an interest in securing people's health. Right now, however, we have enough questions about what will happen to indigent and underserved populations that it should give us all very serious cause for concern. The indigent and uninsured populations are growing rapidly, and this cuts into the quality of Americans' lives. Do we really want to see this worsen? There is a Russian proverb that is increasingly appropriate to health care in the U.S., ''The shortage will be divided among the poor.'' Beyond access to care, there are also serious issues about the double agency of physicians and other health professionals.

Public accountability refers not only to reports on performance for managed care contracts but also to government audits for fraud and abuse related to Medicare funds. While increasing attention to accountability is an appropriate action for the government and AHCs, it is likely to have a major impact on resources for AHCs. We may see a billion dollars wrung out of our AHCs over the course of the next couple of years because of these concerns of the federal government. If this trend continues and the penetration of managed care spreads, AHCs must begin to ask more vocally where the public's accountability is with respect to providing health care for the indigent and uninsured in this nation. AHCs are facing increasing financial pressures, and in some cases are truly struggling, yet we continue to deliver 45% of the care to the underserved in this country. Our ability to continue to provide this needed care is being seriously undermined.

The call for more accountability is also receiving increasing attention from the public. In a recent *Fortune* article, Andy Grove described how, when confronted with an elevated prostate-specific antigen level, he conducted his own meta-analysis.[4] His motivation for this effort was the fact that he could not find an adequate analysis in the medical literature or through physician consultation that would allow him to sort through the literature and determine the best information on which to base the management of his own health and health care. Informed citizens assuming greater responsibility for the management of their health will increasingly challenge health care professionals to provide evidence for their clinical recommendations. We must help them.

Demographics—particularly the size, geographic distribution, and age distribution of the population—will shape critical health issues globally and in the United States in the next century.[5] Even with population rates slowing in many countries, an estimated 8 to 11 billion people will live on earth in the year 2020, with an estimated 300 to 400 million people living in the United States. The sheer number of people will exacerbate many of the issues that we face as a society and that heretofore our political structures have not been able to resolve. Moreover, by the year 2020, more than 20% of the U.S. population will be over 65 years old. The health care system will need to be ready to take care of these aging citizens, whose ailments will be more complex and expensive to treat than those of younger people. Home health care clearly must dominate our approach.

Much can be said about the impressive discoveries of biomedical research and results of technological innovation in health care in recent decades and the impacts they have had on our ability to improve the quality of life of our patients. To illustrate crudely the growth in the volume of medical knowledge, at the beginning of this century the *Index Medicus* weighed 10 pounds, and in 1990 it weighed over 130 pounds.[6] The steepest rate of growth has occurred since 1970,

and growth continues geometrically. Yet health care providers need the ability to manage the huge volume of new knowledge that has emerged to take advantage of these dramatic advances. Of particular concern to AHCs in light of revenue reductions from other sources is whether, at what level, and from what sources funding for research will continue. Equally important to all health care organizations is the question of how professionals can stay current with such a quickly-changing knowledge base.

As Vannevar Bush said during the 1940s, ''The world has arrived at an age of cheap complex devices of a great reliability and something is bound to come of it.'' The same can be said for informatics and communications networks. Early adopters of computer-based patient record (CPR) systems are reporting that these systems contribute to quality improvement and cost reduction of their services.[7,8] Moreover, the phenomenal growth of the Internet and the development of browser software have made the nation's information infrastructure increasingly accessible. Finally, both high-end and low-end telemedicine technology continue to diffuse, and although comprehensive evaluations are not yet available,[9] this technology shows promise, particularly in the triage of patients in remote areas and in providing cost-effective continuing education for health care professionals.

A View of AHCs

Academic health centers still show great interest in pursuing zebras—very rare diseases and novel ideas—but are beginning to show some signs of change toward greater direct responsiveness to society's concerns—the more common horses around us. Of greater concern is the fact that too many AHCs riveted their attention on managed care and maintaining traditional revenue streams rather than on becoming irreplaceable in the minds of their communities and regions by responding to clear health care needs that were previously unmet. Steven Shortell recently provided a rather chilling yet accurate assessment of the future of AHCs when he noted that AHCs will not be competitive based on their current competencies.[10] We must learn new skills and apply them.

There is a tendency for AHCs to see themselves as being totally local entities, but in reality they are heavily national organizations as well. For example, the University of Virginia, a state-supported health sciences center, gets two federal dollars for every state dollar. Yet most of our faculty members and their leaders get up in the morning and go to bed at night worrying solely about competing for health care enrollees in the 11 counties around us. In the future, success will come to AHCs only if we think and plan as both local and national entities. Given our constituencies and future markets, our strategy must of necessity be a complex one if we want to maintain anything close to the scale of our current enterprises. Unfortunately, too many AHCs seem to be playing a holding game, waiting to see who moves first and then reacting to it rather than laying out their own strategies oriented to success in the future. George Wills' Law of Holes applies to our situation, ''The first Law of Holes is that if you find yourself in a hole, stop digging.'' We have heard this sentiment in various ways during this conference. Our institutions, however, are still having trouble taking this advice.

Currently, about half of the world's information technology (IT) spending in major industrial markets is in the United States, although expenditures outside the United States are increasing.[11] Estimates of spending within the United States indicate that the health care sector spends approximately 3% of its budget (or less) on IT, compared with other information-intensive industries that spend 8% (or more).[12,13] This wide discrepancy may be explained in part by the fact that until recently health care was predominantly a cottage industry. Yet, even with only 3% of health care budgets allocated to IT, the expenditures are not trivial.

The University of Virginia Health Sciences Center is almost exactly midsize for academic health centers in size and budget. It currently spends approximately $20 million on IT. If one extrapolates in rough terms, the 125 AHCs in the United States are spending about $2.5 billion on IT. If you were to reach an 8% investment in IT in health care, we would be talking about $7.25 billion. Thus, there is roughly $5 billion of underinvestment in IT for AHCs alone, excluding the rest of health care. Given the information-intensive nature of the health care industry, a range of investment from 6 to 10% is not unreasonable. In any event, the idea of expecting the norm ultimately to be 8% is not wildly out of line.

Returning to the initial question raised in the introduction and rephrasing it in terms of these admittedly rough calculations, ''Will managed care companies and AHCs come up with 5 billion dollars of additional new investment in the near term?'' ''No.'' Obviously, I would prefer the answer to be ''yes.'' As a result of this admittedly thumbnail cost analysis, I have concluded that we need to develop this issue into a challenge—a challenge to the entire nation. At the same time, however, we must address two related challenges that arise from the mutagenic forces in health care.

Grand Challenges for Health Care

Our country actually likes grand challenges when it understands and grasps them; indeed, our nation really responds to a well-articulated vision. As Edwin Land has said "Don't undertake a project unless it is manifestly important and nearly impossible." Each of the three challenges that follow meets both of these criteria.

First, we live in a time when we have the opportunity as well as the responsibility to make clinical medicine much more scientific. Today we have less and less of an excuse for doing things the way we have always done them. Fully developing and appropriately applying the health-evaluation sciences (i.e., biostatistics, clinical epidemiology, health services research, and informatics) are indeed major challenges for health care. Without these tools and their widespread application, our ability to address growing biomedical and biotechnical ethical questions is hindered and we will be providing less effective and more expensive care to our patients.

Significant hurdles must be overcome as we strive to integrate these disciplines with the continuing growth in the biomedical and psychosocial sciences. Perhaps more difficult is the task of convincing the public that maturing these emerging sciences is worthy of public investment. Assessing and managing the diffusion of technology, developing clinical guidelines, and eliminating useless medical procedures as a result of these kinds of studies are just now occurring on a limited scale. We have not, however, carried this message far enough either within our institutions or to the public to build the support that is needed. As Reed Gardner reminded us when he described the work of LDS Hospital and Intermountain Health Care on their CPR system at the 1995 Nicholas Davies CPR Recognition Symposium, our successes will ultimately come from process control and not retrospective analysis. Full development of the health evaluation sciences depends in large measure on the use of robust information systems that track processes and outcomes. Only when such data are available are we able to manage processes and make a difference. The challenge of making clinical medicine more scientific is a fairly complex one when you consider all its implications, but evidence-based, value-driven health care is an imperative.

Second, just as we must strengthen the scientific basis of clinical care, we must confront the moral implications of our information technology. Perhaps most familiar to us is the issue of protecting privacy in the information age.[14] Yet as health care delivery becomes more dependent upon information technology, are we implicitly allocating better health care solely to those who have access to the technology? Moreover, as a field, we have not begun to confront the fact that software is not necessarily value-neutral. We need a new field of biotechnical ethics that looks at how we create software that essentially integrates desired values within the applications. This is a whole scholarly discipline needed for us to keep pace with technological developments. These two challenges could keep us very busy for at least a couple of decades and will utilize the skills of individuals with a wide range of interests, but the third challenge, which follows, is the most important and requires our immediate attention.

A National Health Information Infrastructure Initiative

Given that health care is heavily based upon reliable, timely, and secure information, the third challenge is to assure the American public that the telecommunications and computing revolutions improve health care, health education, and biomedical and health services research, and secure accountability for cost, quality, and access. How could we possibly hope to pull this of? To start, we need to remind ourselves that as health care professionals and institutions, we are engaged in noble work and that others who believe in our work are likely to pay attention to us. We ought to build on this strength.

Many of us would prefer to focus on the need to evaluate and demonstrate effectiveness of information systems. In my opinion, this is not where we should put all of our efforts. A recent survey of health leaders in the country suggests that we need not spend a huge amount of energy trying to make our case based on an evaluation of effectiveness.[15] According to the results of this survey, America's health leadership today is very bullish about our work and what it holds for the future. When asked, "Will information technology increase or decrease the cost of care in the next five to ten years?" 48% of the sample of America's health leaders said it would decrease care costs and 43% said it would not make a difference in the cost. Two to one, they believed that information technology would help people get affordable health insurance, and 90% thought information technology would get more and better health information to the public. Two to one, they said that in five years, 75% of physicians would be using CPRs. I do not know whether we deserve this level of confidence or not. Regardless, we have got it for the moment, so we might as well ride it. We must develop a clear plan that is quite grand, com-

prehensive, and understandable and take it to the country.

What should this grand plan look like? First and foremost, it should focus on meeting the needs of those that we serve—the patient and society at large. The vision needs to be broad and it needs to be inclusive. It needs to be a national vision, but in my view, it ought to have a regional focus, too. Five key components of the plan would include a health-infrastructure strategy, a service strategy, an education strategy, a research and development strategy, and an international-linkages strategy. It needs to be something that people can read and that will grab their consciences as well as their commitment.

The infrastructure strategy would describe how regional collaboration combined with planning grants, implementation support, tax incentives, and loans will allow us to build a true infrastructure across the whole country. The specific objective would be to build integrated area-wide health information networks capable of reaching all citizens and health care provider organizations and professionals within five years and capable of broadband transmission within ten years. Those individuals and organizations that already have experience building regional networks will be instrumental in defining the functionalities these infrastructures should offer, in developing realistic budgets, and in identifying financing mechanisms that will create appropriate incentives for private-sector investment.

The service strategy would address how to use the infrastructure to broaden access to services. We have both major discipline specialty inequities and the issue of increasing geographic maldistribution, and the plan must ensure that we use telecommunications tools to move toward universal access. Specifically, low-end telemedicine should be explored as a means of providing home health care for major chronic illnesses where education and home management have shown to be effective. This strategy would build upon the CPR needed for direct delivery of health care in a system integrated from primary care to tertiary care. The strategy should seek to offer quality care at low cost with capability for evidence-based medicine to shape the processes of care where needed and for computer-based solutions to minimize administrative costs.

The education strategy will seek to educate all citizens about health and its maintenance. Programs should enable interested citizens to monitor their own health status and participate via electronic mail and other means for specific education at minimal cost. A key issue to be explored is how good the information available on the Internet is. Our job is to create the processes for quality control of that information. The education strategy would also include a reinvention of the education of health care professionals to allow basic education at parent educational institutions and decentralization through network connections for subsequent training, with mechanisms for evaluation and accountability built into the system.

The research and development strategy would include a major effort to mature three kinds of computer-based health records with cross-connectivity. First, the CPR will be used for direct delivery of medical and other health care services from professionals. Second, the computer-based population record will ensure that the CPRs are constructed in such a manner that administrative, public health, and related objectives can be achieved. Population-based performance assessments of providers in regions and the quality of health plans will be part of the strategy. The goal is to tie direct assessment of regional health status to public and personal health planning. Third, the computer-based personal or customer record system will offer citizens a means of interacting with their health care providers, accessing reliable medical literature, and tracking key data needed for monitoring and maintaining their own health.

The international strategy would have at least three foci. First, it would create a process for keeping data dictionaries and standards updated nationally and internationally. Second, it would identify global health issues for which the U.S. health care system must be prepared so it can assist progress in global health. Third, it would identify information technology developments in other countries that would benefit the United States, and vice versa.

The strategies developed must address the fact that in addition to health care's being significantly underinvested in IT, we are still looking at our future investments using our current spectacles rather than creating a future-oriented agenda. For example, there is still a disconnect between the single-vendor strategies of the past and what we think is the more appropriate approach for the future—modules with flexibility and an infrastructure that allows for pieces to be added over time. Integration, integration, integration has got to be the way this vision rolls out.

There are also some serious policy issues that need to be part of a comprehensive strategy. For example, issues of security and confidentiality have the potential to derail the promise of all of this if we do not take them into account. The survey of health leaders on information technology also suggests that despite their optimism they have concerns about IT. Eighty-

five percent thought that full medical records would be on computer networks and 80% believed that the risk of information's being read by people without authorization would increase. On the other hand, 90% of these experts had confidence that physicians, nurses, and researchers would maintain confidentiality requirements; when it came to insurers and employers, that level dropped to 52 and 57%.

Broadening the second question raised in the introduction, "How do we overcome barriers to a robust health information infrastructure that includes integrated advanced information systems?" Well, we must be creative and tap the resources of the many players who are already at work on various elements of such a plan. The IAIMS Consortium constitutes a major portion of the brain trust that is needed. Other key groups—including the Association of Academic Health Centers, the Association of American Medical Colleges, the American Medical Informatics Association, the Medical Library Association, the Computer-based Patient Record Institute, Healthcare Open Systems and Trials, representatives of the vendor community, and selected government agencies (e.g., the Department of Health and Human Services, the Department of Veterans Affairs, the Department of Energy)—can all contribute to building the case for why and the plan for how this success can be achieved.

I challenge the IAIMS Consortium to demonstrate leadership in this arena because you have a solid base of experience from which to draw, with accompanying credibility that will enable you to get things moving. Further, given the support that your institutions have received from the federal government to pursue IAIMS projects, now is the time for you to help move the IAIMS beyond the AHCs. One approach for tackling this endeavor is to establish a set of very-short-term, highly focused task forces to describe each of the strategies identified above and define how the strategies interrelate. An important part of this process will be to examine the best practices that we have as models, extrapolate what it would cost to replicate them, and from that build the plan, which would include estimates of what we need to diffuse some of the riches and brilliance evident in the leading IAIMS institutions.

As more and more research demonstrates, there are a lot of opportunities for reducing costs. IT investment in health care, costs money but it also makes money. Don Lindberg has suggested that IT investments are like aerospace investments. You must commit a lot of the investment up front before you begin to reap huge benefits. The point is that you have to commit to a substantial scale of investment. Only our national government is in a position to make that kind of commitment. Once the initial investment is made, however, the private sector, including the telecommunications industry and others, will weigh in and carry it forward.

Conclusion

In 1913, John Shaw Billings, who was director of what became the National Library of Medicine, said, "There is nothing really difficult if you only begin—some people contemplate a task till it looms so big, it seems impossible but I just begin and it gets done somehow. There would be no Coral Islands if the first bug sat down and began to wonder how the job was to be done." We can continue taking our own disaggregated approaches and worry about where current forces will take us. Alternatively, we can decide that this is the right time for the right idea. We can build the strategy and make the argument for greater public investment so that telecommunications and computing can help health care reach its full potential.

James Hillman, in his book on kinds of power, said, "What ultimately gives one the power of leadership is the capacity to embody visionary ideas, to be unafraid of ideals."[16] I have heard a lot of idealism during this conference, and I firmly believe that you can provide the leadership necessary to make this grand idea a reality. If we fail to rise to this challenge, IAIMSs will suffer within and across our institutions. More importantly, however, health care itself will lack the basic building blocks it needs to deal effectively with the transformational forces that have already been unleashed. The resultant losses in human lives are simply unacceptable.

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