Study of Technology Adoption in California Medical Groups, IPAs, and Community Clinics

May 2002

Prepared for the California HealthCare Foundation by

Healthcare Change Institute

Acknowledgments

The Healthcare Change Institute (HCI) utilized the strength of its faculty, a multi-disciplinary team of academics, consultants, and executives to design and conduct the study and analyze findings. The faculty had considerable experience in managing, studying, and consulting with medical groups and other health care organizations. The faculty also had substantial experience in high technology development and adoption in California medical groups as well as in health systems and medical groups on the east coast who are experienced and advanced in technology adoption.

Core HCI study team faculty were: Jeff Oxendine, M.B.A., M.P.H., Founder and Executive Director of HCI at Brigham & Women's Hospital and Lecturer at Harvard Medical School and Harvard School of Public Health, Principal Investigator; Katherine Kim, M.B.A., M.P.H., former president and CEO of the Communications Technology Cluster LLC, Partner in Health Technology Group LLC, Project Leader and Manager; Judy N. Li, M.B.A., Director of Business Development, SRI International, formerly Stanford Research Institute; Thomas Rundall, Ph.D., Henry J. Kaiser Professor of Organized Health Systems, University of California, Berkeley; and Stephen Shortell, Distinguished Blue Cross of California Professor of Health Policy and Management, University of California, Berkeley.

Other HCI faculty who served as collaborators on the project were: Jerry Coil; Jack Silversin, D.M.D., DR.P.H., President of Amicus Consulting, Boston, MA; John Glaser, Ph.D., Chief Information Officer, Partners HealthCare System; Joan Rubano, R.N., Stanford University Medical Center; Dobbe Sangha, M.D., M.P.H., Lead Research Associate; Camila Chavez, Research Associate; and David Monaghan, Research Associate.

Margaret Laws, CHCF Director of Policy and Planning, provided guidance to the faculty and participated in the review of the research questions and methodology.

Healthcare Change Institute is a nonprofit organization dedicated to assisting health care organizations to more effectively anticipate, implement and achieve the intended results of major change initiatives. HCI was founded in 2000 to provide a greater availability of practical skill development, knowledge, coaching and consulting services to health care organizations regarding change management. Its mission is to improve quality of care and organization performance by increasing the capacity of health care organizations to change. Technology adoption is one of its priority areas of specialized interest along with integration, process improvement and physician practice management. A priority is developing physician, administrative, and nursing leaders and teams, who have greater knowledge, skills and tools to achieve the results of change initiatives. Improving patient care delivery, management effectiveness, and organizational performance are primary goals.

In addition to the grant from the California HealthCare Foundation, the HCI has undertaken consulting and research projects at Brigham and Women's Hospital in Boston and a major health system in Florida. HCI is planning a major conference on change management, sponsored by Siemens Medical Systems, for health system and hospital CEOs and COOs in spring of 2002. We are also collaborating with the Risk Management Foundation, based in Boston, to support

initiatives designed to achieve adoption of best practices to improve patient safety and reduce medical errors.

HCI was founded by and is housed at the Brigham and Women's Hospital, 75 Francis Street, Boston, MA 02115, 617-732-7828.

Inquiries regarding this project should be addressed to: Jeff Oxendine, Healthcare Change Institute, joxendine@partners.org, 617-732-7828.

Additional copies of this and other publications can be obtained by calling the CHCF publications line toll-free at 1-888-430-CHCF (2423) or by visiting us online (www.chcf.org).

The California HealthCare Foundation, based in Oakland, is an independent philanthropy committed to improving California's health care delivery and financing systems. Formed in 1996, our goal is to ensure that all Californians have access to affordable, quality health care. CHCF's work focuses on informing health policy decisions, advancing efficient business practices, improving the quality and efficiency of care delivery, and promoting informed health care and coverage decisions. CHCF commissions research and analysis, publishes and disseminates information, convenes stakeholders, and funds development of programs and models aimed at improving the health care delivery and financing systems. For more information, visit us online (**www.chcf.org**).

476 Ninth Street
Oakland, CA 94607
Tel: 510.238.1040
Fax: 510.238.1388
www.chcf.org

Contents

Executive Summary

Study Goal

In June of 2001, the California HealthCare Foundation (CHCF) provided funding for Healthcare Change Institute (HCI) to conduct a baseline study of technology adoption in California medical groups and clinics. The primary goal of the study was to identify opportunities for the Foundation and other organizations to facilitate more rapid and effective adoption of innovative technology solutions to improve quality of care and organizational performance in the California health care system. The study was completed December 2001.

Methodology

To fulfill the study goal, a multidisciplinary team from HCI utilized a written survey, focus groups, and an extensive literature review to obtain insights about technology adoption in medical groups and clinics. "Medical groups" consisted of independent practice associations (IPAs), medical foundations, and integrated medical group practices. "Clinics" consisted of community clinics, rural clinics, and federally qualified health centers. Management service organizations (MSOs) were asked to respond on behalf of a specific medical group or clinic.

For purposes of this study, information technology was defined as information systems and data exchange between medical groups and clinics and the key constituents (physicians, patients, payers and hospital/ancillary service providers) involved in the clinical and administrative functions of patient care delivery, financing, and operations. Medical devices and equipment involved in diagnosis and treatment were not part of the scope of this study.

Sample and Response

The 365 California medical groups and 60 clinics included in a database provided by CHCF were offered the opportunity to complete the survey and participate in a focus group.

Forty-eight medical groups and clinics from throughout California responded to the survey. Twenty-two medical groups, 22 clinics, and 4 MSOs responded. Of these respondents, 5 clinics and 4 medical groups participated in focus groups.

Limitations

The small intended sample size limited the depth and generalizability of the results, meaningful analysis of issues specific to medical groups and clinics as individual categories and to sub-groups within them. There is potential respondent bias in that the medical groups and clinics that responded may have a greater interest in or problems with technology. Finally, the fact that the study was sponsored by CHCF asking how it could assist organizations may have introduced some bias towards respondents emphasizing financial need. However, many medical groups and clinics are encountering significant financial challenges that limit their resources and ability to invest in technology.

Research Questions and Findings

The survey, focus groups, and literature reviews were designed to address five key research questions. The most significant findings related to each research question are summarized below.

Research Question #1: **How are California medical groups and clinics currently using information technology in the delivery of care and administration?**

Overall, medical groups and clinics participating in this study had very limited use of information technology to communicate and exchange information with any of their key constituents. Systems for administrative functions were far more prevalent than clinical systems. Electronic claims submission and email were the most commonly implemented systems across all constituent groups. However, respondents indicated a high level of dissatisfaction with these systems' abilities to meet functional requirements and user needs. Clinical systems such as electronic medical record (EMR) and disease management systems seem to be high priorities for medical groups and clinics in the next three years, with many groups already having plans to implement them in the next year.

Research Question #2: **How can information technology be used to improve quality of care, service, efficiency, and organizational performance?**

Survey and focus group participants responded that improving quality of care and service was their highest priority information technology objectives. Establishing an IT infrastructure capable of supporting future desired applications, improving information exchange with physicians and HIPAA compliance were also frequently mentioned. Further down the list were improving clinical decision support, information exchange with payers, information exchange with hospitals, and reducing cost of services. It is notable that improving information exchange with patients and improving patient safety/reducing medical errors were the two lowest ranked of the ten options provided.

To meet these objectives, the top priority information technology needs identified by survey and focus group participants were: electronic medical record, increased infrastructure, and practice

management applications. Improved EDI with payers and communications/Internet access were also frequently mentioned as priority needs.

Research Question #3: **How are decisions made about technology investment and adoption?**

The most significant message related to IT investment and decision-making from both the survey and focus groups is that medical groups and clinics do not perceive that they have sufficient financial resources to fund IT objectives and initiatives. Respondents indicated that IT investments are primarily funded out of operating revenues. This is difficult given the limited if any operating margins available and numerous competing other operating and capital needs.

Respondents indicated that IT decisions required administration and board approval. Increased operating efficiency, improvement in quality, and provider satisfaction were listed as the top priority decision-making factors related to IT. A high percentage of respondents lacked an IT plan approved by their board and having a chief information officer. These factors may contribute to the lack of awareness and use of innovative technology solutions and of organizations having sufficient plans and funding for their initiatives.

Research Question #4: **What are the barriers to more effective and accelerated adoption of information technology solutions to improve quality of patient care and organizational performance?**

Survey respondents and focus group participants indicated that successful adoption of technology is complex and requires many important factors such as the availability, awareness, and quality of IT solutions, leadership support, infrastructure, interfaces and training and support. However, at this point the impact of these critical factors is minimized by the dominant perception that most organizations do not have sufficient resources to invest in and support their priority IT objectives and initiatives.

When asked to rank the importance of major factors in successful implementation of IT initiatives financial factors were the most important:

- Greater access to capital
- Ability to access high quality IT services at affordable prices
- External funding for disease management or clinical applications

Financial factors were indicated as the most significant obstacles to technology by 85 percent of survey respondents. Lack of leadership support was the next most frequently listed obstacle (39 percent), followed by insufficient internal resources (33 percent) and lack of reliable/fitting products (26 percent).

The top three enablers of effective implementation were identified as leadership support (35 percent), capital (32 percent), and infrastructure (30 percent). Expertise, vendor support, and fitting products and staff adaptability were the next most frequently listed (14 to 16 percent).

***Research Question #5*: What can the California HealthCare Foundation and other organizations do to stimulate and enable the acceleration and enhancement of the adoption of information technology solutions?**

Common recommendations were:

- Access to funding (70 percent)
- Support for R&D, best practices, and standards (57 percent)
- Training (22 percent)
- Access to talent (8 percent)

Focus group respondents suggested the following specific initiatives:

- Provide education about technology in use and adoption successes from outside health care.
- Assist in evaluating the benefits of technology solutions and validating proven technology and vendor capabilities.
- Connect CIOs that serve community clinics and medical groups.
- Fund demonstration projects on innovations and incent and support collaborative projects among multiple organizations.
- Advocate through public policy channels for reimbursement of new, technology-based services such as e-visits.

In addition to these suggestions, HCI recommends:

- Development of case studies on successful and failed technology adoption efforts from within and outside health care and convene forums for discussion.
- Sponsorship of "visiting fellowship" opportunities for physicians, staff, or CIOs to spend time in settings that have successfully adopted technology.
- Further research on the process and factors related to technology adoption, including drivers of user dissatisfaction, objective measures of value or return on investment, development and evaluation of potential models for adoption including essential success requirements.
- Convening of skill development programs for physicians and executives regarding technology visioning, concrete strategic planning, and adoption.
- Support of a Web forum that would provide white papers on timely practical topics such as HIPAA, foster interaction among interested parties through discussion and information sharing, and provide a community of like-minded innovators.
- Connection to and funding for the use of external resources expert in change management and technology implementation with this target group.
- Development of models for alignment of incentives between medical groups and clinics and their constituents (such as hospital, payers, and physicians) for development of collaborative solutions.

The process of technology adoption is very complex and requires synchrony and success in multiple factors and stages. HCI's research indicates that there is a dearth of literature on practical models for technology adoption in medical groups and clinics. The model would

include an assessment of the key success factors and practical strategies for achieving them at each step of the process from awareness, selection, readiness and implementation, through user support, process change and results evaluation.

Conclusion

There are many ways that CHCF and other organizations can support more accelerated and effective technology adoption to improve quality of care and organizational performance. Based on this study, funding appears to be the most significant immediate obstacle to groups proceeding with technology investment. However, it is also clear that **assisting with funding is very necessary but insufficient**. Investment is only one of the first steps to technology adoption. To be successful clinics and medical groups will need support to perform well at all stages. This lack of support is one factor why even well funded and technically competent groups who did not have the appropriate change management resources have failed in technology adoption.

Healthcare Change Institute, founded by and housed at Brigham & Women's Hospital, Boston, MA. Inquiries should be directed to Jeff Oxendine, Executive Director, joxendine@partners.org.

I. Introduction

In June of 2001, the California HealthCare Foundation (CHCF) provided funding for the Healthcare Change Institute (HCI) to conduct a baseline study to inform CHCF and external stakeholders about the information technology infrastructure and adoption issues facing medical groups, independent practice associations (IPA), and community clinics in California.

The study focused on the following five key research questions:

1. How are California medical groups, IPAs, and community clinics currently using information technology in the delivery of care?
2. How can information technology be used to improve quality of care, service, efficiency, and organizational performance?
3. How are decisions made about technology investment and adoption?
4. What are the barriers to more effective and accelerated adoption of information technology solutions to improve quality of patient care and organizational performance?
5. How might CHCF and other organizations stimulate, enable, accelerate, and enhance adoption of information technology solutions?

Methodology

To address the five key research questions, the members of an interdisciplinary team from HCI developed and utilized the following methodology.

The study focused on two target groups:

1. **Medical Groups:**
   - Medical groups
   - Independent practice associations (IPAs)
   - Multi-specialty and single specialty medical groups
   - Medical foundations

- University-owned medical groups

2. **Clinics:**
   - Community clinics
   - Federally qualified health centers
   - Rural health centers

IPAs and medical groups were combined into one category that is referred to hereafter simply as medical groups. Also for the purposes of the study "information technology" was defined as information systems within and data exchange between medical groups and clinics and their key constituents (physicians, patients, payers and hospital/ancillary service providers) involved in the clinical and administrative functions of patient care delivery, financing, and operations. The focus was on infrastructure, applications that support and provide clinical and administrative functionality, and information exchange. Medical devices and equipment involved in diagnosis and treatment were not within the scope of this study.

Management Services Organizations (MSOs) that provide management and IT services to medical groups and clinics were also invited to participate in the survey and focus groups, but were asked to limit their responses to a specific medical group or clinic.

Sample

The target population of California Medical Groups and Clinics was derived from a database previously prepared for CHCF by the consulting firm of Catanneo & Stroud. At the outset of the study (July 2001) the database included 365 medical groups and 60 clinics. While all medical groups and clinics in the database were provided an opportunity to participate in the study, CHCF and HCI agreed that, given the study timeline and budget, a sample of 30 responses would be sufficient to meet study objectives. We attempted to enlist a sample that represented large and small medical groups and clinics from both Northern and Southern California. An additional objective was to obtain responses from both urban and rural medical groups and clinics.

Data Collection Methods

The HCI team utilized two primary data collection methods and also conducted an in-depth literature review.

Written questionnaires. Separate written questionnaires were developed for medical group and community clinic target groups (see Appendix A). The format and questions were identical except for categories of organization structure, which varied due to different circumstances of medical groups and clinics. Questionnaires were organized to address the key research questions, however they provided limited opportunity for respondents to answer in an open-ended manner. Focus groups were utilized to obtain more detailed and expansive responses.

Written questionnaires were mailed and faxed to all medical groups and clinics in the study database. Questionnaires were sent to the senior administrator and/or medical director of each organization. Contact information was obtained from the database. As an incentive for survey

completion, individuals who responded to the survey were offered an opportunity to attend an E-health Conference sponsored by the CHCF and U.C. Berkeley in December 2001.

In an effort to achieve the goal of 30 responses from a diverse sample of medical groups and clinics, a target list of 60 medical groups and clinics was established. The target list had a balanced representation of large and small, urban and rural, and Northern and Southern California organizations. Research associates made up to three phone calls and sent follow-up faxes to executives in these target organizations to encourage them to complete the survey. The executives were also offered an opportunity to have the associate complete the questionnaire via a telephone interview. In addition, Institute faculty called on personal executive and physician contacts to request that they complete the questionnaire.

Focus groups. All medical groups and clinics in the database were invited to participate in a focus group. Separate focus groups for medical groups and clinics were held in Oakland on October 9, 2001, and Los Angeles on October 11, 2001. As an incentive for participation, administrators and physicians were offered scholarships to attend the E-Health conference and priority consideration for any pilot technology demonstration projects that might be sponsored by CHCF. Focus groups were designed and facilitated by Katherine Kim and Judy Li, HCI faculty.

Focus groups were organized to obtain more in-depth insights into medical group and clinic decision-making and experience with technology adoption. To provide a framework and structure for the focus groups, facilitators guided participants through a series of questions about their successful and unsuccessful technology adoption initiatives. Participants were asked to discuss their decision-making and adoption experience with technology adoption initiatives—both those that they would consider successful and one that they would consider failures. A series of specific open-ended questions directly related to the research questions were also asked. Preliminary issues and findings from questionnaire responses were also discussed and probed further with participants. Questions about decision-making, adoption success factors, and the potential role of CHCF and others in supporting groups and clinics were discussed in-depth.

While focus group turnout was lower than desired in both Northern and Southern California, participants provided interesting and significant insights. Two clinics and one medical group were represented in the Northern California sessions. The Southern California turnout was three clinics and three medical groups. All focus group participants had also completed the survey. Focus group findings are incorporated into the summary of findings for each research question.

Literature review. In addition to the survey and focus groups, the HCI conducted an extensive review of existing literature related to technology adoption in Medical Groups and Clinics. The review includes both scholarly and commercial publications. Appendix B contains an index and abstracts obtained in the literature review. The HCI found a significant number of publications on information technology in health care. However, there was a dearth of publications on technology adoption in health care and very limited scholarly or commercial literature on medical group and clinic adoption. This indicates a significant need and opportunity for further research and publication in this area.

Responses

The target number of survey responses at the outset of the project was 30. This target response level was determined to be sufficient to meet the CHCF study objectives of issue identification and to provide a baseline for further work in this area. It was felt to be realistic given the aggressive time schedule for the study (four months from design to final report) and the grant budget.

The actual number of survey responses was 48. Twenty-two respondents were from clinics, 18 were from medical groups, and 8 were from Management Services Organizations (MSOs) responding on behalf of a medical group or clinic. The respondents were distributed throughout Northern and Southern California, and included two rural clinics.

Study Limitations

The study was designed to describe the current use of information technology and factors that enable or inhibit effective and timely adoption of technology in medical groups and clinics. It was also designed to identify potential opportunities for CHCF and others to contribute to improvement in these areas. The research questions and the methodology utilized were designed to generate this information and to provide a baseline snapshot of technology adoption in California. Neither the study nor the sample size was intended to produce statistically valid results that could be generalizable to all California medical groups and clinics.

The small sample size limited the ability to have meaningful analysis of issues specific to medical groups and clinics as individual categories and to sub-groups within them. It also limited cross tabulation analysis. The sample distribution did not permit meaningful analysis of factors such as urban versus rural, Northern versus Southern California or differences based on group/clinic size. Therefore, except where specified, findings reported will be combined medical group, IPA, and clinic results.

There may be significant differences between medical groups and IPAs in their approach to technology decisions, investment amounts, approaches, and other aspects of technology adoption. The combination of these two groups in this study may mask certain of those characteristics.

A certain number of study participants were recruited via telephone by faculty who have prior relationships. Thus the sample is not a random sample or necessarily representative of the all California provider organizations. There is potential respondent bias in that the medical groups and clinics that responded may have a greater interest in or problems with technology. Hence, the data presented here may be overestimated. All focus group participants were also questionnaire respondents and represent only a small subset of the group.

Finally, the fact that the study was sponsored by CHCF asking specifically how it and others might assist organizations with adoption may have introduced some bias towards respondents' emphasis on financial need. However, many medical groups and clinics are encountering significant financial challenges that limit their resources and ability to invest in technology.

II. Survey and Focus Group Findings

Research Question # 1: How are California medical groups and community clinics currently using information technology in the delivery of care and administration?

Survey respondents were asked to indicate the information technology applications and infrastructure solutions that they currently have in place and/or are planning to implement over the next one to three years. This information was obtained though a range of questions related to the status of implementation of IT solutions for communication and information exchange with key constituents (patients, payers, hospital/ancillary providers and participating physicians). Survey respondents were also asked to assess whether or not solutions they currently have in place are meeting their functional requirements, and how satisfied the primary users are.

The primary solutions in place and being planned for each constituent group and the level of satisfaction are summarized below.

Patients

Overall, the medical groups and clinics that responded to questionnaires and participated in the focus groups seem to have very limited information technology solutions in place to exchange information and communicate with patients. The IT solutions most commonly being used in medical groups and clinics to interact with patients are listed below. However, all of these systems were in place in less than one-third of the sample, indicating a currently low level of investment in IT to communicate or conduct business with patients.

- Email between physicians or other providers and patients (31 percent)
- Online eligibility information (21 percent)
- Automated health information (17 percent)
- Reminders (17 percent)

Notably missing were online scheduling and online patient satisfaction assessment. However, many groups indicated plans to implement these functions—as well as online results reporting and disease management—in the next one to three years.

Not only was the use of interactive technology with patients extremely low, respondents in both the survey and focus groups indicated that the applications were not meeting their functional requirements, and that many users were not satisfied. Focus group participants indicated that many applications are not well designed for ease of use. In addition, the requirement of "a PC on every desk" ended up being more complicated and problematic than anticipated. One clinic CIO indicated that even with grant funding to pay for PCs, the initiative was "too expensive and too many things went wrong."

Focus group participants also indicated that they often encountered resistance from physicians and staff, who questioned "what was in it for them." Insufficient training also emerged as an adoption barrier. These factors may both contribute to the high degree of dissatisfaction with applications. It's also important to note that survey respondents ranked connecting with patients a lower priority than connecting with other constituencies.

One positive example came from a medical group that had developed and implemented a major initiative to connect patients with the group and its providers. Patients had the ability to view their own electronic medical record (EMR) information, communicate via email with providers, and request prescription refills, all via a Web site. Patients, nurses, and physicians reported high levels of satisfaction with these functions. The group has also reported anecdotal improvements in quality, cost, service, and productivity. Development and implementation of this initiative required substantial investment, organizational commitment, and time. Unique factors such as significant pressure to offer these applications from a patient population with a high degree of Internet savvy, a committed, visionary core team of physicians and executives, health system level leverage and ability to commit required resources were cited as essential to the initiative's success. Further case study of this group's technology, development process, and measurable results may help stimulate and inform others on the benefits, feasibility and success factors of technology enabled patient-provider information exchange.

Payers

Medical group and clinic respondents have many more systems and applications in place to communicate and exchange information with payers than they do with patients. However, even these applications are limited in use, and there is considerable dissatisfaction with their performance. Eighty-three percent of survey respondents reported that they had electronic eligibility verification in place with payers and 77 percent were using electronic claims submission. The next highest level of application usage is significantly lower (25 to 35 percent) and includes electronic authorization, claims reconciliation and physician and member utilization reporting.

Forty percent of respondents who use electronic eligibility and 30 percent utilizing electronic claims submission felt that their functional requirements were not being met. In addition, more than 60 percent of respondents said that *users* were dissatisfied with these applications. Overall,

greater numbers of respondents were dissatisfied with these payer-related applications than were satisfied.

Focus group feedback and the literature review indicated that insufficient infrastructure and lack of uniform submission standards are major factors limiting the use and performance of information systems to enable transactions between payers and medical groups and clinics. It was also suggested that some of the dissatisfaction comes from the often unmet expectation that electronic claims and eligibility would increase the accuracy and timeliness of information and ultimately improve the rate at which organizations get paid. It was suggested that often none of these benefits have been realized while the organization has incurred significant cost and expended a great deal of effort to implement these systems. Further research to understand the drivers of dissatisfaction and define objective measures of value or return on investment for implementing these systems could provide insight into potential solutions to these challenges.

Affiliated Hospital and Ancillary Providers

Overall, respondents reported low use of information technology to enable communication and transactions with their organizations and the hospital and ancillary providers with whom they are affiliated.

Email (46 percent) and electronic eligibility (33 percent) are the major systems in place between affiliated hospitals/ancillary providers and respondent medical groups and clinics. Electronic authorizations (21 percent), electronic claims reconciliation (19 percent), and access to reports on physician and member use of services (19 percent) were the next most frequently used systems. Surprisingly, online scheduling and results reporting were not mentioned as IT applications in place with ancillary providers.

Participating Physicians

Email (85 percent) and electronic claims submission (75 percent) are the applications most frequently in place between medical group and clinic respondents and participating physicians. Online eligibility (63 percent) and common practice management systems (50 percent) were the next most frequent. It was clear that systems to perform administrative functions were the most prevalent. Email and claims submission also typically offer immediate tangible value to physicians, are relatively easy to implement on a large scale and require less physician behavior change. Some groups use these systems to begin the process of connectivity and information exchange with physicians and office staff.

Clinically related applications are in use by far fewer respondent organizations at this time. Only 27 percent reported having online results reporting, 25 percent had online access to clinical information, and 21 percent had automated disease management systems in place. Twenty-one percent also indicated that they had automated access to patient satisfaction data. Of those that did not have disease management systems in place, 66 percent said they were planning to implement these systems; 52 percent in the next year, an additional 28 percent within the next three years. The remainder did not have implementation plans. Disease management was by far the category of IT investment with the highest percent of "planned implementation."

Tools to improve physician efficiency, such as handheld devices, automated dictation and voice recognition were in place in only 10 percent of practices surveyed.

Only 6 percent of practices reported having an electronic medical record (EMR), but 63 percent reported that they were planning to implement an EMR in one to three years. Forty-four percent of the respondents also ranked an EMR as one of their top three priority information technology needs, making it the most frequently indicated need in the list of options. Focus group participants also indicated that an EMR was a highest priority. However, concerns were raised about whether EMR technology was proven, and some worried that it may be an "all or nothing" proposition, making it hard for organizations to pull the trigger. One group indicated that "EMR may be an outcome, but is not a specific goal," meaning that eventually they would end up with an electronic patient record through incremental implementation of different pieces of technology.

While email and claims submission were by far the most widely used systems, many respondents indicated that these systems were not meeting functional requirements (30 percent claims, 22 percent email) and that a high percentage of physician users were not satisfied with them (44 percent claims, 39 percent email). Further investigation is needed to uncover the factors that led to such dissatisfaction.

Summary of Systems in Place for All Constituents

Overall, medical groups and clinics participating in this study currently use information technology to communicate with their key constituents in a fairly limited fashion. Administrative functions were far more prevalent than clinical systems. Electronic claims submission and email were the most commonly implemented systems across all constituent groups. However, respondents indicated a high level of dissatisfaction with these systems' abilities to meet functional requirements and user needs. Clinical applications, such as EMR and disease management systems seem to be high priorities for medical groups and clinics in the next three years, with many groups already having plans to implement them in the next year.

Infrastructure Capabilities

Web sites. The survey asked respondents to indicate if they had a Web site, and if so, how it is used. Eighty-three percent responded that they have a Web site. The most frequent uses reported were content (general communication, publishing information and advertising). Initially 30 percent reported using the site for core business functions such as referrals, claims, and online forms. Further investigation of these sites, however, revealed that only 17 percent actually conducted one or more of these functions. This over-reporting of technological capability was also revealed in confirmatory calls on another survey question. These discrepancies warrant caution in making any generalizations from these findings, which rely heavily on self-reported information.

Internet connectivity. Overall, participating organizations indicated that on average, 65 percent of physician and staff computers have access to the Internet. However, this means that 35 percent of computers in the organization *do not* have Internet access. This may be an inhibiting factor in

adoption of applications requiring Internet access. These findings are similar to published studies that indicate 70 percent of physicians have Internet access (www.healthcentertech.org report of physician Internet use). This study, however, refers to physician Internet access, not necessarily use of the Internet in the workplace.

Sufficient computer capability in affiliated physician offices. In addition to Internet access, office computers must have sufficient technical capabilities to operate the clinical and administrative applications the organization currently has and plans to implement. Organizations were asked to indicate the percentage of physician offices they own or contract with that have sufficient computer capability to access and operate the electronic functions the organization offers. The overall average was 59 percent. This was a subjective and unverified answer.

Also notable is that the functions currently conducted electronically by most groups do not require sophisticated physician office capabilities. Going forward, it will be important to assess whether physician organizations' computer systems are able to support the organization's planned or desired administrative and clinical applications.

Planning, acquisition, and support of IT. In addition to exploring how groups are using IT solutions, and whether they're satisfied with the systems they currently use, we also examined how they plan for, acquire, and support information technology improvements. We hypothesized that factors such as an IT strategy, IT leadership, system ownership, and staff were important to evaluating the current state of technology use and adoption.

Sixty-seven percent of the respondents reported that they were the primary owner of the information technology network, equipment and software applications they utilize and that they also employ the staff. Fifteen percent acquired IT systems and 21 percent used staff from a contracted MSO. The remainder acquired systems and services from hospitals, health systems or outside vendors. The significant level of ownership by the organizations themselves allows for control but may limit the rate of adoption due to lack of in-house expertise, infrastructure and investment necessary to support implementation and use. However, 63 percent of respondents said they had increased or significantly increased IT staff over the past three years. In the focus groups, clinic administrators reported that access to IT services from a shared, collaborative resource supported by multiple clinics would be of significant value.

Additional survey indicators used to assess capacity for and commitment to successful IT adoption were the presence of an IT strategy and a CIO. Sixty-seven percent of respondents initially indicated that they had a written and approved IT strategy and plan. However, follow-up discussions with these respondents revealed that in many cases their plan (some were using a compilation of memos or meeting minutes) did not meet criteria for an effective planning document, and this level dropped to 60 percent.

We found that only 31 percent of organizations have a CIO. The responsibility for IT may lie with another senior management position due to the small size of many of the organizations, but the fact that this position does not exist for many raises the question of how and by whom IT strategies are developed, how technologies are assessed and how systems are managed without

senior technology leadership. Interestingly, among the survey sample, those with a CIO were not any more likely to have an IT strategy and plan than those without a CIO.

Surprisingly, 29 percent of organizations surveyed had a written HIPAA compliance plan. Although the requirement for compliance with the first set of HIPAA regulations by groups and clinics (which applies to those with less than $5 million in revenue) does not take effect until 2003, it is still seen as important for groups to begin planning, given the investment required and the need for IT expertise and capacity.

Research Question #2: How can information technology be used to improve quality of care, service, efficiency, and organizational performance?

While the primary objectives of the study were to describe how medical groups and clinics are using technology and to identify potential barriers and enablers to effective adoption, the survey and focus groups did provide some insights into how respondents would like to use IT to improve quality and efficiency.

Questionnaire respondents were asked to rank the priority of a list of ten information technology objectives over the next three years. Improving quality of care and service was the top priority objective, appearing as both the most frequently indicated number one priority and the most frequently mentioned objective overall. The second priority was establishing an IT infrastructure capable of supporting future desired applications. Also frequently mentioned were improving information exchange with physicians and HIPAA compliance. Further down the list were improving clinical decision support, information exchange with payers, information exchange with hospitals, and reducing cost of services. It is notable that improving information exchange with patients and improving patient safety/reducing medical errors were the two lowest ranked of the ten options provided.

The survey also included an open-ended question, asking respondents to rank their three top priority information technology needs. The three that tied for top priority were:

- Electronic medical record
- Increased infrastructure
- Practice management applications

Improved EDI with payers and communications/Internet access were also frequently mentioned. Focus group respondents discussed a goal of "going paperless," but felt it was a long way off and that there would be many organizational and cultural hindrances.

The survey then asked if respondents were aware of innovative information systems or software applications that could fulfill their priority needs. Interestingly, 22 different products/vendors were identified, but only five were mentioned more than once, and only one product was mentioned three times. Most products mentioned were practice management systems. This may suggest that: (1) respondents are unaware of the breadth and depth of products available and of their potential benefits; (2) respondents are aware but not impressed with them; (3) the market

consists of multiple vendors and products, none of which have a dominant reputation or market share; or (4) there is a dearth of legitimately innovative products designed to meet the needs of medical groups and clinics. Given that many organizations don't have a CIO, other executives and physicians may not have the time or resources to stay abreast of available IT solutions and evaluate potential benefits.

Research Question #3: How are decisions made about technology investment and adoption within medical groups?

The questionnaires asked respondents to rank their top five decision-making factors related to the investment in information technology of clinical and administrative applications. For clinical systems the top factors were: increased operating efficiency, improvement in quality, and provider satisfaction. Respondents noted that IT investments must compete for limited funding with patient care, new programs and required facility maintenance and enhancements.

Return on Investment (ROI) was rated as a priority factor for an investment decision by 38 percent of respondents; however only one respondent rated as it the number one factor. How organizations currently measure results of technology implementations (if they do so at all) was not addressed in this survey. ROI was cited more frequently as a significant factor in decisions about administrative systems, where operating efficiency was overwhelmingly the top factor. Decreasing costs and improving quality were distant second and third factors.

A critical factor is access to the capital necessary to invest in both technology and implementation. A sound strategy and the organizational will to prioritize the investment are also seen as crucial to success.

Seventy eight percent (78 percent) of medical groups surveyed fund IT investments out of operating revenue, as do 88 percent of MSOs. Since many California groups are under extreme financial pressures and are currently utilizing margins to fund competitive physician compensation, it is difficult for them to make capital investments in IT. This may be partially responsible for medical groups responding that they "do not have sufficient funding to meet their investment requirements for priority IT initiatives." We found that 41 percent of groups reported that they did not have sufficient capital to meet IT initiatives in the next year, and 81 percent reported that they do not have adequate funding for initiatives planned for the next three years.

Survey respondents indicated that they spend on average 5 percent of operating gross revenues (as opposed to income) on IT investments. This compares to 3.4 percent for health insurers, 4.1 percent in telecommunications, and 6.1 percent in financial services. (Goldsmith, *Health Affairs*, 11/2000). While 81 percent reported spending less than 5 percent, several organizations reported that they spend 15 to 35 percent, which skewed the results quite dramatically. They also indicated that they were not investing adequately in capital-intensive infrastructure. Some 77 percent of groups felt the percentage of gross revenue spent was insufficient to meet their needs. It should be noted that even if the percentage spent is on par with health insurers, the actual total dollar amount for groups and clinics is significantly smaller, thus inhibiting adequate investment.

Operating revenue serves as the greatest source of funds for IT investment for survey respondents, with 45 percent of clinics and more than 80 percent of groups and IPAs reporting this as their primary source of funds. However, grants represented an important source for clinics, 41 percent of which reported grants as their primary source of funds for IT investments. Focus group respondents indicated that while grants are potentially very helpful, grant funds need to be provided in a more strategic fashion. Problems reported with previous grants were that "the same size grants were available for both small and large clinics, while the two constituencies have very different needs," and that "the larger grants are often too narrowly focused, and many clinic organizations can't meet requirements."

The survey also asked the total percentage of the respondent organization's capital budget spent on IT initiatives, and the allocation between administrative and clinical applications. The mean percentage of capital budget spent reported by all respondents was 25 percent. Medical groups spent on average 39 percent, MSOs 31 percent, and clinics indicated a mean of 13 percent.

While the percentages for medical groups and MSOs are high, it is important to note that many of these organizations, particularly IPAs, tend to focus more on providing administrative systems than on facilities and medical equipment. They also tend to allocate as high as possible a percentage of revenue to physician compensation. As mentioned above, clinics rely heavily on grant funding for IT initiatives and may also have more required equipment and facility investments, which may explain their lower reported capital percentage.

Of the capital funds utilized for IT initiatives, respondents spent more on administrative applications than clinical. The mean percentage of IT capital funds allocated to administrative applications was 61 percent. Medical groups reported 74 percent for administrative functions, while MSOs reported 66 percent and clinics 46 percent. This is consistent with the findings that the most frequent systems currently in place—electronic claims submission and eligibility—are administrative in nature.

The most significant message related to IT investment and decision-making from both the survey and focus groups is that medical groups and clinics do not perceive that they have sufficient financial resources to fund what they believe are important IT objectives and initiatives.

Research Question #4: **What are the barriers to more effective and accelerated adoption of information technology solutions to improve quality of patient care and organizational performance?**

Survey respondents and focus group participants indicated that successful adoption of technology is complex and requires many important factors such as the availability, awareness, and quality of IT solutions, leadership support, infrastructure, interfaces and training and support. However, at this point the impact of these critical factors is minimized by the dominant perception that most organizations do not have sufficient resources to invest in and support their priority IT objectives and initiatives.

When asked to rank the importance of major factors in successful implementation of IT initiatives financial factors were the most important:

- Greater access to capital
- Ability to access high quality IT services at affordable prices
- External funding for disease management or clinical applications

Ability to measure return on investment was also rated an important factor. Groups and clinics may need more assistance in assessing and subsequently being able to measure results and ROI.

Other factors important to medical groups and clinics being able to successfully implement technology solutions were:

- Improved interfaces with payers of health systems
- More uniform standards for data submission and reporting
- Better performing and higher value products from vendors
- Greater understanding of best practices for technology adoption

Focus group participants emphasized the need for training and information about best practices. These factors came up within the context of discussions of successful and unsuccessful initiatives that the organizations had implemented. Findings from these discussions suggested that when the obstacle of funding is overcome, implementation factors become very important to adoption.

Survey and focus group participants were asked to report what they see as the top three obstacles to and top three enablers of information technology adoption. Some 85 percent of survey respondents indicated financial factors as the top obstacle. Lack of leadership support was the next most frequently listed obstacle (39 percent), followed by insufficient internal resources (33 percent) and lack of reliable/fitting products (26 percent).

The top three enablers of effective implementation were identified as leadership support (35 percent), capital (32 percent), and infrastructure (30 percent). Expertise, vendor support, and fitting products and staff adaptability were the next most frequently listed (14 to 16 percent).

Focus group respondents reflecting on their successes and failures indicated several potential barriers to technology adoption:

- Insufficient integration and changes to underlying business processes. Paradoxically, "some IT successes of the past have been failures in the respect that they maintained the operational inefficiencies of the old business process."
- Lack of incentives for technology adoption at all levels of the organization means that there can be "more to lose" (that is, executives risk job status by deciding to go forward with unproven systems, staff have no incentive to adopt but must change).
- Cultural resistance—"want to go paperless, culture stops initiative at point of entry"; "Culture seems to be content with 20 percent adoption."

- Physician resistance and capabilities—"what is the incentive, have more to lose than other constituents"; "changing patient relationships"; "physicians range from innovators to dinosaurs"; "physicians actually behind patients in adoption."
- Implementation processes are lengthy (multiple months or years) and complex.

Research Question #5: How might CHCF and other organizations stimulate, enable, accelerate, and enhance adoption of information technology solutions?

Many focus group respondents suggested the following ways that CHCF and others might contribute to successful technology adoption at the medical group level. Note that because the survey was commissioned by CHCF, there is the potential that respondents were biased into listing financial factors more frequently.

- Educate medical groups and clinics about technology in use and adoption successes from outside health care.
- Assist in evaluating the benefits of technology solutions, "what technology can do for you," and validating proven technology/vendor capabilities, "seal of approval." Indicate products that perform "above the bar."
- "Share stories of those that have been successful." Case studies and convening of best practices forums were suggested.
- "Connect CIOs that serve community clinic networks."
- "Health care is behind the technology curve, fund innovations that can move ahead of curve and support access and thoughtful care."
- Fund demonstration projects. Provide incentives for and support collaborative projects among multiple organizations— "collaboration across organizations and clinics, like a project for a group of three clinics, will promote affordability."
- Advocate through public policy channels for reimbursement of new, technology-based services such as e-visits.

Survey and focus group respondents along with the literature indicated that developing more uniform standards for data submission and interface with payers is very important. This is also supported by the Institute of Medicine (IOM) Report on "Crossing the Quality Chasm," which recommends the development and implementation of national data standards. In addition, the IOM advocates for an information technology "Capital Innovation Fund" to assist with these efforts.

III. Recommendations: A Model of Technology Adoption

The process of technology adoption is very complex and requires synchrony and success in multiple factors and stages. A model of successful adoption should include an assessment of these environmental factors:

- internal or external urgency to change;
- availability of appropriate products; and
- awareness of technology options on the part of buyers.

In addition, the model should encompass these key aspects:

- identification of leadership commitment and vision;
- explicit business strategy, goals and metrics related to technology;
- development of functional and technical requirements that meet the goals desired;
- assessment and selection of technology options relative to requirements;
- development and promotion of the business case for investment and implementation;
- assessment and analysis of organizational readiness for change—cultural, leadership, training, competency, incentives, core project team; and
- assessment and analysis of technical readiness for change—infrastructure and set-up; process redesign; implementation planning; workflow redesign; training; installation; integration; measurement and feedback of results; continuous improvement and integration.

To be successful clinics and medical groups will need support to perform well at all aspects of the technology adoption process. This lack of support is one factor why even well funded and technically competent groups have failed in technology adoption when they did not have the appropriate change management resources.

Appendix A: Survey Instrument

Cover Sheet

Name: _____

Title: _____

Organization: _____

Address: _____

_____

Phone Number: _____

Fax Number: _____

Email Address: _____

Medical Group/IPA Technology Adoption Survey **Code: _____**

I. Background Information

1. Which of the following best describes your physician organization? **Check all that apply.**

   ☐ a. Medical group
   ☐ b. IPA
   ☐ c. MSO
   ☐ d. Other (Specify _____)

2. If you are a provider organization, do you have a contract with an MSO?

   ☐ a. Yes
   ☐ b. No

3. If yes, provide the name of the MSO_____

4. If you are an MSO, name the provider group or clinic you are representing in this survey. **List only one**. _____

5. What is your practice type? Please note that primary care specialties are defined as family practice, general medicine, and pediatrics. Include OB/GYN as a non-primary care specialty.

   ☐ a. Primary care only
   ☐ b. Multi-specialty, specialists only
   ☐ c. Multi-specialty- primary care and specialists
   ☐ d. Other _____

6. Who is the primary owner of the information technology network, equipment and software applications that are used by your organization for core clinical and administrative functions? **Check only one.**

   ☐ a. Organization itself
   ☐ b. MSO
   ☐ c. Hospital/Health System
   ☐ d. Physicians in the group
   ☐ e. External vendor
   ☐ f. Other _____

7. Who is the primary employer of the IT staff and/or consultants? **Check only one.**

   ☐ a. Organization itself
   ☐ b. MSO
   ☐ c. Hospital/Health System
   ☐ d. Physicians in the group
   ☐ e. External vendor
   ☐ f. Other _____

I. Background Information

8. Over the past three years the number of full-time and part-time IT employees in your organization has:
   - ☐ a. decreased significantly
   - ☐ b. decreased slightly
   - ☐ c. stayed the same
   - ☐ d. increased slightly
   - ☐ e. increased significantly

9. If you contract for IT services from an MSO or outside vendor, how do you pay for those services?
   - ☐ a. Part of overall management fee
   - ☐ b. IT outsourcing contract
   - ☐ c. Direct cost pass through
   - ☐ d. Application Service Provider (ASP)
   - ☐ e. Other _____

10. Do you have a Chief Information Officer (CIO)?
    - ☐ a. Yes
    - ☐ b. No

11. Does your organization provide any of the following services at one or more of your practice sites? **Check all that apply**.
    - ☐ a. Lab
    - ☐ b. Pharmacy
    - ☐ c. Radiology
    - ☐ d. Physical Therapy
    - ☐ e. Health Education
    - ☐ f. Cardiac Testing
    - ☐ g. Other _____

II. Information Technology Objectives, Strategy, and Decision-making

1. Please rank the following IT objectives in order of priority relative to your organization's IT strategy over the next three years. **Please rank your top 5 in priority order from 1-5 with 1 being highest and using each number only once.**

____	a. Improve communications/information exchange with patients
____	b. Improve communications/information exchange with physicians
____	c. Improve communications/information exchange with payers
____	d. Improve communications/information exchange with hospitals/ancillary
____	e. Reduce the cost of providing services
____	f. Improve quality of care and service
____	g. Comply with HIPAA requirements
____	h. Establish IT infrastructure capable of supporting desired applications
____	i. Improve patient safety and reduce medical errors
____	j. Improve clinical decision support
	k. Other_____

2. Does your organization have a written and approved information technology strategy?

____	a. Yes
____	b. No
____	c. Don't know

3. Which entities need to approve your IT strategy? **Check all that apply.**

____	a. Board
____	b. Administration
____	c. MSO
____	d. Hospital and Health System
____	e. Other _____

4. Does your organization have a written and approved HIPAA compliance plan?

____	a. Yes
____	b. No
____	c. Don't know

5. What are your organization's sources of funding to implement your IT initiatives? **Check all that apply.**

☐	a.	Operating Revenue
☐	b.	Reserve and/or Physician's Capital Contributions
☐	c.	Affiliated Hospital/Health System
☐	d.	MSO
☐	e.	Borrowing/Leasing
☐	f.	Grants
☐	g.	Other _____

6. Do you have all required funds for your priority IT initiatives in the next

	Yes	No
a. 1 year	☐	☐
b. 3 years	☐	☐

7. Approximately what percentage of your organization's operating revenue (not income) is spent on IT (including infrastructure, connectivity, hardware, software, staff and consultants)? ☐

8. Is this amount sufficient?

☐ a. Yes
☐ b. No

9. Approximately what percentage of your organization's capital budget is spent on IT? (including infrastructure, connectivity, hardware, software) ☐ %

10. Approximately what percentage of the IT capital funds are spent on
    a. clinical applications ☐ %
    b. administrative applications ☐ %

11. Please indicate the importance of the following factors in your ability to successfully implement IT initiatives. **1 is Not Important At All and 5 is Very Important.**

a. Greater access to capital	1	2	3	4	5
b. Greater in-house or consulting expertise to develop strategy	1	2	3	4	5
c. More uniform standards for data submission and reporting	1	2	3	4	5
d. Improved interfaces with payers or health systems	1	2	3	4	5
e. In-house or consulting resource for gaining technology adoption	1	2	3	4	5
f. External funding for disease management or clinical applications	1	2	3	4	5
g. Greater understanding of best practices for technology adoption	1	2	3	4	5
h. Ability to access high quality IT services at affordable price	1	2	3	4	5
i. Greater familiarity with technology vendors for specific needs	1	2	3	4	5
j. Ability to measure results or return on investment	1	2	3	4	5
k. Other_____	1	2	3	4	5

III. Current and Planned Use of Information Technology

1. Do you have a Web site?

   ☐ a. Yes
   ☐ b. No

2. If yes, what purpose does the Web site serve for your organization? **Check all that apply.**

   ☐ a. Advertising
   ☐ b. Information publishing
   ☐ c. General communication (e.g., information requests, links to resources)
   ☐ d. Core business functions (e.g., referrals, claims submission, online forms)
   ☐ e. Other_____

3. Approximately what percentage of the total number of computers of your staff and physicians have access to the Internet? ☐%

4. What percentage of physician offices you own/contract with have sufficient computer capability to access and operate the electronic functions your organization offers? ☐ %

We would like to understand how you are currently using information technology for your administrative and clinical functions and for communication and information exchange with each of the following "constituents" of your organization.

"Constituents"

1. **Participating Physicians** - Physicians who are either owners or contract to provide service to your patients
2. **Patients/members**- Patients/members for whom you provide coverage or services
3. **Payers** - HMOs/PPOs, intermediaries or insurance companies you are contracted with
4. **Affiliated Ancillary or Hospital Providers** - Organizations that you contract with or refer patients to for outpatient, ancillary or hospital services

In the sections provided for each of the Constituents, please indicate whether you have the indicated information system or software application in place, is currently meeting your requirements, is planned to be implemented and, if so, indicate the timeframe.

Medical Group/IPA Technology Adoption Survey Code: _____

Constituent: **5. Participating Physicians**	System or Application in Place?		If yes				If no		**If planning to implement,**		
			Is it meeting organizational/ functional requirements?		Are physician users satisfied?		Are you planning to implement?		In what time frame**?**		
Information System or Application	Yes	No	Yes	No	Yes	No	Yes	No	1 yr	2-3 yrs	Don't Know
Electronic Claim Submission/Status											
Online Eligibility and Authorization											
Online or Internet Based Scheduling											
Online Results Reporting, e.g., Radiology, Lab											
Online Access to Clinical Information											
Automated Clinical Decision Support											
Access to Patient Satisfaction Data											
Email											
Voice Recognition											
Automated Dictation											
Disease Management											
Electronic Medical Record											
Wireless and/or Hand Held Devices											
Common Practice Management System											
Other											

Constituent: **6. Patients**	System or Application in Place?		If yes				If no		If planning to implement,		
			Is it meeting organizational/ functional requirements?		Are physician users satisfied?		Are you planning to implement?		In what time frame?		
Information System or Application	Yes	No	Yes	No	Yes	No	Yes	No	1 yr	2-3 yrs	Don't Know
Email with Physicians or Other Providers											
Online or Internet Based Scheduling											
Online Results Reporting											
Automated Health Information											
Automated Disease Management											
Online Patient Satisfaction Assessment											
Online Eligibility Information											
Reminders											
Other											

Medical Group/IPA Technology Adoption Survey Code: _____

Constituent: **7. Health Plans**	System or Application in Place?		If yes				If no		**If planning to implement,**		
			Is it meeting organizational/ functional requirements?		Are physician users satisfied?		Are you planning to implement?		In what time frame?		
Information System or Application	Yes	No	Yes	No	Yes	No	Yes	No	1 yr	2-3 yrs	Don't Know
Electronic Claim Submission/Status											
Electronic Eligibility Verification											
Electronic Authorization											
Electronic Claims Reconciliation											
Electronic Access to Leakage Information											
Access to Reporting on Physician and Member Utilization of Services											
Other											
Constituent: **8. Providers of Ancillary and Hospital Services**	System or Application in Place?		If yes				If no		If planning to implement,		
			Is it meeting organizational/ functional requirements?		Are physician users satisfied?		Are you planning to implement?		In what time frame?		
Information System or Application	Yes	No	Yes	No	Yes	No	Yes	No	1 yr	2-3 yrs	Don't Know
Email with Physicians or Other Providers											
Electronic Eligibility Verification											
Electronic Authorization											
Electronic Claims Reconciliation											
Electronic Access to Leakage Information											
Access to Reporting on Physician and Member Utilization of Services											
Other											

9. When making IT related investments for **clinical** applications, what are the most critical decision making factors? **Please rank them in priority order from 1-11 with 1 being highest and using each number only once.**

_____	a. Increased revenue
_____	b. Decreased cost
_____	c. Operating efficiency
_____	d. Patient satisfaction
_____	e. Provider satisfaction
_____	f. Improvement in quality
_____	g. Return on Investment
_____	h. We do not measure effectiveness
_____	i. % Increase in the number of active users
_____	j. Number of additional users of the IT system
_____	k. Other _____

10. When making IT related investments for **administrative** applications, what are the most critical decision making factors? **Please rank them in priority order from 1-11 with 1 being highest and using each number only once.**

_____	a. Increased revenue
_____	b. Decreased cost
_____	c. Operating efficiency
_____	d. Patient satisfaction
_____	e. Provider satisfaction
_____	f. Improvement in quality
_____	g. Return on Investment
_____	h. We do not measure effectiveness.
_____	i. % Increase in the number of active users
_____	j. Number of additional users of the IT system
_____	k. Other _____

V. Summary of IT Needs, Priorities, Issues and Challenges

1. What are your organization's top three priority information technology needs?

2. If you are considering or are aware of innovative information systems or software applications that would fulfill these needs, list them here.

3. a. What are the top three obstacles you face in more effectively investing in and implementing technology solutions?

   b. What are the top three enablers of effective information technology adoption your organization has utilized?

4. How could the California HealthCare Foundation best assist providers such as you fill these needs?

Thank you for completing the survey.
Please fax the completed survey to 510-836-8987 c/o Communications Technology Cluster, Attention: Dobbe Sangha, Research Associate

Would you be interested in participating in a two- to three-hour focus group on technology adoption?

☐ **Yes**

Appendix B: Literature Review as of 10/10/01

Adoption of Information Technology

Literature Review 10-10-01

A. Industry Overview
B. Data Transfer and Information Sharing
C. Medical Errors and Quality of Care
D. Electronic Medical Records/Computerized Patient Records
E. HIPAA Regulations, Privacy, and Security
F. Organizational Change
G. Financial Issues
H. Training Issues
I. Regulation
J. Physician–Patient Relationship
K. Rural and Underserved Areas
L. Other

A. Industry Overview

1. Lohman, P
E-Health: Putting Health on the Net
An FCG White Paper, December 1999, First Consulting Group.
(www.fcg.com/knowledge/white_papers.asp)
SUMMARY: Internet technology has made possible a simultaneous conversation of almost everyone with almost everyone else. Enterprises and markets that have been locked in a straitjacket of rigid, intimidating technology are being transformed and business ventures unimaginable a decade ago are flourishing. Health care is sure to follow—indeed, the first ambitious e-health pioneers are already operational and are working aggressively to seize first mover advantage. And, while it is too soon to discern any but the most general shapes that e-health will take, it is clear that the changes will be momentous. The Internet and Internet technology are a true watershed. Simple, robust and ubiquitous, they can support small-scale operations improvements or multinational business ventures. Their scalability makes them the ideal tool for an almost limitless range of purposes. There is, of course, a downside. The security of business and patient data is a concern, but it is being addressed. The newness of the Internet makes virtually any e-health strategy a pioneering venture, and still something of a risk for an industry that has been notably laggard in its use of information technology. And there is the greater risk that the capabilities of the technology will be underexploited by being applied to timid and shortsighted goals. Like any great scientific and engineering advance, the Internet will, in health care, be what we make it. But clearly there is a lot to be made.

2. FCG's Emerging Practices Group
An Executive's Guide to eHealth

An FCG White Paper, July 2000, First Consulting Group.
(http://www.fcg.com/knowledge/white_papers.asp)
In order for health care organizations to continue to play an influential role in patients and physicians lives, one response to the new economy must be developed in the form of an eHealth strategy. This does not mean, "One size fits all." It means a purposeful way of defining the delivery and services of the core business in this new world are required. Some providers will be "late adopters" and implement the minimum of Web initiatives to defend their current market share and reputation; others will seize the opportunity to optimize processes and attempt to deliver care and services better, faster and potentially cheaper than in the past. As with all major innovations, a small percentage of providers will see the possibility to transform health care and will develop an eHealth strategy and tactical plan consistent with that vision. But, every health care organization needs to determine, in the very short term, where they want to be positioned and what initiatives they are going to implement.

3. McGoldrick, C; O'Dell, S; Ziegler, S
The Digital Health Threat or Opportunity? Implications for the Health Plan Market
An FCG First Report, February 2001, First Consulting Group.
http://www.fcg.com/knowledge/first_reports.asp
Employers are fed up with the cost of current approaches to selecting and funding health insurance and are looking for new ways to rein in rising health care costs. As a result, they are questioning all aspects of their traditional role in providing health benefits. At the same time, new businesses are bringing innovative strategies and models to market by leveraging the connectivity of the Internet. For health plans, new models and their possible adoption pose both short-term questions and longer-term challenges. This paper explores the emergence of the Digital Health Company and what it means to the health plan market.

4. Cain, M; Carlson, R; Everett, W; Kirsch, S; Lang, L; Olson-Grande, T; Runde, D; Sarasohn-Kahn, J; Taylor, B; Wayne, J; Wilson C
The Future of the Internet in Health Care: Four Scenarios for 2005
Health Care Horizons, Institute For The Future, February 2001
http://www.iftf.org/html/membershipprograms/healthcarehorizons/executivesummaries/internet.exec.sum.pdf
Summary: The Internet has already changed health care substantially-and in the next few years it will bring much more change. Organizations and individuals from all parts of the industry need to prepare ourselves for these events. This report describes a powerful method for anticipating this uncertain future.

5. Cain, M; Mittman, R
The Future of the Internet in Health Care: Five-Year Forecast
Health Care Horizons, Institute For The Future, January 1999
http://www.iftf.org/html/researchareas/hc_research/chcf/CHCF.INET.0199.pdf
The use of the Internet in health care has attracted a lot of attention lately. Publications from The New York Times to The Journal of the American Medical Association have featured stories on how consumers are finding medical information on the Web and changing the balance of power in the practice of medicine. Health care practitioners are also using the Internet—to keep up in their fields, to communicate with patients, and to consult with each other. But there is a dark side

to Internet medicine. Inspiring stories of lives saved through the Internet get equal billing with hair-raising tales of Web-based quackery. What are we to believe? One constant of futures research is that we tend to overestimate the impacts of changes in the short term and underestimate their impacts in the long term. In the early phases of any new development, there is a cycle of hype and raised expectations, followed inevitably by a cycle of disappointment. We believe that the Internet in general, and health care on the Internet in particular, is in one of these early cycles of hype. This forecast seeks to sift through the hype and provide a realistic assessment of the direction and pace of change in health care on the Internet. The forecast begins by describing the driving forces behind some of the high expectations—the good reasons people are excited about the Web. It then presents some of the barriers to the implementation and diffusion of health care applications on the Internet—some sobering analysis to temper the enthusiasm. Finally, it presents forecasts of six leading-edge applications for health care on the Internet. The intended audience for this forecast is the stakeholders in health and health care—consumers, health care professionals, health plans and other health businesses, researchers, and policymakers. We have assumed a basic knowledge of the Internet and the World Wide Web, as well as of the health care industry.

6. Shortiffe, E
Networking Health: Learning From Others, Taking The Lead ; The Internet was created without much help from biomedical researchers or HHS. The time for leadership has arrived.
Health Affairs November - December 2000, 19(6), 9-22.
ABST: The Internet provides one of the most compelling examples of the way in which government research investments can, in time, lead to innovations of broad social and economic impact. This paper reviews the history of the Internet's evolution, emphasizing in particular its relationship to biomedical computing and to the nation's health care system. Here I summarize current national research programs, emphasizing the need for greater involvement by the medical research community and leadership from federal health care agencies.

7. Goldsmith, J
How Will The Internet Change Our Health System?; Powerful though the Internet may be, its impact on health care will continue to be tempered by privacy concerns and professional resistance.
Health Affairs January - February 2000, 19(1), 148-156.
One basic misperception of the Internet is that its greatest impact will be in its consumer retail applications. Consumer use is actually only the visible tip of a much larger iceberg. The underwater part of the iceberg—business-to-business electronic commerce—is five times larger than consumer-based e-commerce and is projected to grow at a far faster rate. According to Forrester Research, consumers spent an estimated $8 billion (out of roughly $2 trillion in overall consumer spending) online in 1998, an amount expected to increase more than tenfold to $108 billion by 2002. By contrast, businesses did more than $40 billion in Internet business with each other in 1998, an amount expected to reach $1.3 trillion by 2002. In this paper I examine some of the areas of the health care system that are most likely to be affected by the spreading influence of the Internet.

8. Deloitte Consulting, Deloitte & Touche, and Cyber Dialogue
Taking The Pulse: Physicians And The Internet, 2000

http://www.dc.com/obx/script.php?Name=getFile&reportname=taking_the_pulse.pdf&type=pdf
The Internet revolution continues in health care. Just as the Internet is forcing health care companies to rethink traditional business models, it is also empowering consumers with broad access to information, and giving physicians the ability to communicate and access global reference material in real-time. Our past research efforts have focused on the role and influence of e-Health consumers today and in the future. While we are in agreement that consumers are becoming empowered and will eventually wield more influence, the truth remains that physicians essentially control the delivery of health care today. Because of their clinical and financial decision-making authority and their close link to patients/consumers, physicians are expected to serve as the critical nexus in an Internet-mediated health care information system in the near future. Despite the critical role physicians could play, their acceptance and adoption of e-Health professional services and applications has lagged. Yet to fulfill the Internet's promise in health care, physicians must not only be onboard but also be a driving force for change. Engaging and involving physicians is a challenge; meeting it requires, first and foremost, understanding and addressing their current, apparent lack of enthusiasm. By "taking the pulse," our research seeks to understand this challenge by looking beneath the superficial symptoms and trying to discover the root cause. Following up on our medical analogy, we are trying to diagnose the underlying problems as accurately as possible in order to better understand the implications, and prescribe the most appropriate course of action or treatment for all interested parties: physicians, Internet companies, other health care industry players, and even public policymakers.

9. Kopp, E
Physicians and the Internet: Affection or Rejection
eHealth Report, Skila News, October 9, 2000
(http://www.skila.com/ereportArchive/ereport_109.htm)
While studies on physician use of the Internet vary in their findings, Skila believes the trend is clear—medicine is rapidly entering the age of the Internet. The key question is how quickly this technology will be embraced and which particular applications will be aggressively adopted. Currently, eHealth companies are frantically trying to anticipate the Internet's "killer application" for physicians' practice of medicine, and lock up online relationships with providers. The challenge for these businesses is to not be too far in front (or behind) of the technology curve. Only those companies that offer a service in a format that's truly compelling to physicians will emerge as winners.

10. O'Dell S; McGoldrick C
Where will the Road to E-Health Lead?; Ten E-Health Trends
An FCG First Report, May 2000, First Consulting Group.
(www.fcg.com/knowledge/first_reports.asp)
In this report, we attempt the impossible: to condense all that is going on in e-health into ten trends. Ten is not a magic number; there may be 12, 15, or more. What is relevant is that health care organizations and their leadership begin to incorporate e-health into their thinking about the future and begin to take action. One thing is clear: the health care market is changing rapidly, and e-health is emerging as a critical driver. The question is which organizations will be prepared to leverage this transformation and which will be left behind. We offer these ten trends to stimulate your thinking. We hope that you will find them to be thought-provoking and useful. Uncovering market trends and hypotheses should be the starting point of your strategy. They will

help you think about where the market is going and where you believe your organization needs to be. We recommend that you identify the trends you feel will most significantly affect your health care organization, use them to set your strategy, and act on them. As you read this document, the market is changing and reacting. So too must your hypothesis and theories about the future. Stated explicitly, debated rigorously, updated periodically, and used routinely in visioning and planning, they can help ensure that your organization's path and course are correct.

B. Data Transfer and Information Sharing

11. Cavanaugh, BJ; Garland, HT; Hayes, BL
Upgrading legacy systems for the Integrating the Healthcare Enterprise (IHE) initiative...
Proceedings of the 17th Symposium for Computer Applications in Radiology. "The Electronic Practice: Radiology and the Enterprise." Philadelphia PA, June 3-6, 2000
Journal-of-Digital-Imaging (J-DIGIT-IMAGING) 2000 May; 13(2): Suppl 1: 180-2
ABST: As technology vendors have adopted standardized communication protocols, including Digital Imaging and Communications in Medicine (DICOM) and Health Level 7 (HL7), interconnectivity between various devices has been simplified. The recent Integrating the Healthcare Enterprise (IHE) initiative will further promote the use of standards for interconnectivity. Until these standards are universally accepted, we must live in a transitional world where some components will communicate without any modification, while others require upgrades to allow them to meet the new standards. In designing and implementing the network at University of California Los Angeles (UCLA) Medical Center, some integration problems were found that are common to the industry. Creating departmental workflow with only a limited number of acquisition devices supporting the DICOM work list was the initial problem addressed. Although many manufacturers provide this function for their new scanners, upgrading existing equipment is often cost-prohibitive. To ensure the quality of the demographic information in the image data and the workflow of the system, third-party work list components were required to upgrade the legacy acquisition devices. These work list components provided a standards-compliant facade on top of the legacy equipment, allowing seamless integration with the remainder of the network. To support the distribution of work list information and the feedback of procedure status, a bi-directional HL7/DICOM protocol bridge was required. Although many radiology information system (RIS) manufacturers will be providing native DICOM capabilities in future product releases, the majority of current RIS installations have no DICOM functionality. Similar to the legacy scanners, the HL7/DICOM bridge provided a DICOM-compliant facade to the non-DICOM RIS. The additional use of Web-based technology for work list display further extended flexibility of this facade. We have demonstrated standards-compliant facade technology allowing legacy components to operate seamlessly in an IHE environment at a fraction of the cost of upgrading to new equipment.

12. Goldblum, OM
Electronic prescribing: criteria for evaluating handheld prescribing systems and an evaluation of a new, handheld, wireless wide area network (WWAN) prescribing system.
Dermatol Online J 2001 Feb; 7 (1): 1. Department of Dermatology, University of Pittsburgh Medical Center, Pittsburgh, PA, USA.

ABST: OBJECTIVE: The objectives of this study were: (1) to establish criteria for evaluating handheld computerized prescribing systems; and (2) to evaluate out-of-box performance and features of a new, Palm Operating System (OS)-based, handheld, wireless wide area network (WWAN) prescribing system. The system consisted of a Palm Vx handheld organizer, a Novatel Minstrel V wireless modem, OmniSky wireless Internet access and ePhysician ePad 1.1, the Palm OS electronic prescribing software program. DESIGN: A dermatologist familiar with health care information technology conducted an evaluation of the performance and features of a new, handheld, WWAN electronic prescribing system in an office practice during a three-month period in 2000. System performance, defined as transmission success rate, was determined from data collected during the three-month trial. Evaluation criteria consisted of an analysis of features found in electronic prescribing systems. METHODS: All prescriptions written for all patients seen during a three-month period (August - November, 2000) were eligible for inclusion. Prescriptions written for patients who intended to fill them at pharmacies without known facsimile receiving capabilities were excluded from the study. The performance of the system was evaluated using data collected during the study. Criteria for evaluating features of electronic prescribing systems were developed and used to analyze the system employed in this study. RESULTS: During this three-month trial, 200 electronic prescriptions were generated for 132 patients included in the study. Of these prescriptions, 92.5 percent were successfully transmitted to pharmacies. Transmission failures resulted from incorrect facsimile numbers and non-functioning facsimile machines. Criteria established for evaluation of electronic prescribing systems included System (Hardware & Software), Costs, System Features, Printing & Transmission, Formulary & Insurance, Customization, Drug Safety and Security. CONCLUSION: This study is the first effort to establish comprehensive criteria for evaluating handheld prescribing systems and to evaluate the performance and features of a handheld, electronic prescribing system. The results demonstrated that the evaluated system: (1) was simple to install; (2) successfully interfaced with a commonly used practice management system; (3) was user-friendly and easy to operate; (4) offered a robust variety of standard features; and, (5) resulted in a high rate of success for transmitting electronic prescriptions. The criteria established for the evaluation of features of an electronic prescribing system can be used to critically evaluate the performance and features of other handheld and personal computer-based electronic prescribing systems.

13. Jeff Goldsmith
The Internet And Managed Care: A New Wave Of Innovation; Internet tools promise to restructure health insurance.
Health Affairs November - December 2000
SUMMARY: The rise of the Internet has brought into being powerful new electronic tools for automating administrative and financial processes in health insurance. These tools may enable new firms or employers to create custom-designed networks connecting their workers and providers, bypassing health plans altogether. Alternatively, health plans may use these tools to create a new consumer-focused business model. While some disintermediation of managed care plans may occur, the barriers to adoption of Internet tools by established plans are quite low. Network computing may provide important leverage for health plans not only to retain their franchises but also to improve their profitability and customer service. No segment of the health care system is in greater ferment than the managed care market. Roiled by political crosscurrents from the managed care backlash, plans face rising medical costs and rapidly stiffening economic

resistance from doctors, hospitals, and drug companies. At the very same time, however, technological breakthroughs driven by the Internet promise to fundamentally restructure the health insurance business. Major health insurance functions-network development and management, enrollment and eligibility verification, claims submission and payment, and medical and subscriber management-appear amenable to outsourcing through network computing applications. Some industry analysts believe that start-up firms that offer these Internet capabilities could enable employers to bypass health plans altogether in managing their health benefits (a process known as disintermediation). If employers use the same approach to managing health benefits as they are using for pension benefits, more of them may remove themselves from the loop except as funders and provide their employees with Internet tools to manage their own health benefits. If employers adopt defined-contribution health benefits, consumers could either shop directly for health coverage on the Internet, or bypass the plans and contract directly for care through eBay-like auction sites that connect consumers and providers. For the past several years managed care plans have struggled to cope with increasing cost pressure from the health care system. Although premiums have risen in the past two years, they have barely kept pace with rising medical expenses. With unrelenting pressure on margins, one would have expected investment in information technology (IT) to be a core strategy for managed care firms to reduce their administrative expenses and to improve customer service. Many health insurance functions are still, sadly, driven by manual paper processing and telephone interactions. According to Faulkner and Gray, only 18 percent of health maintenance organization (HMO) claims and 45 percent of all commercial health insurance claims were submitted electronically in 1999. The vast majority of these electronic claims must be processed manually because of incomplete or inconsistent data. Despite the obvious incentives, investment by managed care companies in upgrading their IT capabilities still lags behind other information-intensive sectors of the economy. According to the Gartner Group, health insurers spent only 3.4 percent of their gross revenues in 1999 on IT, compared with 4.1 percent for telecommunication firms and 6.1 percent for financial services firms. The ability to manage IT effectively has been a critical strategic weakness of managed care firms. IT system failure (brought about by rapid growth) played a crucial role in the near-collapse of Oxford Health Plans in 1998 and Harvard Pilgrim Health Care in 1999. Moreover, when cash flow evaporates, innovative IT strategies are often sacrificed to the budget cutter's knife. When Foundation Health Plan's operating profit disappeared in 1998, one of the first casualties was its promising Fourth Generation (4G) Medical Management system, which combined many innovative customer service and physician support features.

14. Gandsas, A; Montgomery, K; McIntire, K; Altrudi, R
Wireless vital sign telemetry to hand held computers.
Studies in Health Technology and Informatics, 2001, 81:153-7. (Unique ID/PMID: 0011317730)
ABST: Most physicians and other health care providers share/access patient information via hard copy chart records, telephone conversations, or through hospital computer networks. These modalities are cumbersome when physicians are away from the hospital and ground wiring infrastructure is not readily available. In a prior study, we used wireless in-flight telephony and the Internet to transmit vital signs from an airborne Boeing 757 to three remote locations on the ground. However, because all recipient stations relied on an institutional network to receive the information, it was not possible to transfer data to a given location beyond the hospital campus. We now propose an innovative system capable of transmitting telemetry information from any

location in the globe to a single portable computer using Wireless Application Protocol (WAP) technology for the Internet. Medical data including blood pressure, pulse, respiratory rate, end tidal CO2, oxygen saturation and EKG tracings were transferred from a G2 (digital cellular) phone linked to a hand held computer to a remote hand held device and were viewed in real time using customized software. Cellular Digital Packet Protocols (CDPD) enabled data transfer speeds up to 19,200 bps. Advances including the Internet and wireless computer technology may revolutionize the way medical information is shared, making it possible for physicians and health allies to directly access patient data from anywhere at any time.

15. Kleinke, JD
Vaporware.com: The Failed Promise Of The Health Care Internet; Why the Internet will be the next thing not to fix the U.S. health care system.
Health Affairs November - December 2000, 19(6), 57-71.
ABST: Contrary to the claims of its well-financed promoters, the Internet will not solve the administrative redundancies, economic inefficiencies, or quality problems that have plagued the U.S. health care system for decades. These phenomena are the result of economic, organizational, legal, regulatory, and cultural conflicts rooted in a health care system grown from hybrid public and private financing; cultural expectations of unlimited access to unlimited medical resources; and the use of third-party payers rewarded to constrain those expectations. The historic inadequacy of information technology to solve health care's biggest problems is a symptom of these structural realities, not their cause. With its revolution of information access for consumers, the Internet will exacerbate the cost and utilization problems of a health care system in which patients demand more, physicians are legally and economically motivated to supply more, and public and private purchasers are expected to pay the bills.

16. Kaplan, B; Brennan, PF; Dowling, AF; Friedman, CP; Peel, V.
Toward an informatics research agenda: key people and organizational issues.
Journal of the American Medical Informatics Association, 2001 May-Jun, 8(3):235-41. (Unique ID/PMID: 0011320068)
ABST: As we have advanced in medical informatics and created many impressive innovations, we also have learned that technologic developments are not sufficient to bring the value of computer and information technologies to health care systems. This paper proposes a model for improving how we develop and deploy information technology. The authors focus on trends in people, organizational, and social issues (POI/OSI), which are becoming more complex as both health care institutions and information technologies are changing rapidly. They outline key issues and suggest high-priority research areas. One dimension of the model concerns different organizational levels at which informatics applications are used. The other dimension draws on social science disciplines for their approaches to studying implications of POI/OSI in informatics. By drawing on a wide variety of research approaches and asking questions based in social science disciplines, the authors propose a research agenda for high-priority issues, so that the challenges they see ahead for informatics may be met better.

17. Kronhaus, LL
Linking affiliates electronically.
Healthcare Inform 2001 Mar; 18 (3): 73-4 Bethesda Healthcare System, Boynton Beach, Fla., USA.

ABST: PROBLEM: Store-and-forward clinical messaging system was cumbersome and inadequate to support modern technology. SOLUTION: Installation of a secure Web-based system that automates communication among physicians, hospitals, clinical laboratories, and other departments. RESULTS: Time savings for office personnel and physicians; access by physicians to clinical information anytime, anywhere; consolidation of lab results into one report; customized form—filing capability. KEY TO SUCCESS: Comprehensive and ongoing training to ensure user acceptance.

18. McManus, B
A move to electronic patient records in the community: a qualitative case study of a clinical data collection system, problems caused by inattention to users and human error
Topics-in-Health-Information-Management (TOP-HEALTH-INF-MANAGE) 2000 May; 20(4): 23-37
ABST: With the move toward electronic patient records, many U.K. National Health Service (NHS) Trusts are using computers to make their workforces more clinically effective. This article examines one such system where clinicians are using hand-held computers to maintain up-to-date records on their clients. The effectiveness of the system is measured using standard human computer interaction concepts. The results are considered, leading us to the conclusion that for the effective use of information technology, industry and the NHS must ensure that the whole lifecycle of a project is considered together with its impact on users and its integration with the rest of the information systems.

19. Toussaint PJ; Bakker AR; Groenewegen LP
Integration of information systems: assessing its quality.
Computer Methods Programs Biomed 2001 Jan; 64 (1): 9-35 Faculty of Technology, Policy and Management, Delft University of Technology, Delft, P.O. Box 5015, NL-2600GA, Delft, The Netherlands.
ABST: Due to organizational and technological changes the need for integrating information systems within health care institutions has increased enormously. Although the technical means for systems integration have definitely matured, integration methodologies are still in their infancy. Two important questions regarding systems integration are hardly ever addressed in a systematic way: how to derive integration requirements, and how to check whether the requirements are met in a given integrated system. These two questions must be answered if we want to assess or improve the quality of integration of a given set of systems. In this article we present a nine-step method for deriving integration requirements from a business process model, and we assess the quality of integration of a given integrated system against these requirements. The method is demonstrated by elaborating two case studies from the health care domain.

20. Edgemon, J; Olmeda, C
Evaluating Paper Reduction Alternatives For Healthcare IT Organizations
An FCG White Paper, March 2000, First Consulting Group.
(www.fcg.com/knowledge/white_papers.asp)
Health care Information Technology (IT) organizations can lower the costs of report generation and distribution services by adopting an aggressive paper reduction strategy. Traditional print functions within data center operations require a large commitment of IS and operations resources. Some health care organizations have reduced their stock paper requirements by 50 to

70 percent by replacing paper with an electronic standard. These health care organizations have cut IT staffing requirements for print operations and freed operations staff for more important functions. Eliminating paper in the workplace is now an achievable goal, and viewing electronic documents online is both cost efficient and practical. The electronic age has provided businesses with the tools to replace hard-copy paper documents with new technology, and organizations utilizing this technology will stay on the cutting edge of efficiency and cost reduction.

21. Edgemon, J; Olmeda, C
Workflow Apps Help Healthcare Improve Customer Service & Financial Performance
An FCG White Paper, March 2000, First Consulting Group.
(www.fcg.com/knowledge/white_papers.asp)
Workflow applications are instrumental in helping hospitals convert paper-intensive manual processes into an efficient, automated method for routing and approval. Health care administrators are implementing workflow to reduce cost and improve efficiency, customer service, employee productivity, and financial performance This approach enables health care organizations to build on their existing investments in legacy applications while sharing information from any desktop in a secure networked environment. In a workflow application the process knowledge that applies to the information is also managed, transferred, shared and routed. The key ingredient is the PROCESS. Process Knowledge involves capturing the roles, schedules, and resource descriptions and then automating these as part of the workflow application." Although the two are closely related, this white paper will focus on workflow products rather than workgroup computing.

22. Edgemon, J; Ryan, S; Miller J
The Cost of Network Downtime In A Healthcare Environment
An FCG White Paper, July 1999, First Consulting Group.
(www.fcg.com/knowledge/white_papers.asp)
Today's health care industry increasingly relies on information technology to improve patient care processes, making network downtime less and less excusable. However, preparing for an I/T disaster or network outage takes significant time, energy, and money—causing many health care organizations to wonder if it's really worth their while to worry about a crisis that may never occur. Traditionally, the health care industry's attitude toward I/T disaster planning has been a combination of denial and ignorance of the true costs, yet an ambivalent approach to this serious problem will no longer work.

23. Madell, R
Speaking The Same Language
HealthLeaders, September 2001.
Wouldn't it be nice if medical societies could communicate in a common language to exchange structured data over the Web? That was the sentiment driving Peter S. Greene, a cardiothoracic surgeon at Johns Hopkins University School of Medicine, when he agreed in May to become the founding executive director of the MedBiquitous Consortium, a group dedicated to creating technology standards and software for education and collaboration in online medical communities. Fifteen organizations representing more than 400,000 physicians have so far joined the consortium, and three companies are taking the lead in designing the technical architecture. Greene recently took time to discuss his role in the consortium's launch.

C. Medical Errors and Quality of Care

24. Adams, JM
Applying e-health to case management
Lippincott's-Case-Management (LIPPINCOTT-CASE-MANAGE) 2000 Jul-Aug; 5(4): 168-71
ABST: The health care industry is only beginning to understand e-health. E-health can be defined as the use of technology to directly improve health care delivery-affording patients the opportunity to participate in their own health care management, provider, and institution. The market is changing rapidly, and innovations, partnerships, and mergers are taking place daily. For health care institutions, setting a long-term, yet adaptable e-health strategy is of vital importance for the continued success of the organization. For clinicians, an understanding of and familiarity with technologies can significantly improve workflow, organization, and patient interaction. For the patient, technology can be leveraged as a means to take initiative and responsibility for his/her own health. This article defines e-health and explains the implications and benefits of e-health to nurses and their patients. The article also identifies unique opportunities e-health/e-commerce can provide case managers in promoting patient connectivity, care management, and economy in cost of care.

25. Suzanne Bakken
An Informatics Infrastructure Is Essential for Evidence-based Practice
Columbia University Press, New York, New York 2000
ABST: The contention of the author is that an informatics infrastructure is essential for evidenced-based practice. Five building blocks of an informatics infrastructure for evidence-based practice are proposed: (1) standardized terminologies and structures, (2) digital sources of evidence, (3) standards that facilitate health care data exchange among heterogeneous systems, (4) informatics processes that support the acquisition and application of evidence to a specific clinical situation, and (5) informatics competencies. Selected examples illustrate how each of these building blocks supports the application of evidence to practice and the building of evidence from practice. Although a number of major challenges remain, medical informatics can provide solutions that have the potential to decrease unintended variation in practice and health care errors.

26. Elise C. Becher and Mark R. Chassin
Improving Quality, Minimizing Error: Making It Happen ; A five-point plan and why we need it.
Health Affairs May - June, 2001
ABST: Medical errors and the quality problems to which they lead harm millions of Americans each year. If we are to reduce errors and improve quality substantially, we must create systems and care processes that anticipate inevitable human errors and either prevent them or compensate for them before they cause harm. Formidable barriers now stand in the way of progress. Success will require a multifaceted strategy, including public education, government investment and regulation, payment system restructuring, and leadership from within the delivery system. Concern about medical errors is running high in the wake of an Institute of Medicine (IOM) report. Print and electronic media have sustained coverage; state and federal lawmakers have debated proposed legislation; and the Clinton administration took executive action to mobilize federal health programs to respond to the problem. However, as Lawrence Altman put it in the New York Times, "Doctors have amputated the wrong leg...for centuries." Quality has been a major focus of concern in health care for several decades. How should we fit the recent discourse

about medical errors into the larger issue of health care quality? How big a problem is the harm done by medical errors? In this paper we explore these questions, consider how health care would have to change for errors to occur far less often, discuss the barriers to such change, and identify five directions for policies that might accelerate it.

27. Deaton, C
Outcomes measurement and evidence-based nursing practice
Journal-of-Cardiovascular-Nursing (J-CARDIOVASC-NURS) 2001 Jan; 15(2): 83-6
ABST: Outcome measurement and evidence-based practice are complementary and iterative efforts; both contribute to quality health care. In this article, hemodynamic monitoring is utilized as an example to discuss outcome measurement and evidence-based practice. The use of technology, medications, and other interventions ideally would be based on sound scientific evidence of efficacy and effectiveness in clinical practice. Outcome measurement can contribute to the evidence and strengthen the process of appropriate technology use and evidence-based practice.

28. Farbstein K; Clough J
Melior Consulting Group, 166 Lindbergh Ave, Needham, MA 02494-1526, USA.
kenfarb@melior.ma.ultranet.com
Improving medication safety across a multihospital system.
Joint Commission on Quality Improvement 2001 Mar; 27 (3): 123-37
ABST: BACKGROUND: The Massachusetts Coalition for the Prevention of Medical Errors and the Institute for Healthcare Improvement have identified 16 best practices to reduce adverse drug events. CareGroup, a network of six hospitals in eastern Massachusetts, multiplied its routine use of these best practices tenfold in the first 18 months of its medication reliability project. DEVELOPING THE COLLABORATIVE STRATEGY: Although CareGroup's long-term plans included technological advances such as clinical order entry, computer systems in the pharmacy, dispensing stations on patient floors, and bedside bar-coding, efforts first focused on manual improvements feasible within a year's time. A four-year strategy involves helping the medication reliability team leaders at each hospital to create impressive local results, publicize the results to their colleagues, invite their clinical colleagues to learn to use plan-do-study-act (PDSA) cycles, and have colleagues lead PDSA cycles themselves. At monthly or bimonthly task force meetings, team results are presented and team leaders are given specific assignments for their teams. CASE STUDIES: One project reduced the time to blood anticoagulation for heparinized patients. The second dramatically reduced lookalike/soundalike errors. The third improved the safety of patient-controlled analgesia. The fourth reduced coumadin incidents. The fifth improved the education of patients about their medications. The sixth greatly reduced the morning dispensing backlog in the pharmacy. SUCCESS FACTORS: Key success factors, in addition to leadership, are the use of data, forcing functions, appropriate pacing, inexpensive practices, and a consultant. The pace needed to implement the best practices overall made it imperative to make many changes rapidly. Often, the team initiated several changes at one time, rather than sequencing changes in successive PDSA cycles. LIMITATIONS, BARRIERS, AND NEXT DIRECTIONS: CareGroup faces key challenges in measurement and in spreading and deepening the involvement of clinicians, particularly physicians. It lacks an overall, objective measure of medication safety. Spread of the changes made has been incomplete although the adoption of the best practices increased tenfold (from 6 to 60) in 21 months. Two of the case

study interventions—in coumadin order sequencing and dedicating a pharmacy technician to order entry—have been implemented at only one site to date, even though the adoption of the change ideas across hospitals is encouraged. The eventual impact of the changes planned for the future, through automated systems such as computerized order entry, is much larger. Considerable progress is anticipated in adoption of best practices; improvement in top-priority areas of each hospital; improved automation and technology in ordering, dispensing, and administering medication; and better reporting.

29. Goldberg, HI; Neighbor, WE; Cheadle, AD; Ramsey, SD; Diehr, P; Gore, E.
A controlled time-series trial of clinical reminders: using computerized firm systems to make quality improvement research a routine part of mainstream practice.
Health Services Research, 2000 Mar, 34(7):1519-34. (Unique ID/PMID: 20199712)
ABST: OBJECTIVE: To explore the feasibility of conducting unobtrusive interventional research in community practice settings by integrating firm-system techniques with time-series analysis of relational-repository data. STUDY SETTING: A satellite teaching clinic divided into two similar, but geographically separated, primary care group practices called firms. One firm was selected by chance to receive the study intervention. Forty-two providers and 2,655 patients participated. STUDY DESIGN: A nonrandomized controlled trial of computer-generated preventive reminders. Net effects were determined by quantitatively combining population-level data from parallel experimental and control interrupted time series extending over two-month baseline and intervention periods. DATA COLLECTION: Mean rates at which mammography, colorectal cancer screening, and cholesterol testing were performed on patients due to receive each maneuver at clinic visits were the trial's outcome measures. PRINCIPAL FINDINGS: Mammography performance increased on the experimental firm by 154 percent (0.24 versus 0.61, p = .03). No effect on fecal occult blood testing was observed. Cholesterol ordering decreased on both the experimental (0.18 versus 0.1 1, p = .02) and control firms (0.13 versus 0.07, p = .03) coincident with national guidelines retreating from recommending screening for young adults. A traditional uncontrolled interrupted time-series design would have incorrectly attributed the experimental-firm decrease to the introduction of reminders. The combined analysis properly indicated that no net prompting effect had occurred, as the difference between firms in cholesterol testing remained stochastically stable over time (0.05 versus 0.04, p = .75). A logistic-regression analysis applied to individual-level data produced equivalent findings. The trial incurred no supplementary data collection costs. CONCLUSIONS: The apparent validity and practicability of our reminder implementation study should encourage others to develop computerized firm systems capable of conducting controlled time-series trials.

30. Hunt, DL; Haynes, RB; Hanna, SE; Smith, K.
Effects of computer-based clinical decision support systems on physician performance and patient outcomes: a systematic review [see comments]
JAMA, 1998 Oct 21, 280(15):1339-46. (Unique ID/PMID: 99008446)
ABST: CONTEXT: Many computer software developers and vendors claim that their systems can directly improve clinical decisions. As for other health care interventions, such claims should be based on careful trials that assess their effects on clinical performance and, preferably, patient outcomes. OBJECTIVE: To systematically review controlled clinical trials assessing the effects of computer-based clinical decision support systems (CDSSs) on physician performance and patient outcomes. DATA SOURCES: We updated earlier reviews covering 1974 to 1992 by

searching the MEDLINE, EMBASE, INSPEC, SCISEARCH, and the Cochrane Library bibliographic databases from 1992 to March 1998. Reference lists and conference proceedings were reviewed and evaluators of CDSSs were contacted. STUDY SELECTION: Studies were included if they involved the use of a CDSS in a clinical setting by a health care practitioner and assessed the effects of the system prospectively with a concurrent control. DATA EXTRACTION: The validity of each relevant study (scored from 0-10) was evaluated in duplicate. Data on setting, subjects, computer systems, and outcomes were abstracted and a power analysis was done on studies with negative findings. DATA SYNTHESIS: A total of 68 controlled trials met our criteria, 40 of which were published since 1992. Quality scores ranged from 2 to 10, with more recent trials rating higher (mean, 7.7) than earlier studies (mean, 6.4) (P<.001). Effects on physician performance were assessed in 65 studies and 43 found a benefit (66%). These included 9 of 15 studies on drug dosing systems, 1 of 5 studies on diagnostic aids, 14 of 19 preventive care systems, and 19 of 26 studies evaluating CDSSs for other medical care. Six of 14 studies assessing patient outcomes found a benefit. Of the remaining 8 studies, only 3 had a power of greater than 80% to detect a clinically important effect. CONCLUSIONS: Published studies of CDSSs are increasing rapidly, and their quality is improving. The CDSSs can enhance clinical performance for drug dosing, preventive care, and other aspects of medical care, but not convincingly for diagnosis. The effects of CDSSs on patient outcomes have been insufficiently studied.

31. Carole M. Lannon, MD, MPH, Chairperson, Barbara Jane Coven, MD, F. Lane France, MD, Gerald B. Hickson, MD, Paul V. Miles, MD, Jack T. Swanson, MD, John Ichiro Takayama, MD, MPH, David L. Wood, MD, MPH, Loren Yamamoto, MD, MPH
Pediatrics 2001; 107: 1473-1475 June, 2001 Principles of Patient Safety in Pediatrics
National Initiative for Children's Health Care Quality Project Advisory Committee (NICHQ PAC), 2000-2001,
ABST: The American Academy of Pediatrics and its members are committed to improving the health care system to provide the best and safest health care for infants, children, adolescents, and young adults. In response to a 1999 Institute of Medicine report on building a safer health system, a set of principles was established to guide the profession in designing a health care system that maximizes quality of care and minimizes medical errors through identification and resolution. This set of principles provides direction on setting up processes to identify and learn from errors, developing performance standards and expectations for safety, and promoting leadership and knowledge.

32. Lauren LeRoy and Katherine M. Treanor
Special Report; Patient Safety: Grant makers join The Effort To Reduce Medical Errors; Foundations are well positioned to support these efforts at the local, state, and national levels.
Health Affairs March - April 2001
SUMMARY: Medical errors have been documented for many years, but the evidence had not captured the public's attention until the Institute of Medicine (IOM) report, *To Err Is Human: Building a Safer Health System*, was published in November 1999. The report placed patient safety firmly on the nation's health care agenda in part because of one startling statistic: Between 44,000 and 98,000 persons die in U.S. hospitals each year as a result of medical errors. The precise number of deaths and injuries that patients experience while receiving medical care is uncertain, but the magnitude suggested by the IOM study is clearly unacceptable. Improving

patient safety is a shared responsibility that depends on cooperation and action by private-sector organizations, consumers, and government. Health grant makers are well positioned to support these efforts both locally and nationally. Medical errors take many forms, from patient falls because of a lack of restraints, to mistakes in administering medications, to miscommunication among providers involved in a patient's care. Medical errors occur in both inpatient and outpatient settings. Some errors have devastating consequences; others do not. Medical errors are not responsible for all poor outcomes but rather represent adverse events that could have been prevented given current knowledge. Health care lags behind some other high-risk industries, such as aviation and nuclear power, in making error reduction and safety central to its mission. Some models and success stories, however, suggest that the IOM's national goal of cutting errors in half over the next five years is within reach. For example, efforts to improve surgical anesthesia outcomes have reduced the error rate nearly sevenfold. Medication errors in the Veterans Health Administration have decreased by 70 percent since the introduction of a handheld, wireless bar-coding system. Contrary to commonly held perceptions, medical errors are generally not the result of individual misconduct; they are caused by failures in the health care systems and organizations that we create. Health care is both labor and technology intensive. The potential for preventable adverse events is exacerbated by both the complexity and fragmentation that characterize health care delivery. The key to reducing medical errors, therefore, is to focus on improving the systems of delivering care. Experience both within and outside of the health sector points to looking for solutions that seek to understand the underlying causes of errors, learn from reported errors or close calls, and work to eliminate the conditions that contribute to preventable adverse events. Shifting the focus from individuals to systems presents perhaps the greatest challenge in reducing the rate of medical errors. It will require a change in both health professional culture and public expectations. Historically, the most common approach to addressing errors has been to assign blame. Doing so, however, is counterproductive and has led to an environment that inhibits discussion of mistakes and close calls for fear of reprisals. Additionally, this culture prevents the reporting and systems examination needed to discover and correct the causes of errors.

33. Bates, D; Gawande, A
The Impact of the Internet on Quality Measurement; Word-of-mouth advice about providers is gaining respectability through the Web.
Health Affairs November - December 2000, 19(6), 104-114.
Consumers are eager for information about health. However, their use of such data has been limited to date. When consumers do consider data in making health care choices, they rely more on word-of-mouth reputation than on traditional quality measures, although this information has not necessarily been readily accessible. The Internet changes the exercise of quality measurement in several ways. First, quality information—including reputation—will be more readily available. Second, consumers will increasingly use it. Third, the Internet provides a low-cost, standard platform that will make it vastly easier for providers to collect quality information and pass it on to others. However, major barriers still stand in the way of public access to quality information on the Internet as well as of having that access actually improve patients' care.

D. Electronic Medical Records/Computerized Patient Records

34. Blignaut, PJ; McDonald, T; Tolmie, CJ.
Predicting the learning and consultation time in a computerized primary health care clinic.
Computers in Nursing, 2001 May-Jun, 19(3):130-6. (Unique ID/PMID: 0011391885)
ABST: Managers would like to know how long it takes health care service providers to achieve the same throughput of patients per day that they were used to with a pen-and-paper system. This study has been undertaken to derive a model for predicting the time it takes a service provider from a previously disadvantaged community to enter a patient's record in terms of his or her experience and the number of data units that have to be captured. A model was also derived to predict the average consultation time in terms of the number of data units that are captured by an experienced service provider. It can be inferred that health care service providers should be allowed at least 6 months of computerized system experience before any decisions about the success of the technology introduction can be made.

35. W. Ed Hammond, PhD. Duke University, Durham, North Carolina.
How the Past Teaches the Future JAMIA 2001
ABST: More than 30 years of experience in developing a computer-based patient record system, The Medical Record (TMR), in multiple settings, in multiple specialty groups, and at multiple sites has taught us many lessons. Lessons related to computer-based patient records include the importance of a data model in which input, storage, and planned use are independent; separation of patient-specific data from metadata; a modular design to localize the program code that deals with a set of data; redundant storage to optimize tasks and response time; and integration of decision support into work process. Lessons related to medical informatics include the importance of a clinical–technical partnership, control of tools at the leading edge, and rapid prototyping in the real world. Finally, changes in technology move the challenges but do not eliminate them.

36. Heft-LaPorte, H; Frankel, AJ.
Computer-assisted tracking of a case management program for the homeless.
Care Management Journals, 2000 Fall, 2(3):153-9. (Unique ID/PMID: 0011398571)
ABST: Computer scan sheet technology was used to evaluate process and outcome variables in a case management shelter program for the homeless. Clients spent up to four months in this program, working on a number of goal areas, including housing, employment, drugs and alcohol, mental and physical health, and literacy. Using Tele-Form, a computer program that allows scan sheets to be designed on screen, case manager recording forms were developed that allowed interventions to be documented on a daily basis, while psychosocial goal areas were documented on scan sheets at intake and termination. Data from these scan sheets were fed into SPSS, a statistical program for the social sciences. Using the case management tracking guidelines developed by Frankel and LaPorte, 1998, the results of this study showed that scan sheet technology was an effective, efficient, and extremely cost-effective way to track case management. The analysis of the data and subsequent discussion suggested ways about how to make case management evaluation more uniform across the country.

37. Veronesi-JF
Ethical issues in computerized medical records

Critical-Care-Nursing-Quarterly (CRIT-CARE-NURS-Q) 1999 Nov; 22(3): 75-80
ABST: Greater use of computer technology has permitted rapid access to many forms of data. Hospitals have traditionally been slower to accept this technology for patient medical records. With the rapid approach of the new millennium, hospitals are being forced into reevaluating many processes, including the volumes of data collected on paper. Electronic medical records are one approach to reducing storage and streamlining care across the health care continuum. This article examines the ethical impact of computerized medical records, including access to data, ownership of data, confidentiality, and medical record brokering

38. Zhang C; Zhang S; Xu C; Gao S
Disease control in the information era.
Douglas RM, Med J Aust 2001 Mar 5; 174 (5): 241-3
ABST: With the development of HIS/RIS (Hospital/Radiology Information System), it is very important to study the HL7 (Health Level Seven) Standard for electronic data exchange in health care environments. Firstly, in this paper, the history, development goal, and conceptions of HL7 are introduced. Secondly, its applications and auto-realization technologies are presented. Then, the problems which exist in the standard and the difficulties of HL7 in China are analyzed. Finally, some helpful suggestions about the development of HL7 in China are proposed.

39. Metzger, J; Slye, D.
Inpatient e-Ordering
Healthcare Informatics
http://www.fcg.com/webfiles/pdfs/HealthcareInformatics-eOrdering.pdf
Given impetus by the Institute of Medicine's report, *To Err is Human*, computer physician order entry (CPOE) is increasingly in the limelight as an important element of hospital efforts to improve patient safety. As purchasers and regulators begin to fashion an agenda around patient safety, CPOE takes on even greater urgency. For the past six years, CPRI-HOST (Computer-based Patient Record Institute-Healthcare Open Systems & Trials, Bethesda, MD) has presented the Nicholas E. Davies CPR Recognition Award of Excellence to health care organizations that successfully use CPR systems to improve health care delivery. The panel discussion leader (Jane Metzger) framed questions to tap the knowledge of these experts and elicit advice for organizations moving forward with CPOE. Their answers are summarized and consolidated in the text.

40. Stringer, J
Broken Records: Don't hold your breath for Electronic Medical Records.
Red Herring, October 2000 (83), 236-238.
Electronic medical records (EMRs) were supposed to be the solution; they were supposed to put the right information, at the right time, at the fingertips of health professionals. They haven't. Although the concept is more than 30 years old and the Internet brings some new opportunities that are sure to gain EMRs more acceptance in the health care community, EMRs are still years away. Some of the obstacles to adoption identified are physician resistance, tight hospital and managed care IT budgets, security, lack of time to translate existing paper records and lack of a clear standard. However, several factors, such as the popularity of personal digital assistants, the expanding wired world and empowered online health consumers might advance the adoption of EMRs.

41. Roner, Lisa
Physicians and the Internet: What pharma needs to know
Eyeforpharma Briefing, 8/23/2001
http://www.eyeforpharma.com/index.asp?news=19874
In spite of the rising importance of direct to consumer advertising, pharma's biggest target audience remains the physicians who ultimately write the prescriptions. And although patients are flocking to the Web in droves for the latest medical information, getting physicians to log on has proved more difficult. Understanding what brings doctors online, or perhaps more importantly what keeps them away, remains the "holy grail" of the industry's Internet marketing initiatives.

42. Kopp, E
Physicians Take Hold of Handheld Devices
eHealth Report, Skila News, October 30, 2000
(http://www.skila.com/ereportArchive/ereport_1030.htm)
At first glance, Personal Digital Assistants (PDAs) offer an exciting opportunity for pharmaceutical, medical device, and biotechnology companies to gain unique access to physicians at the most critical point in the health care process—the point-of-care—and obtain a better understanding of physician prescribing behavior. Physicians are attracted to the portability aspect of handheld devices, a key advantage over desktop and even laptop PCs since the unit goes with the doctor and saves him from having to run to the back-office. PDAs promise to move the information needed to make care decisions closer to the actual patient encounter. Already, there is a growing list of companies vying for the physician's palm. Skila believes that to survive, these companies must move quickly from a business model based on sponsor advertising revenue to one based on the generation and use of information that will add value to both the health care provider and supplier. Consolidation will undoubtedly occur for a critical mass of physicians to be captured by one company. In order to achieve a critical mass, companies must provide products and services that are easy to use, save the doctor time, complement a doctor's daily routine, and ultimately have true value-added features that improve the quality of care.

43. J.D. Kleinke
Release 0.0: Clinical Information Technology In The Real World
Health Affairs November - December 1998, 17(6), 23-38.
ABST: The industrialization of medical care delivery, compelled by fifteen years of reimbursement reform, has given rise to a commercial health information technology (HIT) industry. Well financed by Wall Street, the HIT industry offers a variety of ready-made solutions designed to transform a health care organization's raw data resources into useful clinical information. Many of the resulting clinical decision-support products are encumbered by numerous insurmountable intellectual and technical problems and, as a consequence, meet with cultural resistance from physicians. The long-awaited but costly implementation of electronic medical records (EMRs) will make these pioneering but flawed efforts obsolete, if EMR development successfully exploits recent technological breakthroughs and the ongoing consolidation of health care organizations.

E. HIPAA Regulations, Privacy, and Security

44. Russell W. Chesney, MD, Department of Pediatrics, University of Tennessee College of Medicine, LeBonheur Children's Medical Center,
Privacy and Its Regulation: Too Much Too Soon, or Too Little Too Late

Pediatrics 2001; 107: 1423-1425 June 2001
SUMMARY: As reported in a recent article entitled, "The Reinvention of Privacy," a 1999 Wall Street Journal—NBC survey indicated that the American public is "gravely concerned" over issues of privacy. New technologies, particularly the Internet, are perceived by a majority of survey responders as contributing to an escalating loss of privacy. Both state and federal legislators are racing to pass laws that preserve what privacy is left, "after the horse has left the barn." In this context, the Health Insurance Portability and Accountability Act of 1996, termed HIPAA, focuses on medical privacy. On December 28, 2000, the U.S. Department of Health and Human Services (HHS) issued its Final Regulation, Standards for Privacy of Individually Identifiable Health Information, 65 Federal Register 82462. These regulations were mandated in the HIPAA Act. These regulations detail the guidelines and rules for patient privacy that will go into effect on April 14, 2001, with full compliance by most entities on April 14, 2003.
The fundamental principles on which HIPAA is based represent laudable goals. These five principals are:

1. Ensure consumer control over their health information.
2. Establish guidelines for medical record use and release.
3. Ensure the security of personal health information.
4. Set accountability guidelines for medical record use and release.
5. Balance public responsibility with privacy protections.

The Final Regulation, which has been issued to explain the features of the 1996 HIPAA law, comes at a period of renewed interest in privacy. Some individuals and agencies, particularly the American Association of Medical Schools and the AAP, have expressed concerns over the complexity of the regulations, the contradictory statements made, and the chilling effects on the teaching of medical students, and research regarding archival medical records. The Academy has been completely supportive of the final privacy rule, but we asked HHS for assistance with implementation because of the rule's complexity. What the impact of the second public comment period will be is uncertain. How the new administration will view these issues are also unclear. As these regulations are modified, interested parties can keep track of the regulations, public comment, and HHS responses at the HHS Web site (http://asep.hhs.gov/admnsimp).

45. Janlori Goldman and Zoe Hudson
Virtually Exposed: Privacy And E-Health; Privacy concerns are keeping consumers from reaping the full benefit of online health information.
Health Affairs November - December 2000
SUMMARY: The United States is embroiled in a long-standing, contentious debate over how and to what extent individual privacy should be protected in the health care arena. Against this backdrop e-health enters the fray, bringing with it a universe of undefined, unregulated ventures. This paper addresses consumer-focused Internet services—that is, services that target consumers who are accessing information and services. Some of these activities are traditional health care

activities that are migrating to the Internet, such as recruitment for clinical trials, fulfillment of prescription drugs, applications for health insurance, and even consultations with medical care providers. Other activities appear to be unique to the Internet and strain our current understanding of health care. In the past two years the number of American adults accessing health information online has doubled, to ninety-eight million. Many health care consumers are attracted to the Internet because it appears to offer anonymity and a safe place to seek and share information. It is ironic that this is most likely an illusion: Many e-health business models depend on identifying and tracking users for a variety of purposes, often without the person's knowledge or consent. One privacy advocate notes: The trail of transactional data left behind as individuals use the Internet is a rich source of information about their habits of association, speech, and commerce. When aggregated, these digital fingerprints could reveal a great deal about an individual's life. As many e-health companies continue to amass detailed consumer profiles-including health status, insurance information, and purchasing patterns-the temptation to use this information for purposes beyond those for which the information was initially gathered will be irresistible. If we as a society desire the Internet to be used as a force for positive, egalitarian changes in health care, we must first remedy one of the most intransigent barriers to people's full participation in e-health and health generally: fear that their privacy will be violated and their health information will be used to hurt them. Without ubiquitous and strong privacy rules, the true promise of e-health to transform the quality of health care and open doors to care may become just another failed venture that further disempowers people in their health care.

46. Lynne P. Hillabrant; Karen E. Gaignard
Implementing HIPAA Security in a Membership Organization
HIMSS 2000, 67-9.
ABST: The upcoming HIPAA security regulations are forcing a change in business and operating procedures that many, if not most, health care organizations are ill-prepared to tackle. Of all health care organizational structures, membership organizations will most likely face the greatest number of obstacles in preparing for and implementing the HIPAA security regulations. This is because the membership organization as a whole must find a way to accommodate the disparate technologies, business and operating methodologies and processes, and available, limited resources of its individual member organizations, and integrate these into a uniform implementation plan. Compounding these obvious difficulties is the unique challenge of enforcement authority. The individual member organizations are autonomous business entities, whereas the membership organization as a whole merely acts as an advisor or consultant, and has only limited enforcement authority over any individual member organization. This article explores this unique situation in depth. We focus on PROMINA Health System, a nonprofit health care membership organization that consists of five disparate member health care organizations. We examine the challenges PROMINA has encountered in its quest to institute an organization-wide HIPAA security program and its methodology for accomplishing program implementation. The process of implementing HIPAA security in any health care organization will most likely require significant business reengineering. In a membership organization, the amount of business reengineering required increases exponentially. If the business issues are not addressed in the early stages of education, assessment, and planning, then the technology issues for HIPAA cannot be addressed successfully. If neither of the business issues nor the technology issues are effectively communicated, assessed, and planned for in the early stages, the HIPAA security implementation will be significantly more trying and expensive for the membership

organization. PROMINA Health System is a local, nonprofit group of physicians, hospitals, and health services created by health care providers who serve the communities of metropolitan Atlanta. The network was formed to ensure each community's access to a full continuum of high-quality, cost-effective health care. By affiliating, health care providers share the benefits of a large system without losing community ownership. PROMINA is committed to the philosophy that helping people maintain good health is as essential to a community's well being as the treatment of illness.

47. Terry R. Knapp, MD; John Walter, MS, Degree of Engineer, MBA; Christian P. Renaudin, DVM, PhD, MBA
Property Rights and Privacy Principles
HIMSS 2000, 191-1
ABST: Health care consumers own their medical information. As paper medical folders become digital, protection of this private and confidential information falls to information specialists rather than the traditional caregivers. On the basis of a nationwide market assessment study, the authors identify the key issues regarding protecting this personal digital property and outline the federal requirements stemming from the Health Insurance Portability and Accountability Act (HIPAA). Consumer informed consent over the use of specific medical data is a basic requirement, and is a concept supported by physicians and caregivers who rely on consent to approve surgeries and treatment. The article concludes with a solution outline that places the patient in control of his or her personal information, meets security and privacy concerns, and facilitates the critical exchange of patient information among caregivers. This article presents an argument that personal information is akin to property and deserves protection against unwarranted use. Much attention has been placed on building high-security "fences" around data systems, but strong security does not guarantee privacy protection. HIPAA has lead to the establishment of acceptable security requirements, but regulations ensuring individual privacy have been hotly debated and still await final approval. Health information differs from most property: it may be parsed according to receiver and purpose (unlike a car, for example). Access to the information by caregivers is absolutely required to provide the optimal care. Today's segmentation of health information (HIV tests and mental health records) could well impede delivery of appropriate care. In these cases, mechanisms to guarantee a patient's privacy must be available. Privacy may outweigh clinical care concerns.

If health systems, payers, pharmacies, and other care entities seek to protect the privacy and confidentiality of individual patient information, then they must include the consumer in authorizing access and transfer of information. Only the individual can determine what information is private and confidential. With individual control comes trust. We have called this action data informed consent, after the well-accepted informed consent required of medical procedures.

A third-party clearinghouse is an ideal approach to conduct the authentication and tracking of these individual consents. Such a clearinghouse model has been used successfully in the financial industry for handling wire transfers and credit card authorizations. Technology is available to extend this model to electronic medical information.

HIPAA requirements for protecting privacy and confidentiality are still unclear. At present, they do not require a solution as comprehensive as the one proposed. Nevertheless, motivation for such a system exists. Need is likely to increase, as more stringent legislation and regulations are to be anticipated. The proposed trusted intermediary system rather easily scales to increased regulatory complexity. The improved operating efficiencies and potential cost-effectiveness associated with this system through ensured, compliant, secure, and private exchange of information; the avoidance of bad press or lawsuits, and its establishment as a protector of patients should prompt industry leaders to consider such a solution.

48. John R. Lumpkin
E-Health, HIPAA, And Beyond; The chair of the expert advisory board on health data outlines the most important issues in developing a secure health information system.
Health Affairs November - December 2000
SUMMARY: Despite rapid and vast changes in our ability to process and share information, the encounter between patient and doctor is little different today from what it was at the dawn of the twentieth century. A bright future where health information systems can revolutionize the doctor/patient encounter on a vast scale is within our reach. However, two obstacles stand in the way: concerns over privacy and lack of uniform standards. HIPAA AND PRIVACY: Three interrelated concepts relate to controlling access to health data: privacy, confidentiality, and security. PRIVACY: Privacy relates to an individual's desire to control access to personal health information. The health record should be under the control of the individual to the fullest extent possible, and release should be based upon consent. Adequate safeguards can only be assured through clear and strong legislation implemented through regulation. The NCVHS supports the adoption of privacy legislation that incorporates provisions of "fair information practices" and provides strong protections for personal health data. These protections should be afforded for data in either a paper or an electronic format. CONFIDENTIALITY: Confidentiality relates to the obligation of a holder of identifiable personal health information to protect the person's privacy. That obligation is determined by common practice, laws, and regulations and may vary from state to state. Those laws and regulations also may indicate instances where that information can or must be shared for public health or other purposes. Otherwise, holders of personally identifiable health information should only share it based upon fair information practices. Concerns have been raised about the risk that the sharing of such information may result in adverse insurance decisions, employment decisions, and other adverse social outcomes. These concerns seem to be heightened as information moves from paper to electronic formats. SECURITY. The extent to which health information can be stored with access limited to those who are authorized is called "security." Security involves protecting data at rest and data in motion. At rest, personally identifiable health data exist in clinicians' offices, hospitals, other health care facilities, and health plan and other third-party payers' offices. The NCVHS has recommended that these data be protected with industry standard approaches, including controlling and monitoring access and organizational practices to make security an integral part of health information systems development and operation. Data in motion include personally identifiable health data that are transmitted from one location to another over local area networks, telephone lines, the Internet, or other means. Data in motion need to be protected like data at rest, but doing so presents a different set of challenges and requires sophisticated technologies, such as encryption.

Pursuant to the direction given by Congress in HIPAA, HHS has issued two sets of proposed rules to address privacy and security. These rules have made great strides in bringing uniformity to an industry that has not been as aggressive as it needs to be to ensure the privacy and protection of individually identifiable health data. Although many of the provisions in the security regulation are part of the functionality of the underlying operating systems, testimony at NCVHS hearings indicated that these functions are often disabled in health care installations. The rules as proposed seek to protect the data and individuals' privacy independent of the operating platform and means of communication. They are equally applicable in a system that communicates over a local area network, a wide area network, or the Internet.

HEALTH DATA STANDARDS: The second major obstacle to the development and adoption of sophisticated health information systems is the lack of uniform standards throughout the industry. Among other things, this has created problems for large integrated systems, since they often merge hospitals and medical group practices with incompatible information systems. Further, the volatile nature of the health care information marketplace has resulted in many vendors' going out of business or being bought out by other companies. As the industry shakeout proceeds, clinicians are left to face orphaned systems with data that cannot be easily imported into new systems.

Other industries have been able to adopt uniform standards because of the dominance of a few companies. For instance, in the automobile industry, standards for the interchange and ordering of parts were established by the "big three" automakers (General Motors, Ford, and Daimler Chrysler). There is no similar dominant force in the health care arena. In fact, the highly competitive nature of the health care marketplace encourages the use of proprietary systems to limit providers' mobility and establish an edge. Congress, through the adoption of the HIPAA Administrative Simplification provisions, directed HHS to play the role of establishing standards for health care data. The beginning of the first phase was marked by the August 11 adoption of rules to establish standards for administrative transactions. The standards that are the basis of this rule have been developed by private sector "standards development organizations." This first set of HIPAA rules will require an intensive response by the health care industry to come into compliance. Health plans; insurance companies, and other payers will have to modify their systems to receive these standardized transactions. Providers of care are only required to use the standardized transactions when they submit claims for services electronically. However, over time providers probably will be increasingly required to submit standardized transactions to payers as payers simplify their systems. Therefore, providers will be able to install practice management systems to transmit administrative data with a format and content that is consistent across payers, which will dramatically reduce costs.

The adoption of the first HIPAA standards has implications that far transcend simplification of administrative transactions. These rules establish the first uniform definition of more than 400 data fields and the data content and format of those fields. This allows systems developers to create office management and clinical management computer programs that can share data with systems developed by other vendors. The next step in the process is not only to allow the sharing of the data, but also to activate knowledge tools such as guidelines, protocols, and alerts. For example, not only could the computer share that "an ear exam is positive for inflammation," but it also would be able to trigger the appropriate decision-support tools for management. The

NCVHS, in its 6 July 2000 recommendations to HHS secretary Donna Shalala, outlined the criteria and the process for adoption of rules for patient medical record information. These recommendations are independent of platform or communication methodologies.
The rapid acceptance of the Internet as a means to communicate health information highlights the need for a national approach to health information technology. Privacy concerns have a high priority and need further congressional action. Privacy protections need to be in place not only for Internet-related health activities, but also to protect individually identifiable information in paper and electronic formats, wherever they exist. Health care information systems must be designed to ensure that personal health information has a high degree of protection through industry standard technology and organizational practices. The development and adoption of data and information standards are crucial to the further expansion of information systems that not only record health events but also provide caregivers with the decision support they need to deliver high-quality, effective, and efficient health care.

49. McCarthy, Robert.
Is nothing sacred on the net? Business & Health, Feb 2001, 19(2): 21-26
Medical Economics Inc. Feb 2001
ABST: The privacy and security of personal medical records and browsing habits are major concerns that could hamper full use of e-health. Both public and private initiatives are addressing the problem. Some 41 million U.S. adults, well over half the online population, use the Web either to secure health care information or to perform health care interaction or transactions. That's a lot of e-health action, yet another 7 million Americans refrain from using the Web for health care-primarily out of privacy and security concerns, according to CyberDialogue, a New York City-based analyzer of Internet usage. Their concerns are twofold, and supported by reality. On one level, there is the security of medical records in an environment that allows instant distribution. Some lapses that have already occurred: Confidential medical records of 20 patients at an Alaska hospital were accidentally posted on the public Web site of a software developer working for the hospital Kaiser Permanente accidentally emailed confidential medical information on 858 members to 19 other members. Kaiser blamed the mismailing on, alternatively, either human error or a technological glitch. In August, a temp worker at Boston-based DanaFarber Cancer Institute allegedly used her computer access to steal the files of at least 23 patients. On another level, consumers fear misuse of personal information inferred from the kinds of Web sites an individual visits, be the diabetes, depression or sexually transmitted diseases. Some examples: Pharmatrak, an online market research company, was outed in August for allegedly placing "cookies" (i.e., ID codes that "mark" a computer visitor to a Web site) on consumers. The cookies enabled 11 pharmaceutical company clients of Pharmatrak to collect information about the browsing habits of Web site visitors to their Web pages. A computer privacy consultant testified before the Senate Commerce Committee that Drkoop.com either sold or gave away his email address and some personal health information to DoubleClick, one of the largest developers of Internet advertising. As Michigan Attorney General Jennifer Granholm put it, "every time you use the Internet, DoubleClick is placing a bar code on your back, so it can identify your interests, habits and preferences." Internet e-health vendors and watchdogs agree that unless privacy and security can be rigorously guaranteed and enforced, there will be more incidents like the Kaiser email glitch as well as more revelations about "cookie" monsters. Until end users trust the Internet enough to share information about health and disease status, however,

the Internet will fail to realize its considerable potential as health care educator and deliverer of care.

50. Mozlin R.
The complexities of HIPAA and administration simplification. (16 REFS)
Optometry 2000 Nov; 71 (11): 727-32. SUNY State College of Optometry, New York, New York.
ABST: BACKGROUND: The Health Insurance Portability and Accessibility Act (HIPAA) was signed into law in 1996. Although focused on information technology issues, HIPAA will ultimately impact day-to-day operations at multiple levels within any clinical setting. Optometrists must begin to familiarize themselves with HIPAA in order to prepare themselves to practice in a technology-enriched environment. METHOD: Title II of HIPAA, entitled "Administration Simplification," is intended to reduce the costs and administrative burden of health care by standardizing the electronic transmission of administrative and financial transactions. The Department of Health and Human Services is expected to publish the final rules and regulations that will govern HIPAA's implementation this year. RESULTS: The rules and regulations will cover three key aspects of health care delivery: electronic data interchange (EDI), security and privacy. EDI will standardize the format for health care transactions. Health plans must accept and respond to all transactions in the EDI format. Security refers to policies and procedures that protect the accuracy and integrity of information and limit access. Privacy focuses on how the information is used and disclosure of identifiable health information. Security and privacy regulations apply to all information that is maintained and transmitted in a digital format and require administrative, physical, and technical safeguards. CONCLUSIONS: HIPAA will force the health care industry to adopt an e-commerce paradigm and provide opportunities to improve patient care processes. Optometrists should take advantage of the opportunity to develop more efficient and profitable practices.

51. Peter Niedzwiecki; Stephen L. Priest, MS; Vincent C. Pivnicny, PhD; Barbara C. Ruffino
Leveraging HIPAA to Support Consumer Empowerment
HIMSS 2000, 109-23.
ABSTRACT: The consumer empowerment movement needs to provide consumers with more access and control of their health care records. The premise of this article is that there is a fundamental market shift towards consumer empowerment—and technology is the driving force. We contend the results will satisfy the intent of the HIPAA mandate. Two restrictions impede the market from moving toward real consumer empowerment. First, managing one's own health history record is difficult because the complete record is segmented in disparate systems that are difficult to integrate. This is because unique identifiers and consistent coding are nonexistent. Second, security and control of patient identifiable health information is still evolving. There is no consensus among providers for Internet security, as we can see by all the legislative privacy bills trying to address the issue.
HIPAA is both a legislative mandate and an enabler of the next health care paradigm. Providers must comply with the HIPAA mandates for electronic data interchange (EDI) code sets, administrative simplification, and privacy and confidentiality protocols. By recognizing HIPAA as part of a consumer-driven movement, organizations can incorporate empowerment strategies into a planning process that creates consumer options in health care and leverages HIPAA

compliance to benefit both providers and consumers. This article suggests methods for meeting HIPAA compliance through innovative consumer empowerment methods.

52. Tribble D
The Health Insurance Portability and Accountability Act: Security and Privacy Requirements
American Journal Health-System Pharmacy (AM J Health-Syst Pharm) 58(9):763-770, 2001
ABST: The security and privacy requirements of the Health Insurance Portability and Accountability Act of 1996 (HIPAA) and their implications for pharmacy are discussed. HIPAA was enacted to improve the portability of health care insurance for persons leaving jobs. A section of the act encourages the use of electronic communications for health care claims adjudication, mandates the use of new standard code sets and transaction sets, and establishes the need for regulations to protect the security and privacy of individually identifiable health care information. Creating these regulations became the task of the Department of Health and Human Services. Regulations on security have been published for comment. Regulations on privacy and the definition of standard transaction sets and code sets are complete. National identifiers for patients, providers, and payers have not yet been established. The HIPAA regulations on security and privacy will require that pharmacies adopt policies and procedures that limit access to health care information. Existing pharmacy information systems may require upgrading or replacement. Costs of implementation nationwide are estimated to exceed $8 billion. The health care community has two years from the finalization of each regulation to comply with that regulation. The security and privacy requirements of HIPAA will require pharmacies to review their practices regarding the storage, use, and disclosure of protected health care information.

53. FCG's Emerging Practices Group
The Latest on HIPAA (The Health Insurance Portability and Accountability Act) Including Final Rules for EDI Transactions and Code Sets, plus Privacy (published December 28, 2000)
An FCG White Paper, February 2001, First Consulting Group.
(www.fcg.com/knowledge/white_papers.asp)
SUMMARY: On December 28, 2000, the highly anticipated final rule for privacy standards governing individually identifiable health information was published in the Federal Register. This final rule now joins its companion final rule for EDI Transactions and Code Sets, marking a continued transformation of the health care industry. It also marks the beginning of a 26-month implementation period (38 months for small health plans) for this component of HIPAA, culminating in compliance by early 2003. Now with standardized formats and content for electronic data transmission as well as new provisions protecting the privacy of that information, we continue to move toward reduced administrative burden and increased efficiency across the entire industry.

54. FCG's Emerging Practices Group
HIPAA - The Health Insurance Portability and Accountability Act) Final Standards for Privacy of Individually Identifiable Health Information (Released by the Department of Health and Human Services December 28, 2000)
An FCG White Paper, February 2001, First Consulting Group.
(www.fcg.com/knowledge/white_papers.asp)
SUMMARY: Why Is This Important? The recently released HIPAA rule protecting the privacy of patient identifiable information is important to nearly all health care organizations. Provider

and health plan organizations alike must comply with these rules by April 2003 and face stiff penalties for misusing patient information. The rules spell out new national patient rights regarding their personal medical information and the associated obligations of the health care organizations that use and share that information.

55. Health Plans and HIPAA Readiness: Approaches & Status
An FCG First Report, January 2001, First Consulting Group.
(http://www.fcg.com/knowledge/first_reports.asp)
The requirements of the Health Insurance Portability and Accountability Act of 1996 (HIPAA) have far-reaching implications for systems and processes in health plans. Since the passage of HIPAA the development of specific regulations has been slow and timetables have slipped. This has put health plans in the challenging position of facing major tasks in retooling core business systems and processes (which will require significant lead time) yet not knowing the eventual schedule for compliance or the specific requirements. Recently, First Consulting Group (FCG) and the American Association of Health Plans (AAHP) joined forces to survey health plans to get an update on how they are approaching HIPAA readiness and how much progress they have made. The timing of the survey was late summer 2000, when approval of some EDI transaction standards was pending, though rules for other EDI elements (e.g., patient ID, payer ID, claims attachments) had not even been proposed. (Since the survey, some of the EDI transaction standards have been finalized.) The sample provided by the 27 plans that completed the survey, including 15 very large plans, provides an opportunity to understand HIPAA compliance in the large plans that serve much of the U.S. population.

56. Herrera, S
Hypocritic Oath: Personal information may not be private on consumer medical sites.
Red Herring, October 2000 (83), 240-242.
This article discusses a study by the California HealthCare Foundation concludes that the perceived anonymity of the leading medical sites has been an illusion. Contrary to what these sites write in their privacy policies, personal information is being transferred to third parties.

57. Hodge, J; Gostin, L; Jacobson, P
Legal Issues Concerning Electronic Health Information: Privacy, Quality, and Liability
JAMA. 1999;282:1466-1471
Personally identifiable health information about individuals and general medical information is increasingly available in electronic form in health databases and through online networks. The proliferation of electronic data within the modern health information infrastructure presents significant benefits for medical providers and patients, including enhanced patient autonomy, improved clinical treatment, advances in health research and public health surveillance, and modern security techniques. However, it also presents new legal challenges in three interconnected areas: privacy of identifiable health information, reliability and quality of health data, and tort-based liability. Protecting health information privacy (by giving individuals control over health data without severely restricting warranted communal uses) directly improves the quality and reliability of health data (by encouraging individual uses of health services and communal uses of data), which diminishes tort-based liabilities (by reducing instances of medical malpractice or privacy invasions through improvements in the delivery of health care services resulting in part from better quality and reliability of clinical and research data).

Following an analysis of the interconnectivity of these three areas and discussing existing and proposed health information privacy laws, recommendations for legal reform concerning health information privacy are presented. These include (1) recognizing identifiable health information as highly sensitive, (2) providing privacy safeguards based on fair information practices, (3) empowering patients with information and rights to consent to disclosure (4) limiting disclosures of health data absent consent, (5) incorporating industry-wide security protections, (6) establishing a national data protection authority, and (7) providing a national minimal level of privacy protections.

58. Cunnigham, R
Old Before Its Time: HIPAA And E-Health Policy; A law that predates the Internet explosion needs retrofitting to serve as a foundation for standardized data exchange.
Health Affairs November - December 2000, 19(6), 231-238.
The corner stone of federal policy on information technology (IT) in health care is an ambitious law that by a twist of fate was conceived just before network computing and the World Wide Web revealed themselves as the building blocks of a new electronic marketplace. As a result, federal policy making remains locked in a framework that does not properly fit the realities of current IT and the challenges that the emerging electronic marketplace pose for the health system. At the same time, the slow pace and crowded agenda of the health policy process have been aggravated by delays in the rulemaking process and jurisdictional fragmentation in Congress that is even more acute than usual because of the high stakes and keen interest that e-commerce arouses. Despite the extravagant claims that are now routinely made about the potential impact of the Internet on health care, only a minimum of effective focus on these issues has been discernible on Capitol Hill in the year 2000.

F. Organizational Change

59. Billings, DM
A comparison of teaching strategies for integrating information technology into clinical nursing education
Nurse-Educator (NURSE-EDUC) 2000 May-Jun; 25(3): 136-44
ABST: As health care becomes more information-intensive and diverse, there is a need to integrate information technology (IT) into clinical education. Little is known, however, about how to design instructional strategies for integrating information technology into clinical nursing education. This article outlines the instructional strategies used by faculty in five nursing programs who taught students to use a point-of-care information technology system. The article also reports students' computer acceptance and summarizes IT clinical teaching recommendations.

60. Billings, DM
A framework for assessing outcomes and practices in Web-based courses in nursing
Journal-of-Nursing-Education (J-NURS-EDUC) 2000 Feb; 39(2): 60-7
ABST: This article presents a framework to assess the dynamic interaction of technology used to offer Web-based courses, the teaching-learning practices in these courses, and the outcomes enabled by the technology. Concepts of the model include outcomes, educational practices,

faculty support, learner support, and use of technology. Variables are identified for each of the concepts.

61. Brittain, JM; Norris, AC
Delivery of health informatics education and training
Health-Libraries-Review (HEALTH-LIBR-REV) 2000 Sep; 17(3): 117-28
ABST: An overview is provided of education and training in health information management in the context of national information strategies. Although the article focuses upon British programs, there are examples from North America, Australasia and other countries. Reference is made to international activities in the development of generic courses for education and training, the need for education and training, the content of courses, and methods of delivery, including Internet-based training and education. Governments and health authorities in many countries have recognized the urgent need for a highly educated and trained workforce in information management, but universities have been slow to respond, until the last few years. However, there is now a plethora of education and training programs in North America, most European countries, and Australasia.

62. Gillies, A
Information support for general practice in the new NHS
Health-Libraries-Review (HEALTH-LIBR-REV) 2000 Jun; 17(2): 91-6
ABST: Surveys of GP computing suggest that over 95% of practices now have computers. Unfortunately, many of these practices are making little effective use of this technology. Recent White Papers, The New NHS and Information for Health place an even greater emphasis upon the effective use of information and its associated technology. This paper describes a model for the assessment and managed change of information management maturity within general practice. The model, known as GPIMM (General Practice Information Maturity Model), which has been developed from related models in fields such as software quality and diffusion of innovation, provides a framework for the assessment of the maturity of information processes within general practice. The model can also be used to define key tasks in terms of training and information strategies to facilitate practice development. The model and its antecedents are described, and it is shown how this model can be used to assess and improve information processes within case study practices. This paper then goes on to examine the health librarians' role in the process of change and discuss the metaphor of a 'virtual library' as a means to shift the agenda from information technology to information itself.

63. Michael J. Goran, MD; Jean Stanford
E-Health: Restructuring Care Delivery in the Internet Age
HIMSS 2000; 101-4.
ABST: The authors advocate using the Internet to support clinical care teams dedicated to monitoring patients who can most benefit. Care teams will provide such services as home monitoring for vital signs and supplying patient information. They will work with physicians in managing care. The result should be a stronger provider-patient relationship. Connected consumers are seeking better health care information and a better, stronger relationship with their physicians. Many patients are now using the Internet to obtain information about their condition and would like to maintain a close relationship with their physician via the Internet as well. To avoid swamping physicians with email and trivia, we propose to organize clinical care teams,

dedicated to the segment of the patient population that can benefit from close monitoring. The clinical care teams will provide patients with home monitors for glucose, vital signs, and so on and will communicate with patients regularly to monitor their conditions and ensure that they are following their protocols correctly. They will answer questions, encourage patients to make lifestyle changes, and communicate with the patient's physicians as required. We believe that providers can and should offer these ser- vices rather than wait for payers and dotcoms to preempt them. Patients' providers are the best equipped to manage patient care rather than complicate care through adding new players and layers in an already costly and complex environment.

64. Hebert, M; Benbasat, I
Adopting information technology in hospitals: the relationship between attitudes/expectations and behavior
Hospital-and-Health-Services-Administration (HOSP-HEALTH-SERV-ADM) 1994 Fall; 39(3): 369-83
ABST: The purpose of this field study was to measure the influence of three factors on the adoption of information technology in a health care setting—namely, attitudes toward using the technology, subjective norms or beliefs about others' expectations, and perceived voluntariness. Approximately 77 percent of the variance of intent to use the technology was explained by three attitude variables (beliefs related to perceived relative advantage and compatibility with previous work patterns as well as result demonstrability), and one variable associated with subjective norms (influence of a senior policymaker, the director of nursing). Use of this model may provide insights for administrators managing the process of information technology implementation in health care.

65. Hilz, LM
The informatics nurse specialist as change agent: application of innovation-diffusion theory
Computers-in-Nursing (COMPUT-NURS) 2000 Nov-Dec; 18(6): 272-81
ABST: The informatics nurse specialist (INS) is often the primary change agent in facilitating the implementation of clinical information systems (CIS) in health care settings. The INS has a unique understanding of the nursing issues that can affect the change process, and thus is in a key position to facilitate positive implementation outcomes. Innovation-diffusion theory is particularly useful in its application to the change agent role of the INS. With this theoretical knowledge, the INS can design CIS training interventions according to the psychological phenomena of Rogers' Innovation-Decision Process. An understanding of the decision-making process and the distribution of different rates of innovation adoption within a given population enable the INS to anticipate and address influential factors that affect the implementation process. Thus, Innovation-Diffusion Theory may be used as a powerful cognitive tool for the INS in facilitating the diffusion process and nurses' adoption of the technology in practice.

66. Kenny, A
Untangling the Web... barriers and benefits for nurse education... an Australian perspective
Nurse-Education-Today (NURSE-EDUC-TODAY) 2000 Jul; 20(5): 381-8
ABST: The Internet; a Web of information technology. The potential exists now and increasingly in the future to use this technology to deliver widely distributed, creative, innovative learning to students across vast distances and at times which suit individual needs. The implications of this

technology for nurse education, and indeed health care in general, are exciting. The technology is growing at such a vast rate that it would be easy to blindly accept it and promote its use. However, there is a need to stop and consider some of the practical barriers to the use of this technology, particularly for nursing education.

67. Kiat, TK
Computer attitudes of nurses in a Singapore hospital
Singapore-Nursing-Journal (SINGAPORE-NURS-J) 2000 Oct-Dec; 27(4): 14-25
ABST: In nursing, the utilization of computers at work can have an impact on both practice and care of patients. Notwithstanding, anxiety can lead to resistance in nurses' learning and use of computers. Besides, the use of computers may be perceived to be dehumanizing, confusing, and uncaring. Hence, some nurses distrust the appropriateness of computer technology as part of nursing and health care.

This research examined the computer attitudes of nurses in a Singapore hospital in terms of their anxiety towards computers and attitudes towards computerization. Two survey instruments were used for this purpose. One was the Computer Anxiety Index (CAIN) and the other the Nurses' Attitudes Towards Computerization Questionnaire (NATC).

Several past studies have been conducted using either the CAIN or the NATC instrument to examine aspects of computer attitudes among nurses where such attitudes are deemed to comprise cognitive, behavioral, and affective components. However, none of the studies has used both instruments simultaneously. In order to effectively explore attitudes, it is necessary that the measures of all three components are examined. As such, the CAIN and the NATC instruments were used as complementary tools in this study.

This research on computer attitudes also examined factors such as: age, gender, nationality, basic professional qualification, length of service, job appointment and computer familiarity, and how they correlate with computer attitudes.

The results of this study indicated the validity of the CAIN and the NATC instruments in ascertaining the general status of nurses' computer attitudes. The significant correlations of some individual characteristics, and the predictors for computer anxiety and attitudes towards computerization were identified.

In view of more comprehensive use of computer technology in the health care industry in Singapore, the implications of the findings and methods in enhancing the implementation of computerization were discussed. Some limitations were also identified and suggestions for future research proposed.

68. McCarthy, Robert.
E-health, your workforce and you: Tales of the early adopters Business & Health, Jan 2001, 19(1):27-30.
Medical Economics Inc. Jan 2001
SUMMARY: Companies on the cutting edge have learned that expectations, whether great or small, need to be specific before you wander into the world of e-health. Thinking about how the

Internet could fit into your benefits package? Contemplating a health care site on your company Intranet? Talking to ASPs (application services providers) about a corporate—branded health care portal? Stop where you are, and ask yourself: "What is my purpose in going electronic? What advantages does a virtual solution offer that an off-line, traditional solution doesn't?" Savvy employers see a number of promising tools in the Internet's grab bag of health care applications, including: Online health risk assessment, which can provide a wealth of aggregate data showing corporations precisely where they need to target interventions; A library of health care information sites, which, theoretically, can transform employees into more prudent health resource users; A medley of disease management sites and applications, which should be able to improve the care and lower the cost of chronic illness; online admin tools for plan selection, enrollment and provider selection, which should greatly improve HR efficiency. What do the corporate Intranet health sites look like? Some are of the prime vendor mode-HRA, health news, disease and self-care information, etc., brought to you by a MayoClinic.com or a DoHealth.com or a GlobalMedic.com, but customized and branded with an employees logo. Other employers have taken the multivendor approach, pulling an online wellness program from one, an HRA profiling system from another and assembling the parts into an Intranet health site. Vetting the vendors is a serious task for both those strategies, if only because putting the corporate brand on the site means the employer is in some sense vouching for content. Partnering with reliable third parties has become even more critical as highly touted sites expose shaky financial foundations, dubious Net ethics and inadequate privacy safeguards. The third option has been to leave the e-health driving up to health plans and insurers. Employees are then invited to "go direct" to their plan's Web site to sample online products and services. In fact, even corporations that have opted for strategies one or two are still requiring that their plans have an e-health strategy.

69. McConnell, EA
Health care technology: nursing's challenge and opportunity
NursingConnections (NURSINGCONNECTIONS) 1999 Winter; 12(4): 49-53
ABST: The growth in health care technology is ubiquitous and has far reaching consequences both for users and providers. This paper explores how health care technology affects ours lives, presents the challenges inherent in its use, and also identifies some of the opportunities that it provides nurses.

70. Minard, B
Commentary. Factors that cause industries to lead or lag in use of information technology: does health care lag?
Topics-in-Health-Information-Management (TOP-HEALTH-INF-MANAGE) 1999 Nov; 20(2): 91-103
ABST: The rate of diffusion of information technology varies among industries, as does its resultant added value. The different paces of work transformation are determined by the opportunities of the differing work processes, efficiency of exchange of workplace ideas, and relationships among constituencies. The differences raise the question of why the maturation process is accelerated (or restrained) in different industries, how the health care industry fares in comparison, and how information technology may be more effectively used as health care evolves toward new forms of work interaction, control mechanisms, and information technology management paradigms and as information processing moves toward higher levels of complexity.

71. Moen-A; StOvring-T; Andrusyszyn-M; Iwasiw-C; Ostbye-T; Davie-L; Buckland-Foster-I
ICT and international collaboration; experiences with Internet based computer conferencing as part of studies in nursing science [Norwegian]
Vard-I-Norden-Nursing-Science-and-Research-in-the-Nordic-Countries (VARD-I-NORDEN) 2000; 20(4): 42-5
ABST: Current development and use of Information Technology (IT) enables new learning experiences and international collaboration. In this article we present experiences from the joint project "Canada-Norway Nursing Connection: International Computer Conferencing in Graduate Nursing Education" where we used an interactive, asynchronous Internet conferencing system to facilitate communication and learning. To provide context and framework for discussion and interaction we developed three cases to address issues of interest. The cases focused on leadership, organizational change, and team-building. Students of health care management at the Institute of Nursing Science at the University of Oslo, Norway and nursing management at School of Nursing at the University of Western Ontario, Canada engaged in focused discussion framed by the cases over a project period of 6 weeks. In evaluation of the project, experience with learning, collaboration with other students, technology and satisfaction was emphasized. The students viewed international collaboration as the most important and meaningful leaning experience. Further they also found the technology feasible to facilitate learning over a distance. In addition, the students would have liked more time to allow in-depth discussions and analysis of each case.

72. Ouellette, PM; Rank, MG
Transitioning from teaching to life-long learning toward yet another paradigm shift for family social work practitioners and educators
Journal of Family Social Work (J-FAM-SOC-WORK) 2000; 5(1): 57-73
ABST: The introduction of computer technology in the social work profession is requiring a review of what we think we know about how family social work practice is best taught, learned, or even implemented. This article compares the paradigm shifts our profession has already witnessed with those of today as we are confronted with innovations that have the potential to impact how we traditionally teach, practice, and what we value as a profession. With a review of the journey we have already traveled, unnecessary turmoil may be avoided as new technological advances reach the fringe of our professional realm.

73. Parker, J; Coiera, E
Improving clinical communication: a view from psychology
Journal of the American Medical Informatics Association (J-AM-MED-INFORM-ASSOC) 2000 Sep-Oct; 7(5): 453-61
ABST: Recent research has studied the communication behaviors of clinical hospital workers and observed a tendency for these workers to use communication behaviors that were often inefficient. Workers were observed to favor synchronous forms of communication, such as telephone calls and chance face-to-face meetings with colleagues, even when these channels were not effective. Synchronous communication also contributes to a highly interruptive working environment, increasing the potential for clinical errors to be made. This paper reviews these findings from a cognitive psychological perspective, focusing on current understandings of how human memory functions and on the potential consequences of interruptions on the ability to

work effectively. It concludes by discussing possible communication technology interventions that could be introduced to improve the clinical communication environment and suggests directions for future research.

74. Reeve, R; Rose, G
The role of top management in supporting the use of information technology in Australian hospitals
Australian-Health-Review (AUST-HEALTH-REV) 1999; 22(4): 151-60
ABST: The progressive use of information systems and information technology has the potential to transform the way complex organizations are managed and the way they operate. This article reports the findings of a study undertaken to examine the importance of various factors related to the progressive use of information technology in Australian hospitals. Our analysis of data from 84 hospitals shows that hospital size has a significant positive relationship with the progressive use of information technology, as does the chief executive officer's attitude to information technology; however chief executive officer participation in information technology activities does not. The implications of these findings for the role of top management are discussed.

75. Savitz, LA; Kaluzny, AD.
Assessing the implementation of clinical process innovations: a cross-case comparison.
Journal of Healthcare Management, 2000 Nov-Dec, 45(6):366-79; discussion 379-80. (Unique ID/PMID: 0011187358)
ABST: Clinical process innovations (CPI) are central to the ability of organizations to negotiate the challenges of cost containment and quality improvement, yet many CPI have not met expectations. Perhaps most alarming is that the dissemination and implementation of CPI is not well understood. This is the second of two articles addressing the dissemination and use of CPI in integrated delivery systems. This article discusses those factors that have been identified as either facilitating or impeding the various stages in implementing CPI and suggests some intervention strategies to enhance opportunities for continuous CPI. Identifying the process and the factors driving the implementation of CPI is only part of the challenge. The development of CPI adequate to fully meet current challenges will require managers to re-examine existing paradigms and values influencing their actions to date. Within this context, the necessary staging of the innovation process within the life cycle, developing partnerships both within and outside the organization to gather the necessary resources and support, and multidimensional performance monitoring and feedback can prepare organizations and managers to better face the reality of managing the innovation process.

76. Sinkowitz-Cochran, RL; Stein, GP; Keyserling, HL; Levine, GL; Jarvis, WR
Practice forum. The Internet: a practical example of the use of new technology in the assessment of vancomycin use in pediatrics
American Journal of Infection Control (AM-J-INFECT-CONTROL) 2000 Dec; 28(6): 459-64
ABST: BACKGROUND: The rapid emergence of both new infections and new technologies has revolutionized health care during the past 50 years. Increased use of the Internet has enabled health care professionals to educate, interact, and collaborate throughout the world in ways never before possible. Increased use of vancomycin has been associated with the emergence of organisms with decreased susceptibility to vancomycin, such as Enterococcus and staphylococcal species. The purpose of this article is to describe our experience using Internet

technology to assess vancomycin use at children's hospitals in the United States. METHODS: A Web-based evaluation was developed and distributed on the Internet to 57 Pediatric Prevention Network hospitals. The evaluation was structured to collect summary statistics on vancomycin use and admissions data by service for 1997 and 1998. RESULTS: Twenty-four hospitals were able to provide archived vancomycin use and patient admissions data; completed evaluations were returned from 15 hospitals (62.5% response rate). Personnel at 6 (40%) hospitals completed the evaluation directly on the Internet. CONCLUSIONS: In our study, Internet technology facilitated a more efficient evaluation of vancomycin use, but fewer than half of the personnel at Pediatric Prevention Network hospitals completed the evaluation directly on the Internet. It is unclear whether personnel at these hospitals were limited in Internet access, support, or understanding. Efforts should be directed to educate health care personnel on the advantages of the Internet. Furthermore, many of the pharmacy databases used in our assessment were not standardized across hospitals nor systematically validated. Understanding that limitations still remain-within the source of the data studied, the health care system sampled, and the Internet tools available-is essential because the Internet offers health care professionals today a tool both to protect patients and to improve quality throughout the world.

77. Sobol, MG; Alverson, M; Lei, D
Barriers to the adoption of computerized technology in health care systems
Topics in Health Information Management (TOP-HEALTH-INF-MANAGE) 1999 May; 19(4): 1-19
AB: The increased emphasis on national health care plans, cost reduction, and additional record keeping has given impetus to the adoption of computerized information technologies in hospitals. A series of case studies performed in large, multi-hospital health care systems revealed ten important barriers to the adoption of information technologies grouped as follows: knowledge problems, approval problems, design problems, and implementation problems. These aspects were uncovered by using focus studies and interviews with chief information officers, physicians, consultants, and medical staff and by consulting numerous journals in the field. The article describes the barriers that arise because of the special conditions in hospitals and shows how some institutions are working to eliminate these barriers. The strategic issues that should be studied to overcome these barriers are also discussed.

78. Barret, M
Why Doctors Hate The Net
Forrester Report, Forrestor Research Inc. March 2000. www.forrester.com
SUMMARY: Health care leaders think empowered consumers and new doctors will drive the entire profession online. Not so. Physicians will selectively embrace the Net—and only when the value proposition serves the clinical domain. Interviews: To gauge the current state of physician resistance to the Net in the United States and Canada, Forrestor conducted 60 in-depth interviews—40 with nonphysician executives in health care and 20 with MDs who are practicing doctors and active Net users. The nonphysicians, whether employed in traditional health care or in online businesses, are counting on doctors' participation in order to execute their own plans. Analysis: Health care executives view the world through a business lens; doctors, through a clinical lens. Executives will connect with physicians only when they tie the Internet strategies to the clinical domain and revamp the Net's value proposition for doctors. In 2002, electronic medical records (EMRs) will have made the grade, while physician-patient email languishes.

79. Kilbridge, PM
Employing Physicians in Information Systems Departments: Rationale, Qualifications, and Approaches
An FCG White Paper, February 1999, First Consulting Group.
(www.fcg.com/knowledge/white_papers.asp)
Provider organizations are learning that there is great value to formally incorporating one or more physicians into their information services (IS) departments, usually as part-time employees. The rationale for employing these physicians, and hence the functions that they perform, can be broadly categorized; their backgrounds and qualifications are considerably more varied. This paper reviews the arguments for incorporating physicians in IS departments, roles they can play, and considers some of the qualities to be considered in reviewing physician candidates for these roles.

80. Cunnigham, C
Doctor No: Physicians hold the key to the e-health market-but they remain unconvinced.
Red Herring, October 2000 (83), 220-222.
Despite the industry that has developed around the concept of automating health care tasks, most physicians won't commit the time and resources to computerize their clinical data, much less their administrative processes, because they don't see the benefit. So why aren't physicians adopting e-health products at the same rate that Internet-based technologies are penetrating other industries?

81. Kassirer, J
Patients, Physicians, And The Internet ; Coming generations of doctors are ready to embrace new technology, but few incentives now exist to encourage their older peers to do likewise.
Health Affairs November - December 2000, 19(6), 115-123.
ABST: The Internet will have a profound effect on the practice and business of medicine. Physicians, eager to provide high-quality care and forced by competition to offer online services, will introduce email and patient-friendly Web sites to improve administrative services and manage common medical conditions. Patients will identify more health information online and will take more responsibility for their care. The doctor/patient relationship will be altered: Some aspects of electronic communication will enhance the bond, and others will threaten it. Patients will have access to vast information sources of variable validity. Many physician organizations are preparing for the electronic transformation, but most physicians are unprepared, and many are resistant.

82. Burstin, H
Traversing The Digital Divide; On doctoring with and without computers.
Health Affairs November - December 2000, 19(6), 245-249.
Some challenges in the health care system are new and some are old. Helen Burstin, a general internist, writes about a new problem: the emerging digital divide that she encounters as an enthusiastic explorer in the new land of computer-assisted medical practice. She describes the disparity between the "highly evolved" information environment of an academic health center and the absence of computers at a minimally funded inner-city clinic. Her experiences

underscore the potential for the spectacular benefits of the computer in medicine to drive an ever-larger wedge between the rich and the poor in health care.

83. Meyer, C
Once-Reluctant Cardiologists Get to the Heart of the Internet
eHealth Report, Skila News, December 25, 2000
(http://www.skila.com/ereportArchive/ereport_1225.htm)
Like providers of other medical specialties, cardiologists are increasingly using the Internet to enhance the way they learn about new therapies, research and exchange medical information with colleagues, and ultimately improve the quality of care given to patients. Numerous surveys have appeared in recent months, offering myriad figures on how many physicians are actually online and using the Web in their daily practices. While the numbers vary, one point is clear: the Internet is becoming a key part of the health care process. Like any new technology, it is being embraced at different speeds by different population segments, but it is clearly here to stay, in one form or another. Forward-thinking pharmaceutical companies, recognizing this, are already establishing a presence in the physician's cyberworld.

G. Financial Issues

84. O'Dell S; McGoldrick C
Realizing positive returns from your e-health investments.
Healthcare Finance Management 2001 Feb; 55 (2): 50-5. First Consulting Group, Denver, Colorado, USA. sodell@doghouse.com
ABST: Although the health care industry still is in the beginning stages of e-health adoption and has yet to achieve a significant return on e-health investments, health care organizations can anticipate increasingly positive results over time. To capitalize on the potential of e-health, financial managers need to adopt a clear, concise approach to valuing e-health investment options, making investment decisions, and managing an organization's return on invested capital. Key actions to take are developing a strategy, looking beyond cost reduction to other advantages of e-health strategies, understanding the needs of the stakeholders, becoming comfortable with experimentation, having realistic expectations, and instituting a process for valuing e-health investments that does not duplicate valuation processes for traditional information technology projects.

85. Robinson, J
Financing The Health Care Internet; E-health was romanced and then abandoned by the investment community and now stands at the end of its beginning.
Health Affairs November - December 2000, 19(6), 73-88.
ABST: Internet-related health care firms have accelerated through the life cycle of capital finance and organizational destiny, including venture capital funding, public stock offerings, and consolidation, in the wake of heightened competition and earnings disappointments. Venture capital flooded into the e-health sector, rising from $3 million in the first quarter of 1998 to $335 million two years later. Twenty-six e-health firms went public in eighteen months, raising $1.53 billion at initial public offering (IPO) and with post-IPO share price appreciation greater than 100 percent for eighteen firms. The technology-sector crash hit the e-health sector especially

hard, driving share prices down by more than 80 percent for twenty-one firms. The industry now faces an extended period of consolidation between e-health and conventional firms.

86. Parente, S
Beyond The Hype: A Taxonomy Of E-Health Business Models; How to build a health data infrastructure that can deliver both a public and a private good.
Health Affairs November - December 2000, 19(6), 89-102.
ABST: This paper describes a business model of e-commerce, its application to health care, and the reasons why the health policy community should monitor its development. The business model identifies the market barriers health e-commerce firms must overcome and provides perspective on opportunities for building a health care data infrastructure that is capable of delivering both a private and a public good.

H. Training Issues

87. Folkenroth, N
Today's Technology Shapes Tomorrow's MDs
eHealth Report, Skila News, January 22, 2001
(http://www.skila.com/ereportArchive/ereport_012201.htm)
Just as manufacturers and distributors are only beginning to use the Internet to change the way that they conduct business, so, too, is their ultimate target—providers—slowly exploring the power of the Web to enhance the practice of medicine. Evidence of changing attitudes toward use of the Internet is found in the evolving nature of instruction at the nation's medical schools, from where the next generation of providers will come. Health care companies dealing with the physicians of tomorrow will likely face providers even more accepting of, and willing to use, the Internet in their medical practices. This may include eMail, eDetailing, and eClinical trials, just to name a few cyber applications. Businesses need to prepare today for the Internet challenges and opportunities of tomorrow.

88. Meyer, C
Medical Schools Enter Cyberspace
eHealth Report, Skila News, July 31, 2000
(http://www.skila.com/ereportArchive/ereport_731.htm)
U.S. medical schools are entering cyberspace in record numbers. Some are establishing separate entities, trying to offer doctors updated, comprehensive information on everything from drugs to diseases—information that's more complete and relevant than that contained in sites like Medscape and Physicians Online. These online projects aim to improve the flow of medical information, and thus help physicians in their diagnoses and treatment of patients. Doctors in rural hospitals—once difficult settings to receive cutting-edge information—will have access to the same data now available in major metro hubs. But experts say that these tech projects will reach far beyond a doctor's private practice: drug companies, medical suppliers, and others in the health care arena could also benefit, as physicians keep better informed and technology allows for integration of medical databases with corporate health care systems.

89. Iglehart, J.
Forum on the future of academic medicine: final session—implications of the information revolution for academic medicine.
Academic Medicine 2000 Mar, 75(3):245-51.
ABST: The seventh and final meeting of the Association of American Medical Colleges' (AAMC's) Forum on the Future of Academic Medicine began December 4, 1998, with a talk by William W. Stead, MD, associate vice-chancellor for health affairs at Vanderbilt University Medical Center and director of its informatics center. Dr. Stead envisions a future in which informatics and information technology will place the consumer squarely in the center of the system, empowered with greater knowledge of health care; he gave three short scenarios to illustrate future typical interactions of consumers with the system. He then discussed the implications for academic medicine. For example, academic medical centers (AMCs) could become the information providers and quality assurance hubs of their regions. Various participants questioned some of the speaker's claims (one asserting that there would be serious complications if clinical information were made available to patients). The second speaker, Valerie Florance, PhD, director of the AAMC's better-health@here.now program, discussed her program, whose purpose is to explore the ways medical schools and teaching hospitals can best use information technology and the Internet in the coming decade to improve individual and community health. Nothing in the ensuing discussion indicated that the participants believed that academic medical centers would be spared painful dislocations if they were to embark on a road of institutional reform to respond to the pressures of the new and more competitive global economy. Greater awareness of this not-necessarily-welcomed message may be one of the lasting legacies of the forum.

I. Regulation

90. Starr, P
Health Care Reform And The New Economy; Does the new digital economy require a different vision for health reform-its principles as well as its possibility?
Health Affairs November - December 2000, 19(6), 23-32.
ABST: The objectives and assumptions of health care reform have changed repeatedly during the past century and may now be entering a new historical phase as a result of the "new economy" rooted in information technology. In a high growth context, proponents of reform may no longer feel obliged to bundle expanded coverage with tighter cost containment. At the same time, the new digital environment may facilitate innovations intended to inform and expand consumer choice and to improve quality. The new environment elevates "transparency" to a guiding principle. Health informatics has long been peripheral to reform and must now become more central.

91. Fried, B; Weinreich, G; Cavalier, G; Lester, K
Perspective: E-Health: Technologic Revolution Meets Regulatory Constraint; An Internet-driven health system poses new challenges for an area already thick with regulations
Health Affairs November - December 2000, 19(6), 124-132.

The e-health industry must navigate this maze of traditional and new regulations before it can realize its potential, in terms of both economics and quality. By examining government and industry initiatives in the new area of content regulation, and the application of established fraud-and-abuse laws to new economics, this paper highlights some of the regulatory challenges and issues facing the e-health industry.

92. Boulding, M
Perspective: Self-Regulation: Who Needs It?: By developing and enforcing a well-designed set of rules, e-health codes of ethics can direct attention to the best-quality sites.
Health Affairs November - December 2000, 19(6), 133-139.
If the creators of a self-regulatory system understand its valid purposes and design the system with a view to understanding its limits, then the system is worth having, regard less of whether any new laws are passed. Critics can comfort themselves with the thought that if the self-regulatory system is indeed just a shallow device intended only for the simplistic purpose of avoiding new laws, it is not likely to be effective. I begin with an overview of the two codes, followed by a discussion of the inability of self-regulation to substitute for law and a discussion of the aspects of "good" self-regulation.

93. Brodie, M; Flournoy, R; Altman, D; Blendon, R; Benson, J; Rosenbaum, M
Health Information, The Internet, And The Digital Divide; Despite recent improvements, Americans access to the Internet—and the growing body of health information there—remains uneven.
Health Affairs November - December 2000, 19(6), 255-265.
ABST: Through an analysis of recent data on adults' and children's computer use and experiences, this DataWatch shows that use of computers and the Internet is widespread and that significant percentages of the public are already using the Internet to get health information. The surveys also show that the Internet is already a useful vehicle for reaching large numbers of lower-income, less-educated, and minority Americans. However, a substantial digital divide continues to characterize computer and Internet use, with lower-income blacks especially affected. Implications for the future of health communication on the Internet also are explored.

94. Department of Health and Human Services; Health Resources and Services Administration
2001 Report to Congress on Telemedicine
February 2001
The Healthcare Research and Quality Act of 1999, Section 6, requires the Secretary of Health and Human Services (DHHS) to submit a Report to Congress on Telemedicine by 2001. Congress requested that the Report describe barriers to telemedicine, determine the extent of patient and physician satisfaction with this mode of health delivery and assess patient benefits from telemedicine services. What exactly is meant by telemedicine and telehealth? In the Department of Commerce's1997 Report to Congress, "telemedicine" referred to "the use of electronic communication and information technologies to provide or support clinical care at a distance." Telehealth is a broader concept. For the purposes of this Report, telehealth is defined as the use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education, public health and health administration.

95. Patrick, K; Robinson, TN; Alemi, F; Eng, TR
Policy issues relevant to evaluation of interactive health communication applications. The Science Panel on Interactive Communication and Health.
American Journal of Preventive Medicine 1999 Jan, 16(1):35-42.
ABST: This article provides an analysis of policy-related issues associated with the evaluation of interactive health communication (IHC) applications. These include an assessment of the current health and technology policy environment pertinent to public (government, education, public health) and private (medical care providers, purchasers, consumers, IHC developers) IHC stakeholders and discussion of issues likely to merit additional consideration by these stakeholders in the future.

J. Physician–Patient Relationship

96. Ziegler, R; O'Dell, S; Schnetzer, T
eHealth: Transforming Care, Reaching Customers
An FCG First Report, November 2000, First Consulting Group.
(http://www.fcg.com/knowledge/first_reports.asp)
For health care organizations in the 21st century, living with change is compulsory. Regulatory changes and cost pressures are powering new strategies and structures. New biomedical knowledge is changing how health professionals practice, and the spotlight on chronic conditions is forcing organizations to rethink disease management strategies. The most formidable change driver, however, is one that informs all the others—the newly empowered, technologically literate health care consumer. In health care, the rules of survival are clear: staying in business and maintaining a competitive edge hinges on attracting and retaining customers. We believe eHealth can fulfill customer needs by personalizing and streamlining care delivery and health management. Making the customer an active partner can save time and money and improve health care.

97. Cain, M; Sarasohn-Kahn, J; Wayne, J
Health e-People: The Online Consumer Experience
Health Care Horizons, Institute For The Future, August 2000
http://www.iftf.org/html/researchareas/hc_research/chcf/CHCF.HealthE.102000.pdf
SUMMARY: Health e-People: The Online Consumer Experience is the second five-year forecast to map the landscape of Internet health care. This report follows and deepens Institute for the Future's previous forecast of January 1999, The Future of the Internet in Health Care: A Five-Year Forecast. That 1999 report mapped the landscape of Internet-based health care and forecast growth in leading-edge applications based on a series of drivers and barriers. Building on that foundation, this forecast more specifically maps one aspect of Internet health care by looking at a very important constituency: consumers. After describing some of the motivations and behaviors of consumers searching for health information and services online, this report maps market opportunities and forecasts the progression of health-related products and services online.

98. Kopp, E
The New Patient-Internet-Physician Relationship
eHealth Report, Skila News, March 20, 2000
(http://www.skila.com/ereportArchive/ereport_320.htm)

Few industries have the potential to be revolutionized by the Internet as does health care. "E-health," the convergence of the World Wide Web and the health care market, is already changing the way pharmaceutical companies market their products, patients purchase medications, and even how doctors and patients interact.

99. Lerer, Leonard
INSEAD on the e-health consumer
INSEAD Healthcare Management Initiative, June 2000
http://www.eye4pharma.com/pharma/papers/insead.pdf
On June 9 and 10, 2000, the INSEAD Healthcare Management Initiative (HMI) hosted a health care2020.platform on the e-health consumer. Over 50 participants from 14 countries representing pharmaceutical companies, dotcoms, finance, retail, biotechnology, media, consulting, academia and diagnostics gathered at the INSEAD Fontainebleau campus for two days of intensive interaction and discussion on the evolving e-health consumer.

100. Deloitte Consulting and Deloitte & Touche
Winning The Loyalty of the e-Health Consumer; Building and e-Business Roadmap
Deloitte Research, 2000
http://www.dc.com/obx/script.php?Name=getFile&reportname=ehealth_part2.pdf&type=pdf
As part of an ongoing research program, we are pleased to present the second in a series of studies on the e-Health revolution. The first study, The Emergence of the e-Health Consumer, offered an analysis of the interplay among key forces accelerating the emerging e-Health world. The study uncovered the choices, value-added services, and control that e-Health consumers expect, and the critical success factors necessary for health care organizations to succeed in this new consumer-driven environment. Winning the Loyalty of the e-Health Consumer, stems from a proprietary, nationwide e-Health research effort launched in 1999 and continuing throughout 2000. We offer data and analysis derived from in-depth interviews, surveys, and candid roundtable discussions with health care executives, policymakers, employers, physicians, and consumers. Our consumer research partner in this endeavor is Cyber Dialogue, a leader in providing Internet-based customer relationship management solutions. In the pages that follow, we illustrate that e-Health consumers are here. They are demanding services and taking action, and no one—neither incumbent health care organizations nor the new e-Health insurgents—is yet capturing their attention and satisfying their needs. We explore the implications of this new and highly influential group and offer a set of pragmatic principles to guide health care organizations through the maze of strategic choices and to take a leadership position.

101. Deloitte Consulting and Deloitte & Touche
The Emergence of the e-Health Consumer
Deloitte Research, 1999
http://www.dc.com/obx/script.php?Name=getFile&reportname=e-health.pdf&type=pdf
E-Health consumers are set to radically transform the health care industry. What is driving it? What will be the impact? What choices, value-added services, and control will e-Health consumers expect? What will be the critical success factors for health care organizations in this new consumer-driven environment? To address these questions, we launched a comprehensive, nationwide research effort in 1999. Our research partner in this effort is Cyber Dialogue, a leader in providing Internet database-marketing solutions. In the pages that follow, we present our

analysis of the first phase of our research: the interplay among key forces accelerating the evolution of the e-Health consumer.

K. Rural and Underserved Areas

102. Anthony Wellever
Building Rural Health Networks: Examples from the Rural Network Development Grant Program
Office of Rural Health Policy, U.S. Department of Health and Human Services
In 1996, Public Law 104-299 authorized the Rural Network Development Grant Program. The objective of the program is to "expand access to, coordinate, restrain the cost of, and improve the quality of essential health care services, including preventive and emergency services, through the development of integrated health care delivery systems or networks in rural areas and regions." The program is administered by the Office of Rural Health Policy (ORHP), Health Resources and Services Administration, Public Health Service, U.S. Department of Health and Human Services. Thirty-four rural health networks received Rural Network Development Grants from the ORHP in October 1997. The majority of these networks requested funds for programs for managed care, community health, or telemedicine development. The five case studies that follow are examples of rural health networks drawn from the 34 networks awarded grants in the first cycle of the program. Since 1997, ORHP has funded 41 networks. These case studies are not intended as models. The diversity of local circumstances argues against the notion that the forms and functions of networks can be plucked from one locale and replicated in another. Networks must be built one "community" at a time. However, by illustrating how some networks have approached issues of organization and development, these examples may help local decision-makers think through their problems and arrive at their own solutions.

103. Emery S, Whitener LB
The issue is not geography: health care markets and the diffusion of telemedicine.
North Carolina Rural Health Research Program, June 1997
http://www.shepscenter.unc.edu/research_programs/Rural_Program/wor50.pdf
For nearly 30 years, telemedicine has been heralded as a means of overcoming geographical and economic barriers to rural health care delivery. Despite rapid growth in the number of active telemedicine programs in the last three years, most telemedicine projects remain experimental and largely dependent upon state, federal, or private grant funding. Few telemedicine projects have specific plans for sustainability when grant supports are no longer available. Moreover, telemedicine has become a tool of large, urban hospitals. Despite recognition of telemedicine's potential to improve rural health care and the numerous grant programs that support rural initiatives, academic medical centers possess the human, financial, and technical resources for generating successful telemedicine grant proposals to build viable telemedicine programs. In many cases, rural hospitals are key members of consortia organized and controlled by larger, urban hospitals in order to qualify for rural-designated telemedicine programs. This scenario can be advantageous for all involved, but it can also leave rural hospitals dependent upon and subject to the strategic goals of larger, more powerful partners. The persistent experimental status of telemedicine and the dominance of large, urban hospitals in the diffusion of telemedicine are interrelated phenomena. Regional development theory has long proposed that rural areas will be slower to benefit from technological and economic trends that germinate in the diversified social

and economic conditions of urban areas. Because "rural hospitals are handicapped by geography, demographics, and economics," in general, it is most advantageous for them to partner with larger, urban hospitals this logic certainly extends to telemedicine partnerships. It is therefore essential first to explain why telemedicine has not become a mainstream component of medical care, before exploring why rural hospitals have yet to play a leadership role in the evolution of telemedicine. There are several explanations for the persistent experimental status of telemedicine: technological, social-behavioral (physician and patient acceptance), legal, and economic-policy. While these categories are certainly interrelated, each can be analyzed separately, and each can explain part of the slow acceptance of telemedicine.

104. Campbell, JD; Harris, KD; Hodge, R
Introducing telemedicine technology to rural physicians and settings.
Journal of Family Practice 2001 May, 50(5):419-24.
ABST: OBJECTIVE: The researchers investigated rural health providers' perceptions of telemedicine, developed a framework for assessing their readiness to adopt this type of technology, and offered a guide for its implementation. STUDY DESIGN: Qualitative data were collected from semistructured interviews with thematic analysis. POPULATION: The study population included physicians, nurses, and administrative personnel located in 10 health care practices in 4 communities in 3 rural Missouri counties. OUTCOMES MEASURED: The researchers measured how often health providers used telemedicine technology and their perceptions of the advantages, disadvantages, barriers, and facilitators involved in adopting it. RESULTS: Participants varied widely in their perceptions of telemedicine. Providers in practices affiliated with the university's tertiary center were more likely to use it than were those in private practice. Interviews and other data yielded 6 themes related to a provider's receptivity to technological change: These themes were turf, efficacy, practice context, apprehension, time to learn, and ownership. Each theme applies to the computer and videoconferencing components of telemedicine, and each may operate as a perceived barrier or facilitator of change. CONCLUSIONS: Care providers and administrators consider a range of factors, including economic ramifications, efficacy, social pressure, and apprehension, when deciding whether and how fast to adopt telemedicine. Since adopting this technology can be a major change, agencies trying to introduce it into rural areas should take all these factors into account in their approach to health care providers, staff, and communities.

105. Kalsman, MW; Acosta, DA
Use of the Internet as a medical resource by rural physicians.
Journal of the American Board of Family Practice 2000 Sep-Oct, 13(5):349-52.
ABST: BACKGROUND: Internet has become an integral tool for modern physicians, and those not ready to embrace this new technology will be missing a valuable resource. This pilot study reviews rural physicians' usage patterns of the Internet as a medical resource and examines the barriers that might preclude rural providers from using this technology. METHODS: We undertook a questionnaire survey of rural providers in Wyoming, Montana, and Idaho. Information was elicited about the physicians' Internet access, frequency of Internet use, the different Internet categories used, and the barriers they encountered to using the Internet. A background MEDLINE search was performed using the MeSH headings "Internet," "medical informatics," "and rural health." RESULTS: Eighty-five percent of providers had Internet access, and 75% of respondents reported using the Internet either daily or one to four times a week.

Email was the most frequently used category. The next most frequent categories were online literature search, professional organizations, special interest Web sites, clinical reference Web sites, online journals, and patient education. Lack of time and having no computer were the most important barriers cited. CONCLUSIONS: Although the findings of this survey suggest that, compared with broader physician populations, rural physicians are using the Internet with the same frequency, their scope of use might be much more limited. Barriers to using the Internet are difficult to determine, but lack of time, hardware, and a sense of need appear to be important factors.

106. Swanson, B
Information technology and under-served communities.
Journal of Telemedicine and Telecare 1999, 5 Suppl 2:S3-10.
ABST: Advances in information technology (IT) and telecommunications offer many potential benefits to Australia's under-served communities. However, there is also a risk that some of these communities will only be further disadvantaged, as IT will not contribute greatly to bringing groups such as the mentally ill and illiterate into the mainstream of the community. However, other under-served groups may experience service improvements. For people who do not have English as their first language, IT developments provide opportunities for cheaper and easier service and information delivery in their own languages. Telemedicine and IT also have the potential to make working in rural areas more attractive. On the other hand, telemedicine may be used as a means to bypass local health service providers, as has happened with other service industries. The health sector, though, is well behind these other industries in adopting IT and telecommunications. The growth of telemedicine projects is one indication that progress is being made, however. Two case studies—of telepsychiatry, and of medical education at Flinders University—provide examples of major Australian successes. The medical workforce implications will involve the overall numbers and mix of practitioners, their geographical distribution, changing professional boundaries, and changing skill requirements. The only certain effect is that if IT changes the nature of medical work, large numbers of medical practitioners will need to improve their computer skills and older practitioners will find this most difficult.

107. Watanabe, M; Jennett, P; Watson, M
The effect of information technology on the physician workforce and health care in isolated communities: the Canadian picture.
Journal of Telemedicine and Telecare 1999, 5 Suppl 2:S11-9.
ABST: The ratio of physicians to population in Canada peaked in the mid-1990s and is now falling. The decrease in the number of family physicians has had a disproportionate effect on rural and remote communities, and surveys have indicated that the availability of physicians and services is likely to deteriorate in rural and remote communities. Telemedicine is increasingly evident in every Canadian province and territory, and it could assist in more effective use of workforce resources by linking appropriate experts at central sites to patients and practitioners at remote sites. Positive effects on recruitment and retention of health providers and morale of the local workforce can be expected. In spite of national interest, evidence for the effect of telemedicine on staff distribution, roles and recruitment, use of health resources, health management and system integration is very limited. Telephone interviews were therefore conducted to collect information from 12 telehealth projects in Canada, one from each province

or territory. The responses confirmed observations in the literature that telemedicine has positive outcomes for the workforce.

108. Valaitis, R
Community computing: perceptions of technology access, use and policies in urban Ontario.
Journal of Telemedicine and Telecare 2000, 6 Suppl 2:S80-3.
ABST: The perceptions of community service providers about access to public technology and uses of technology to support population health were investigated. Perceptions about policies regarding access to technology for the public were also pursued. Qualitative semistructured interviews with service providers in the community were used. One-hour semistructured interviews were conducted with representatives from five community organizations and one business in an urban center with a population of 400,000. Respondents believed that computers are here to stay, that that they can provide a valuable means for information access and that they have the potential to support communication in local communities. Perceived barriers were also identified.

L. Other

109. Atlas, B; Chiemnto, L; Shukla, P
Business Case Analysis of health-e-app
The Lewin Group, June 2001 (http://www.healtheapp.org/HealtheAppBCAExecSummary.pdf)
An independent, Business Case Analysis of the Health-e-App pilot was conducted by a national health care consulting firm. The findings support the hypothesis that an automated, Web-based application can improve the speed, data quality, and consumer-satisfaction with the application process. The analysis, conducted by The Lewin Group and commissioned by the California HealthCare Foundation, gives Health-e-App high marks from program administrators, applicants and Certified Application Assistants (CAAs) who help families apply for coverage. It shows while there are still some areas needing improvement, Health-e-App makes applying for coverage faster and easier. Increased Speed—The time between application submission and eligibility determination decreased by 21 percent. Improved Data Quality—Application errors were reduced by nearly 40 percent. Greater Consumer Satisfaction—90% percent of applicants would rather apply online using Health-e-App; 95% of CAAs preferred using Health-e-App to the paper application. The study also found that real-time eligibility screening, online provider and plan selection, and confirmation of application receipt contributed to strong customer-satisfaction with the new, more streamlined application process.

110. Raffoni, M
e-Leadership, Take Two
Harvard Management Update Article, June 1, 2001.
It is hard to conceal a smirk when someone mentions a term like e-leadership. But don't let your skepticism get out of hand. A review of several new books suggests that many of the principles of e-leadership have merit, even if they could stand to be grounded by the influence of pre-Internet-era wisdom. This article reviews five tenets of new economy leadership—such as innovating with abandon, emphasizing coaching over managing the details, and designing your culture around the needs of Gen X and Gen Y employees—and offers much needed updated advice.