Journal of the Association for Information Systems
JAIS

Special Issue

Health Care IT: Process, People, Patients and Interdisciplinary Considerations

Fay Cobb Payton
North Carolina State University
fay_payton@ncsu.edu

Guy Paré
HEC Montréal
guy.pare@hec.ca

Cynthia LeRouge
Saint Louis University
lerougec@slu.edu

Madhu Reddy
The Pennsylvania State University
mreddy@ist.psu.edu

Volume 12, Special Issue, *February* 2011

Health Care IT: Process, People, Patients and Interdisciplinary Considerations

1. Introduction

In its report, *Realizing the Full Potential of Health Information Technology to Improve Healthcare for Americans: The Path Forward,* the President's Council of Advisors on Science and Technology (PCAST, 2010) concluded that "information technology can help catalyze a number of important benefits including improved access to patient data, which can help clinicians as they diagnose and treat patients and patients themselves as they strive to take more control over their health; streamlined monitoring of public health patterns and trends; an enhanced ability to conduct clinical trials of new diagnostic methods and treatments; and the creation of new high-technology markets and jobs" (p. V). If properly implemented, information technology (IT) can potentially transform healthcare in a number of domains as noted below (p. 1):

- Integrate technology into the flow of clinical practice as an asset, while minimizing unproductive data entry work.
- Give clinicians real-time access to complete patient data, and provide them with information support to make the best decisions.
- Help patients become more involved in their own care.
- Enable a range of population-level public health monitoring and real-time research.
- Improve clinical trials, leading to more rapid advances in personalized medicine.
- Streamline processes, increase their transparency, and reduce administrative overhead, as it has in other industries.
- Lead to the creation of new high-technology markets and jobs.
- Help support a range of economic reforms in the healthcare system that will be needed to address our nation's long-term fiscal challenges.

"Despite this great promise, the impact of IT on healthcare over the past decade has so far been modest. Currently, almost 80 percent of physicians—the majority in small, independent practices – lack even rudimentary digital records. Where electronic records do exist, they are typically limited in functionality and poor in interoperability. As a result, the ability to integrate electronic health information about a patient and exchange it among clinical providers remains the exception rather than the rule. Compared to other industrialized nations, the United States lags far behind in the use of electronic health records" (p.1), and global economies can and have benefited from the implementation of information technology in the health care domain.

While IT advantages have enabled social networks, instant messaging and blogging, PCAST (2010, pp.25-26) determined that four several identifiable barriers in the healthcare system exists. First, among these barriers are proprietary applications which typically support fragmentation in patient, people and process data and workflow aggregation. Second, electronic health records (EHRs) are largely seen and used for internal organizational purposes with limited connections to external constituents, such as patients, external providers and public health agencies and researchers. Third, patient privacy concerns abound and consequently hinder content for public health and research initiatives. Lastly, given the fee-for-service health delivery model, much of health care IT has focused on financial (administrative) rather than clinical functions.

These barriers highlight the hurdles that both healthcare and IT must address and overcome in order to provide and deliver effective and efficient care. One notable, yet, absent obstacle from the PCAST list is the need for interdisciplinary approaches to healthcare and health IT. In its 2003 report, *Health Professions Education: A Bridge to Quality*, the National Academy of Sciences concluded that *all health professionals should be trained to deliver patient-centered care as members of an interdisciplinary team emphasizing evident-based practice, quality improvement approaches and informatics* (p. 121). This imperative not only calls for interdisciplinary methodologies and theoretical foundations needed to address clinical outcomes, health disparities, evidence-based practices, treatment management (Payton, 2009) but implies the need for integration among people, patients and processes among healthcare stakeholders. Each of the manuscripts in this Special Issue covers the criticality of technology in a myriad of domains, including health care from information sharing,

implementation, prescription notification, ehealth, disease management, health informatics and home-health. In this issue, Setia, Setia, Krishnan and Sambamurthy discuss IT applications architecture longevity and conclude that the effects of assimilation manifest differently across the business and clinical process domains. Hence, we start with an examination of the process perspective in healthcare.

2. The Process Perspective

Developing processes is complex, costly, and critical to the success of healthcare organizations. The Institute of Medicine in 2000 released a now famous report on errors in the healthcare field – "To Err is Human – Building a safer health system" (Institute of Medicine, 2000) which described the challenges that the health care system faces in preventing medical errors not only because of human mistakes but also because of *inappropriate* processes. This report was followed in 2005 by a joint report by the National Academy of Engineering and Institute of Medicine – "Building a Better Delivery System: A New Engineering/Health Care Partnership" that described ways of improving healthcare processes through the use of system engineering and information technology approaches (Institute of Medicine, 2005). Both these reports and other research on healthcare organizations (Bardram, 2010; Barley, 1986) and health IT (Anderson & Aydin, 2005; Ash, Berg & Coiera, 2004) highlight the important role that processes play in healthcare. However, healthcare organizations face two important challenges in managing these processes: (1) integrating the technical and organizational features of the processes and (2) identifying ways to change the processes to better support organizational goals.

Most processes have both technical and organizational features. For instance, when a nurse provides medication to a patient, she not only follows organizational protocols on how to deliver the medication but is often guided by orders entered into an information system on how much medication to provide and when to provide that medication. Yet, many organizations still tend to view processes from a single perspective (i.e. technical or organizational) (Travers & Downs, 2000). However, viewing processes from a purely technical or organizational perspective limits our understanding of the process. Instead, it would be more useful to view processes from a *sociotechnical* perspective – one that regards the technical features of the system and organizational features of the process as fundamentally interrelated (Berg, 1999). Feldman and Horan ("*The Dynamics of Dyadic Information Collaboration: A Case Study of Health Data Exchange for Disability Determination"*) discuss how information exchange, an important part of any process, is affected by technical, organizational, and governance features of the organization. Although this study focuses on inter-organizational rather than intraorganizational processes, it highlights the important roles that various technical and organizational features play in creating dynamic processes. Another important aspect of the sociotechnical perspective on process is to understand how the technical and organizational features interact and affect each other. In Rivard, Lapointe, and Kappos (*"An Organizational Culture-based Theory of Clinical Information Systems Implementation in Hospitals"*), the authors describe the effect that implementing a clinical information system has on the culture of the organization which in turn affects organizational processes.

A second challenge that many healthcare organizations must deal with is how to create more effective processes to better meet the organizational goals (Barley, 1986). Without effective processes, organizations can face a number of problems including poor quality of care, poor financial management, and poor resource management. Yet, changing processes is a non-trivial task requiring an organization that is able to not only reflect on its current weaknesses but also take the often difficult measures required to change these processes. Singh, Mathiassen, Stachura, and Astapova (*"Dynamic Capabilities in Home Health: IT-enabled Transformation of Post-acute Care")* described how a home health organization, THA Group, used information technologies to change their processes to increase organizational effectiveness. For the THA Group to be successful, they not only had to examine their current weaknesses but also implement the necessary process changes in order to lower cost and improve the quality of care. One important aspect of successful process change is the need for organizational buy-in of the change. Without the support of the people in the organization, any process change will be very difficult. Heart, Zucker, Parmet, Pliskin, and Pliskin

("*Investigating Physicians' Compliance with Drug Prescription Notifications*") discussed how well physicians complied with system generated drug recommendation process. The study found that physicians complied more with certain types of drug recommendations than others.

Processes, whether within or between organizations, are at the heart of the healthcare system. Without effective processes, healthcare organizations would be unable to provide quality services.

3. The People Perspective

Healthcare is both an individual and societal issue. Since all people are potential patients at some stage in their life, *every citizen* has a concern for the effectiveness of the healthcare service system. This applies both when health services are used directly for themselves, as well as when it is used for others that are close (Klein, 2002). Technology engages those that design, develop, sell, use, and manage it. When combined, the people, groups, organizations, and systems that affect or can be affected by health technologies, (that is, health IT stakeholders) is far reaching. The span of healthcare organizations connected or to be connected to typically more than one health information technology ranges from private practitioners to major hospital networks. For example, community hospitals are taking advantage of generalized software systems that provide direct clinician order entry, results reporting, and an electronic health record, as well as administrative functions. These systems are ultimately not about mechanistic processes, but about making connections among people and information in a more accurate, timely, and complete way.

Recent studies indicate that many of the main barriers to healthcare information systems (specifically referencing electronic health records) are not technical, but other issues including stakeholder issues such as risk tolerance, physicians' resistance related to time concerns, fears about privacy, the number of vendors in the marketplace, and the transience of vendors (Bates, 2005). Each of the aforementioned barriers is rooted in the associated vested issues in health technologies held by stakeholders. Stahl and Shaw (*On Quality and Communication: The Relevance of Critical Theory to Health Informatics*) indicate that success with health information systems needs to bring together various stakeholders and their work practices.

Figure 1 depicts the broad landscape of health IT stakeholders. Health information technology stakeholders include government/non-profit agency stakeholders, health care providers, professional association leaders and members, regulatory/standards agency stakeholders, private sector vendors, heath organization administrators (particularly CIO, CMO, and project managers) and their staffs, health care consumers and academic/research institution stakeholders. Figure 1 further provides examples of stakeholders in each of these sectors, with the focus interest stakeholders of papers included in this special issue highlighted. Papers in this issue span many sectors and stakeholders. However, the picture of the broad landscape depicts the multiple sectors and stakeholders often with various perspectives and sometimes with competing interests that create various issues and thus opportunities for research.

3.1. Providers and Professional Associations

Health care consumers and physicians are at the core of medical service provision and thus, of most, healthcare technologies. Therefore, it is not surprising that multiple papers in this issue focus on these two stakeholders in relation to healthcare technologies. When looking at medical professionals, researchers need to ascertain they have identified the actual user and all users, which can be illusive due to incorrect assumptions, as indicated in prior research (McLeod et al., 2009). In addition to physicians, nurses, allied health professionals, and pharmacists may be directly and materially engaged with the design, implementation, and/or on-going use of health technologies. Although much has been published regarding physician acceptance or resistance to healthcare technologies, not much attention has been given to the characterization of this group of stakeholders in relation to their use of technology nor the impact of the distinctions and structure of relationships and hierarchies among various healthcare provider groups on the implementation and use of health technologies. The study by Rivard, Lapointe, and Kappos (*An Organizational Culture-based Theory of Clinical Information Systems Implementation in Hospitals*) investigates the implementation of a clinical

information system used by physicians, nurses, pharmacists and administrators. The study illustrates the range in adoption attitudes and practices among various user subgroups. Some nurses and physicians were positive toward the clinical information systems (CIS) while others voiced complaints and concerns, hence hindering the implementation. Their proposed Organizational Culture-based Theory of Clinical Information Systems Implementation provides a rich explanation of the relationships among CIS characteristics, user values, and implementation practices on the level of difficulty of the implementation process. The user values of differentiation included professional status, physicians' medical dominance, and the status and autonomy of other professionals. In this study, when medical professional subgroups (physicians or nurses) interpreted the implementation context in terms of congruence with their value set, consensus on the CIS was reached within the subgroup, but conflict between subgroups often followed. The values that seem to bring the various medical professional subgroups together for integration are broad consensus about the importance of effective and efficient health care.

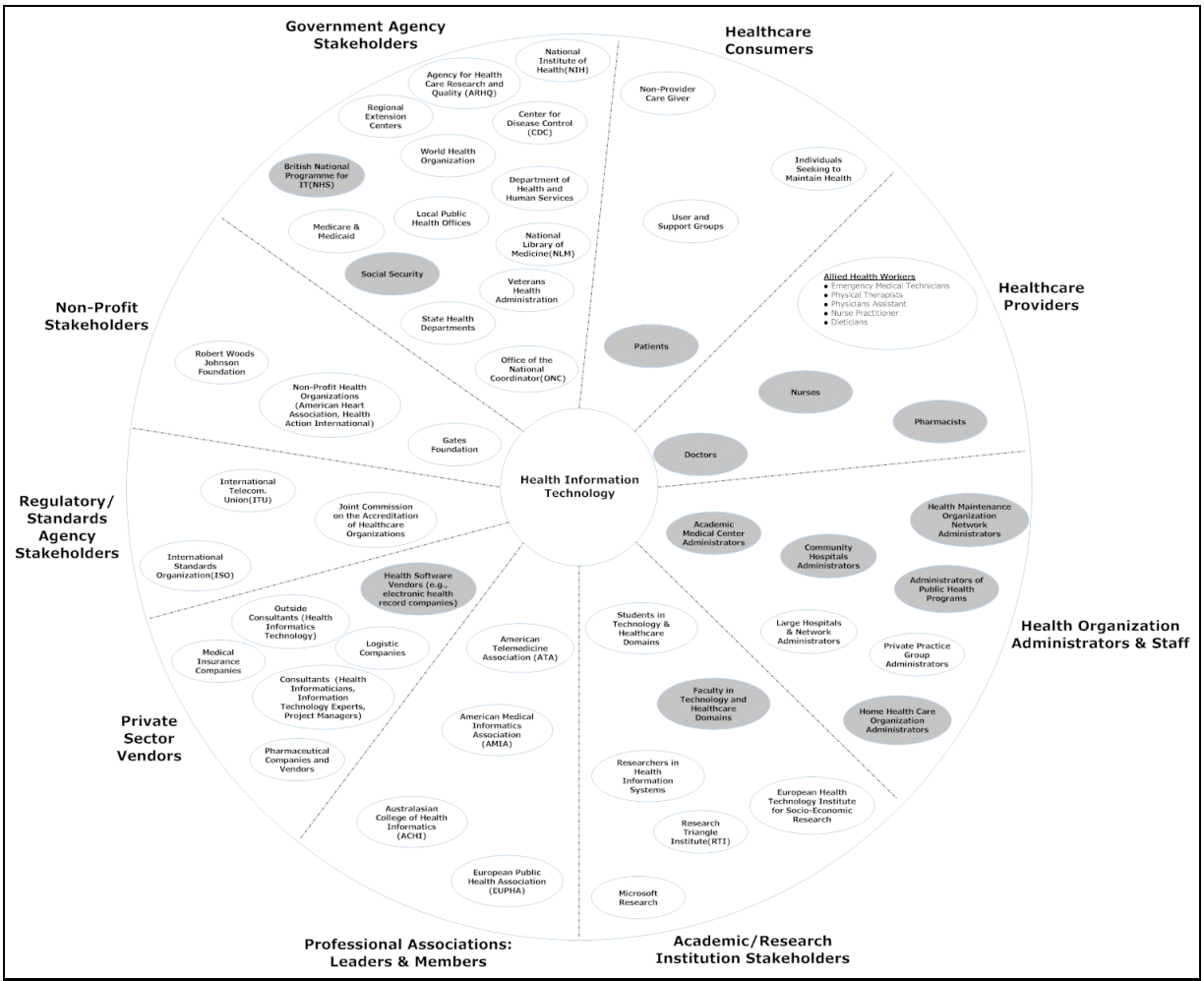


Figure 1. Health Information Technology Stakeholders

A second paper in this issue, *Investigating Physicians' Compliance with Drug Prescription Notifications,* focuses on cognitive factors of healthcare providers in relation to their acceptance and use of technology and indirectly recognizes pharmacists. Decision support capabilities are built into drug ordering systems to ensure accuracy of prescribing and avoid polypharmacy contraindications, patient deaths and litigation (Atkinson et al., 2002). Examples of systems include the one of interest for this paper, pharmacy management systems within healthcare organizations. Heart, Zuker, Parmet, Pliskin, and Pliskin *(Investigating Physicians' Compliance with Drug Prescription*

Notifications) studied physicians in all clinics operated by a large health maintenance organization (HMO). In looking at the factors affecting compliance with a notification about substitute drugs, they found that compliance was found to be non-automatic and selective, following a thoughtful cognitive process. They also found that physician's workload and a personal attribute, age, to have significant effects system compliance.

In addition to traditional healthcare provider roles, as the health informatics field expands, researchers also need to acknowledge emerging informatics professional specializations and their roles among healthcare providers (Lange, 1997). For example, informatics nurse specialists understand the concepts and technology of nursing information management and can provide operational and strategic benefits to nursing organizations. The informatics nurse specialist (INS) is often the primary change agent in facilitating the implementation of clinical information systems in healthcare 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 (Hilz 2002). It will be interesting to see how these emerging roles evolve in relation to "tradition" providers and in their interaction with technology and "technology aware" healthcare consumers.

Various professional groups also collectively represent different healthcare providers. The American Academy of Family Physicians, for example, has taken the lead in an initiative to promote interoperable electronic health records (American Academy of Family Physicians, 2004). Just as specific informatics roles are evolving among health professionals, so are professional associations. The American Medical Informatics Association and American Telemedicine Association, and Australian College of Health Informatics are leading educational programs, knowledge sharing, advocacy, and community development among their constituents.

3.2. Healthcare Consumers

As discussed later in this article, there has been a shift in the role of the patient from passive recipient to active consumer of health information and active user of healthcare devices, logging, and monitoring systems. Given that the patient is the icon of the healthcare model, it is natural that the health information technology community has demonstrated ever-increasing awareness and recognition of the 'Internet informed' patient. However, the concept of "health care informatics consumer" is not solely defined as the patient. "Others" in the healthcare consumer area (see Figure 1) include the community of the well, who want to maintain a healthy lifestyle and evaluate health risks as well as patient caregivers in the home, who may look to healthcare technologies to maintain their personal health or support the health of others. In fact, in the situations of limited capacity, fear, or ability, it is the caregiver that might seek to participate in decisions about their loved one's treatment who turns to the Internet to confirm diagnoses, validate physician-recommended treatment, or seek alternative therapies. In addition, various support groups focusing on topics, such as prevention, particular disease or caregiving comprise distinct peer-to-peer stakeholders of health information technology. These groups and the content of their interactions typically evolve organically and are not pre-fixed by healthcare organizations, provider groups or vendors.

Just as support groups may seek to define, expand, or express themselves via technology, user groups that rally around the use of a specific health information system (such as an electronic health record), consumer health informatics device or monitoring system may also evolve through technological tools and platforms. Part of the evolution of these groups is to move towards collaborative healthcare networks, which seek to connect healthcare organizations, vendors, patients, providers, and health informatics teachers to students (e.g., uCern http://chcconnect.com/category/ucern/).

3.3. Private Sector Vendors

Healthcare is an important component of many economies (for example a multi-trillion dollar industry in the United States). Therefore, it is not surprising that the landscape of key health information technology stakeholders take in many private sector vendors. Private sector vendors include, but are not limited to medical insurance companies, logistic companies, health software vendors (e.g.,

electronic health record companies), pharmaceutical companies and vendors and consulting groups (health informaticians, information technology experts, project managers). Though there may be many opportunities for stakeholders, there are also multiple challenges.

For example, in its role in controlling reimbursement, insurance companies have significant impact on the diffusion of various health information technologies. Insurers, managed care organizations, self-insured corporations, and self-insured unions are major purchasers of care and are theoretically committed to providing high-quality and less expensive health care. Some are using technologies to engage in the wellness process. For instance, many insurers have Web sites that enable enrollees to store their personal clinical records as well as to access their self-management information (Tang et al., 2006). Policy is another way payers exhibit their stake and influence. Specifically, failure to generally allow reimbursement for various telemedicine services and for innovative consumer health devices is cited as impeding mass use. As a result, technology companies may approach innovation and investment into these markets with some trepidation since many will look towards products and services that allow reimbursement to cover costs.

Although none of the papers in this special issue directly explores private sector vendors, there is indirect association through the technologies of interest. These technologies range from remote patient monitoring systems (*Dynamic Capabilities in Home Health: IT-enabled Transformation of Post-acute Care*) to drug recommendation decision making support embedded in an electronic health records *(Investigating Physicians' Compliance with Drug Prescription Notifications).* Given the range of systems and subsystems and implications of data sharing, one underlying message is that interoperability is at the key of health information exchange and connecting the pieces of many aspects of the technology tools and resources that can be used to maintain or improve health. Vendors must recognize the need greater standardization and clinical data exchange (Bates, 2005).

3.4. Health Organizations, Administrators, and Their Staffs

The healthcare organizations that provide a vehicle of service to healthcare consumers introduce another sector of stakeholders, particularly through their administrators and related staffs. The papers in this special issue introduce us to a range of health service organizations, and indirectly or directly to their administrators academic medical administrators (*An Organizational Culture-based Theory of Clinical Information Systems Implementation in Hospitals*), health maintenance organization network administrators (*Dynamic Capabilities in Home Health: IT-enabled Transformation of Post-acute Care*), administrators of public health programs (*The Dynamics of Information Collaboration: A Case Study of blended IT value Propositions for health information exchange in Disability Determination*), and community hospital administrators (*An Organizational Culture-based Theory of Clinical Information Systems Implementation in Hospitals*). Administrators along with healthcare professionals have many concerns regarding the relationships between information technologies and clinical guideline use. However, research also indicates that administrators, physicians, and nurses hold different opinions about specific facilitators and barriers to the success of healthcare information technologies (Lyons et al., 2005). Physicians and nurses most often discussed barriers, whereas administrators focused most often on facilitation. Facilitators included guideline maintenance and charting formats. Barriers included resources, attitudes, time and workload, computer glitches, computer complaints, data retrieval, and order entry.

Moreover, IT personnel, IT consultants, and/or health informaticians may be involved with designing, implementing, and supporting the health information systems (Pouloudi et al., 1997). Stahl and Shaw's (*On Quality and Communication: The Relevance of Critical Theory to Health Informatics*) discussion of the main pillars of a good QA implementation – training, teamwork, leadership, feedback, and organizational stability reinforce the need for communicative among various stakeholders at various levels in a healthcare organization's health IT implementation efforts. As such efforts become more ingrained in healthcare, the distinction between health professional and IT professional become blurred. To illustrate, the role of public health informatician has been described to include an understanding of the respective roles and domains of IT and public health team members; the ability to develop and use an IT architecture; a working knowledge of information

system development, networking, and database design; familiarity with data standards; a clear understanding of privacy and confidentiality issues, as well as security technologies; and skills in IT planning and procurement, IT leadership, managing change, communication, and systems evaluation research (Yasnoff et al., 2000).

3.5. Government and Regulatory Agencies

Health communication is an issue that transcends people and technology. Health information technology is highly dependent of the general development of information technology with standards coming from ISO/IEC JTC1, ITU and several other organizations e.g. IETF, the World Wide Web consortium and Open group. A number of standardization initiatives have been in progress for more than ten years with the aim to facilitate different aspects of the exchange of health information (Tang et al., 2006).

Through policy, legislation, funding, and direct provision of services associated with healthcare, governmental stakeholders take an overarching role when it comes to health information technologies. At the infrastructure level, the federal government could catalyze development and adoption of data interchange standards for key health record content areas.

In the United States, relevant federal agencies such as the Agency for Healthcare Research and Quality (AHRQ) and the National Library of Medicine (NLM) are leading supports of research on information technology; they award considerable sums in grants to "support organizational and community-wide implementation and diffusion of health information technology [HIT]" (Tang et al., 2006). In addition, the United States federal government already has highly developed integrated electronic clinical data systems in the Veterans Health Administration (VHA) and the U.S. Department of Defense (Burton et al., 2004). Furthermore, the Centers of Disease Control and Prevention (CDC) has made systematic efforts to improve the nation's public health telecommunications, information, and distance-learning infrastructure by promoting Internet connectivity and other information infrastructure for state and local public health workers (Yasnoff et al., 2000).

Though each governmental structure provides a unique context, some insights may transcend specific national policy. In *On Quality and Communication: The Relevance of Critical Theory to Health Informatics,* Stahl and Shaw acknowledge that "In some respects the NHS is unique, not least because of its monolithic structure, the idea of free healthcare at the point of delivery and its availability to all UK citizens. Whilst these may distinguish it from other healthcare organisations, the authors contend that most of their arguments on quality assurance, healthcare, information systems and critical theory would be applicable elsewhere because analogues of their components can be seen in the UK's health service."

The private and public sector goals of health information exchange may be best reinforced and extended through collaboration. In *The Dynamics of Information Collaboration: A Case Study of blended IT value Propositions for health information exchange in Disability*, Feldman and Horan emphasize and illustrate the importance of public-private interorganizational collaboration. Key stakeholders represent the public sector from the United States Social Security Association (SSA)'s headquarters and Massachusetts Disability Determination Service Administration; the private sector is represented by Beth Israel Deaconess Medical center (BIDMC). This authors of this study point out that when it comes to data interchange as a vehicle for health care advancement, a blended value proposition approach is needed for collaborations; this approach should not only considers the current technology dynamics, but also how the technology dynamics may change in future collaborations.

3.6. Academic/Research Institution Stakeholders

Each of our contributors to this special issue, the guest editors, and the many reviewers reside within the sector of academic/research institution stakeholders. The "scholarly homes" (i.e., various types of academic departments and colleges and research institutions) of researchers interested in studying health information technologies is ever expanding. Given that this is an interdisciplinary domain, the

health informatics/information systems field of research stands to only benefits from sharing and cross-pollination among those housed in variety of domains and research structures.

4. The Patient Perspective

The public's growing involvement in managing their own health represents a strategic issue in the health care field. The concept of patient-centered care (PCC), which emerged in the late 1990s, has become a major theme of health care systems around the world (Institute of Medicine 2001; Davis et al., 2005; Epstein et al., 2010). Simply said, PCC is about considering the patient's point of view and unique circumstances in the medical decision-making process (Ponte et al., 2003) and it represents an attempt to empower patients by expanding their role in the health system (Pelzang, 2010). Lemire et al. (2008) have identified three different interpretive logics associated with patient empowerment. First, the professional logic refers to a process in which the individuals acquire expert knowledge and put it into practice so that they can act effectively on their personal health. Under this logic, the provision of PCC consists of educating patients of appropriate health advice so that they can make informed decisions. Next, the consumer logic is seen as a process of personal affirmation to make decisions based on personal judgement and resources. This logic encourages the individuals with a sense of responsibility concerning their choices and the consequences of acquiring products (e.g., medications) or services to seek more power on health issues. In this line of thought, Coulter (2002) defines PCC as a health care system that meets and responds to patients' wants, needs, and preferences and where patients are empowered to decide for themselves. Last, the community logic touches on the dynamics of inclusion in action and social change. The corresponding initiatives develop from a sense of community and participation and can take different forms, such as participation as a member of a community, including solidarity networks or support groups.

In short, under the PCC model, patients become active participants in their own care and receive services designed to focus on their individual needs and preferences, in addition to advice and counsel from physicians, nurses, and allied health professionals (Pence, 1997, Institute of Medicine 2001). Empirical evidence shows that PCC improves disease outcomes and quality of life, improves continuity of care, and that it is critical to addressing ethnic and socioeconomic disparities in health care accessibility and health outcomes (Epstein et al., 2010; Davis et al., 2005; Frisch et al., 2000). One of the key factors contributing to the development of the PCC model is the adoption and use of information technologies. Indeed, the growing interest in PCC coincides with the introduction and integration of supportive technologies in the delivery and governance of health care services. According to the Institute of Medicine's report "Crossing the Quality Chasm," there are many opportunities to use information technologies to make care more patient-centered, for instance by facilitating access to clinical knowledge through understandable and reliable Web portals and online support groups (e.g. Honey et al., 2010; Lemire et al., 2008); customized health education and disease management systems (e.g. Neuhauser & Kreps, 2003; Payton & Kiwanuka-Tondo, 2009), home telemonitoring systems (e.g. Paré et al., 2010), and the use of clinical decision support systems to tailor information according to an individual patient's characteristics, needs and conditions (e.g. Garibaldi, 1998).

Ultimately, PCC success is determined by the quality of the interactions between patients and clinicians (Epstein et al., 2010). A fundamental objective of the PCC model is therefore to integrate information technology applications and infrastructures in every link of the care chain in the belief that Web portals, shared patient records, electronic consultation systems, and online data access for patients facilitate relationships between professionals and patients by providing sufficient information, patient engagement and mutual feedback (Vikkelso, 2010). In their article titled *"Dynamic Capabilities in Home Health: IT-enabled Transformation of Post-acute Care,"* Singh, Mathiassen, Tachura, and Astapova describe and explain how the THA Group, a major home health care provider based in Georgia, overcame regulatory and financial challenges through adaptive organization design, and built new dynamic capabilities to meet the evolving needs of patients and allocate clinical resources more efficiently. In order to transform its health delivery process, engage patients as well as health professionals, and improve clinical outcomes, the THA Group leveraged various forms of emerging information technologies, including remote monitors, sensors, telephones, wireless-enabled laptops, and satellite-based telemetry.

While the PCC model offer great promises, for this approach to succeed it is important that physicians, nurses and allied health professionals acknowledge patients' search for medical knowledge, that they discuss the information offered by patients and guide them to reliable and accurate health Web sites (McMullan, 2006). In *The Clinical Impact of eHealth on the Self-Management of Diabetes: A Double Adoption Perspective*, Kelley, Chaisson, Downey, and Pacaud draw attention to the characterization of diagnosed type 2 British patients using a Web portal. They find that an eHealth system may be accessible to people with varying computer knowledge, but not varying computer self-efficacy. This suggests that technically less-proficient patients will still be able to access eHealth systems. This is important information for those health care organizations that elect to adopt eHealth, but it requires them to manage and foster patients' self-efficacy towards system use and not technical proficiency per se. This study also indicates that clinicians need to interact with their patients online in order for eHealth to be successful.

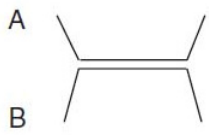
5. Why Interdisciplinary Approaches to Health Care

The Special Issue captures a diversity of theoretical frameworks, methodologies and fields in an effort to address the complexity of healthcare along the people, processes and patient perspectives. The Call for Papers noted the relevant of interdisciplinary approaches to health care as follows*: Effectiveness and efficiency of Health Care Information and Management Systems (HIS) will become one of the main challenges in health care in the next decade. According to the World Health Organization (WHO, 2006), significant improvements are being made in healthcare due to information and communication technologies (ICT). eHealth innovations like electronic health records, computer-assisted prescription systems and clinical databases are transforming health today, and hold even greater promise for the future. ICT's support clinical care, patient education, facilitates scientific advancement of the field, and improves the work flow of various functions in the healthcare. Success in utilizing these systems is predicated on such issues as understanding the wide array of users and their unique needs while developing systems, investigating, documenting and analyzing the impact of eHealth on the users and the broader community of service providers and promoting better understanding of the impact of better information on health service outcomes by disseminating information and improving accessibility to health care information. The HIS domain is intrinsically* ***interdisciplinary****, and the Information Systems (IS) community has a key role in its advancement. The IS discipline is well positioned to conduct research that contributes toward the health care goals of improving the capabilities of physicians, clinical staff, health care consumers and public health workers by systematically investigating the impact of context on existing IS theories and models as they relate to health care issues. In addition, the nuances in the health care context provide a rich environment from which to develop new theory as well as extend the existing IS theories (Chiasson & Davidson, 2004).*

We adopt the National Academy of Sciences (2004) conceptual definition of interdisciplinary research (IDR). IDR is a mode of research by teams or individuals that integrates information, data, techniques, tools, perspectives, concepts, and/or theories from two or more disciplines or bodies of specialized knowledge to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single discipline or area of research practice (Committee on Facilitating Interdisciplinary Research, National Academy of Sciences, National Academy of Engineering, Institute of Medicine, 2004, p 39). Further, IDR and education are inspired by the drive to solve complex questions and problems, whether generated by scientific curiosity or by society, and lead researchers in different disciplines to meet at the interfaces and frontiers of those disciplines and even to cross frontiers to form new disciplines (*Committee on Facilitating Interdisciplinary Research*, National Academy of Sciences, National Academy of Engineering, Institute of Medicine, 2004, p 16).

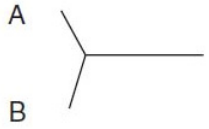
Adopted from the *Committee on Facilitating Interdisciplinary Research (p 29)*, Figure 2 is a simple depiction of IDR drivers. Note that IDR, unlike multidisciplinary research, creates and/or leads to emerging fields and/or disciplines. A degree of continuity exists among stakeholders, disciplines and team members despite conclusion of work, project and/or grant initiative. Multidisciplinary implies an additive approach rather than integration among fields, theories and knowledge.

Continuity of the research, herein, is recommended along the IDR agendas. Synthesis of ideas and methods among disciplines have been adopted and implemented in health care environments to address episodes of illnesses, such as health disease, mental health, depression, palliative Care, HIV, just to name a few. If the IS community seeks to continue to the health care domain, we offer that awareness and use of theories external to IS can provide avenues for contribution to existing knowledge. Further, we espouse, *Borrowing,* as offered by the Committee on Facilitating IDR. Borrowing describes the use of one discipline's methods, skills, or theories in a different discipline (p 27). In sum and as noted by the *Committee on Facilitating IDR* (p 27), *Interdisciplinary research by definition requires the researchers to learn the other discipline. I like to stress vocabulary, but also methodology; I feel very strongly about it. Ruzena Bajcsy, director of the Center for Information Technology Research in the Interest of Society, University of California, Berkeley.*



A
B

Multidisciplinary:
Join together to
work on common problem,
split apart unchanged
when work is done.



C

Interdisciplinary:
Join together to
work on common question or problem.
Interaction may forge a new
research field or discipline.

Source: Adapted from L. Tabak, Director, NINDS, NIH. Presentation at Convocation on Facilitating Interdisciplinary Research, Washington, D.C., January 29 2004.

Figure 2. Difference between Multi- and Interdisciplinary

References

Anderson, J., & Aydin, C. (2005). *Evaluating healthcare information systems: methods and applications*. 2nd ed. New York: Springer.

Ash, J. S., Berg, M., & Coiera, E. (2004). Some unintended consequences of information technology in health care: The nature of patient care Information System-related Errors. *Journal of the American Informatics Association 11*, 104-112.

Atkinson, C., Eldabi, T., Paul, R. J., & Pouloudi, A. (2002). Integrated approaches to health informatics research and development. *Logistics Information Management*, *15*(2), 138-152.

Bardram, J., & Hansen, T. (2010). Why the plan doesn't hold -a study of situated planning, articulation and coordination work in a surgical ward, *ACM Conf. on Comp. Supp. Coop. Work 2010 (CSCW'10)*, Savannah, GA, 331-340.

Barley, S. R. (1986). Technology as an occasion for structuring: evidence from observations of ct scanners and the social order of radiology departments. *Administrative Science Quarterly*, *31*(1), 78-108.

Berg, M. (1999). Patient care information systems and health care work: A sociotechnical approach. *International Journal of Medical Informatics*, *55*(2), 87-101.

Burton, L. C., Anderson, G. F., & Kues, I. W. (2004). Using electronic health records to help coordinate care. *Milbank Quarterly*, *82*(3), 457-481.

Chiasson, M. W., & Davidson, E. (2004). Pushing the contextual envelope: developing and diffusing is theory for health information systems research. *Information and Organization*, *14*(3), 155-188.

Committee on Facilitating Interdisciplinary Research, National Academy of Sciences, National Academy of Engineering, Institute of Medicine (2004). *Facilitating interdisciplinary research*, The National Academies Press, Washington, D.C.

Coulter A (2002). *The autonomous patient: ending paternalism in medical care*. Nuffield Trust: London, United Kingdom.

Davis, K., Shoenbaum, S. D., & Audet, A. (2005). A 2020 vision of patient-centered primary care. *Journal of General Internal Medicine*, *20*(10), 953-957.

Epstein, R. M., Fiscella, K., Lesser, C. S., & Stange, K. C. (2010). Why the nation needs a policy push on patient-centered health care. *Health Affairs*, *29*(8), 1489-1495.

Frisch, N. G., Dossey, B. M., Guzzetta, C. E, & Quinn, J. A. (2000). *Standards of holistic nursing*. Gaithersburg, MD, Aspen.

Garibaldi, R. A. (1998). Computers and the quality of care: a clinician's perspective. *New England Journal of Medicine*, *338*, 259-60.

Hilz, L. (2002). The informatics nurse specialist as change agent. application of innovation-diffusion theory. *Computers in Nursing*, *18*(6), 272-278.

Honey, M. L. L., Bycroft, J., Tracey, J., Boyd, M. A., & McLachlan, A. (2010). Quality processes that maximise the health navigator web portal as an enabler for consumers and health professionals. *Health Care and Informatics Review Online*, *14*(1), 12-18.

Institute of Medicine (2000). *To err is human*. Eds: Kohn, L., Corrigan, J., and Donaldson, M. National Academy Press, Washington, DC.

Institute of Medicine (2001). *Crossing the quality chasm: A new health system for the 21st century*, National Academy Press, Washington D.C. 2001, 337 pages.

Institute of Medicine (2005). Building a better delivery system: A new engineering/health care partnership. Eds: Reid, P., Compton, D., Grossman, J., and Fanjiang, G. National Academy Press, Washington, DC.

Klein, G. (2002). Standardization of health informatics-Results and challenges. *Methods of Information in Medicine*, *41*(4), 261-270.

Lange, L. L. (1997). Informatics nurse specialist: roles in health care organizations. *Nursing Administration Quarterly*, *21*(3), 1-10.

Lemire, M., Sicotte, C., & Paré, G. (2008). Internet use and the logics of personal empowerment in health. *Health Policy*, *88*, 130-40.

Lyons, S.S., Tripp-Reimer, T., Sorofman, B.A., DeWitt, J.E., BootsMiller, B.J., Vaughn, T.E., & Doebbeling, B.N. (2005). VA QUERI informatics paper: Information technology for clinical guideline implementation: perceptions of multidisciplinary stakeholders. *Journal of the American Medical Informatics Association*, *12*(1), 64-71.

McMullan, M. (2006). Patients using the internet to obtain health information: How this affects the patient–health professional relationship. *Patient Education and Counseling*, *63*(1), 24-28.

McLeod, A., & Clark, J. G. (2009). Using stakeholder analysis to identify users in healthcare information systems research: Who's the real user. *The International Journal of Health Information Systems and Informatics*, *4*(3), 1-15.

National Academy of Science (2003). *Health professions education: A bridge to quality***,** Greiner, A.C and Knebel, E. (eds), Committee on the Health Professions Education Summit.

Neuhauser, L., & Kreps, G. L. (2003). Rethinking communication in the e-health era. *Journal of Health Psychology*, *8*(1), 7-23.

Paré, G., Moqadem K., Pineau, G., & St-Hilaire, C. (2010). Clinical effectiveness of home telemonitoring programs in the context of diabetes, asthma, heart failure and hypertension: A systematic review. *Journal of Medical Internet Research*, *12*(2), e21.

Payton, F. C., & Kiwanuka-Tondo, J. (2009). Contemplating public policy in AIDS/HIV online content, Then where is the technology spirit?. *European Journal of Information Systems*, *18*(3), 192-204.

Payton, F. C. (2009). Beyond the IT magic bullet: HIV/AIDS prevention education and public policy. *Journal of Health Disparities Research and Practice*, *3*(2), 13-33.

Pelzang, R. (2010). Time to learn: Understanding patient-centered care. *British Journal of Nursing*, *19*(14), 912-917.

Pence, M. (1997). Patient-focused model of care. *Journal of Obstetric, Gynecologic, & Neonatal Nursing*, *26*(3), 320-326.

Ponte, P. R., Conlin, G., Conway, J. B., Grant, S., Medeiros, C., Nies ,J., Shulman, L., Branowicki, P., & Conley, K. (2003). Making patient-centered care come alive: Achieving full integration of the patient's perspective. *Journal of Nursing Administration*, *33*(2), 82-90.

Pouloudi, A., & Whitley, E. (1997). Stakeholder identification in inter-organizational systems: Gaining Insights for Drug Use Management Systems. *European Journal of Information Systems, 6*(1), 1-14.

President's Council of Advisors on Science and Technology (PCAST): Executive Office of the President (2010), Report to the President Realizing the Full Potential of the Health Information Technology to Improve Healthcare for Americans: The Path Forward.

Tang, P. C., Ash, J. S., Bates, D. W., Overhage, J. M., & Sands, D. Z. (2006). Personal Health Records: Definitions, Benefits, and Strategies for Overcoming Barriers to Adoption. *Journal of the American Medical Informatics Association*, *13*(2), 121-126.

Travers, D. A. & Downs S. M. (2000). Comparing the user acceptance of a computer system in two pediatric offices: A qualitative study. In *American Medical Informatics Association Symposium*. 853-857.

Vikkelso, S. (2010). Mobilizing Information Infrastructure, Shaping Patient-Centred Care. *International Journal of Public Sector Management*, *23*(4), 340-352.

Yasnoff, W., O'Carroll, P., Koo, D., Linkins, R., & Kilbourne, E. (2000). Public Health Informatics: Improving and Transforming Public Health in the Information Age. *Journal of Public Health Management and Practice*, *6*(6), 67-75.