

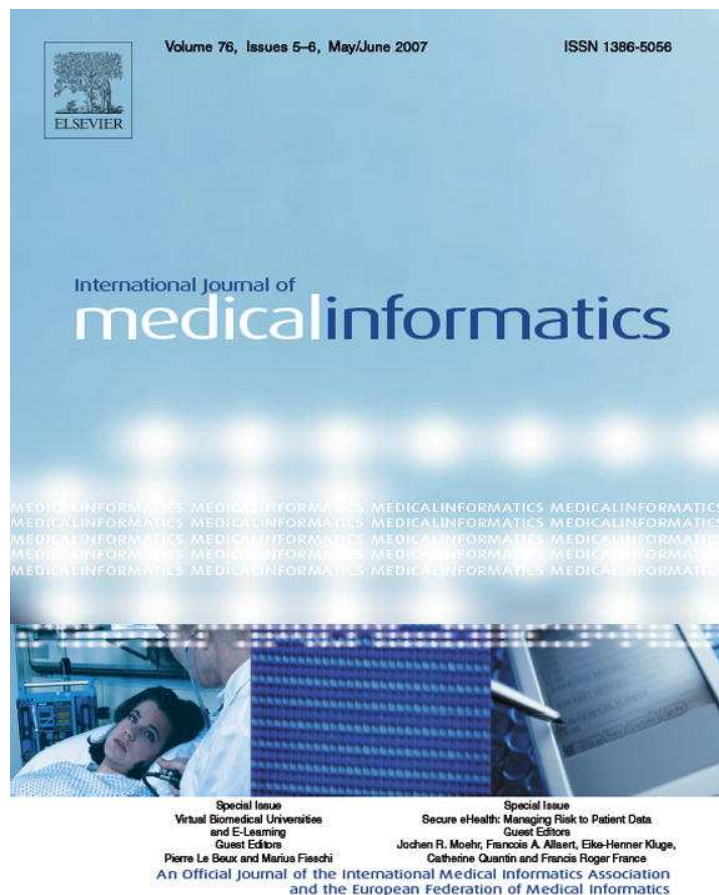
CERIAS Tech Report 2007-09

SOCIAL, ETHICAL AND LEGAL BARRIERS TO E-HEALTH

by James G. Anderson

Center for Education and Research in
Information Assurance and Security,
Purdue University, West Lafayette, IN 47907-2086

Provided for non-commercial research and educational use only.
Not for reproduction or distribution or commercial use.



This article was originally published in a journal published by Elsevier, and the attached copy is provided by Elsevier for the author's benefit and for the benefit of the author's institution, for non-commercial research and educational use including without limitation use in instruction at your institution, sending it to specific colleagues that you know, and providing a copy to your institution's administrator.

All other uses, reproduction and distribution, including without limitation commercial reprints, selling or licensing copies or access, or posting on open internet sites, your personal or institution's website or repository, are prohibited. For exceptions, permission may be sought for such use through Elsevier's permissions site at:

<http://www.elsevier.com/locate/permissionusematerial>



ELSEVIER

journal homepage: www.intl.elsevierhealth.com/journals/ijmi

Social, ethical and legal barriers to E-health

James G. Anderson*

Department of Sociology & Anthropology, Purdue University, 700 West State Street, West Lafayette, IN 47907-2059, United States

ARTICLE INFO

Keywords:

Electronic health
Electronic health record
E-health
Information systems
Delivery of health care
Legal and ethical issues
Implementation
Organizational change

ABSTRACT

Background and purpose: Information technology such as electronic medical records (EMRs), electronic prescribing and decision support systems are recognized as essential tools in Europe, the U.S., Canada, Australia, and New Zealand. But significant barriers impede wide-scale adoption of these tools, especially EMR systems.

Objectives: The objectives of this study were to investigate the present status of information technology in health care, the perceived benefits and barriers by primary care physicians.

Methods: Literature analysis and survey data from primary care physicians on adoption of information technology are reviewed.

Results: The U.S. trails European countries as well as Canada, Australia and New Zealand in the use of information technology in primary care. The results of the study indicate that physicians in general perceive benefits to information technology, but also cite major barriers to its implementation in their practices. These barriers include lack of access to capital by health care providers, complex systems and lack of data standards that permit exchange of clinical data, privacy concerns and legal barriers.

Conclusions: Overcoming these barriers will require subsidies and performance incentives by payers and government; certification and standardization of vendor applications that permit clinical data exchange; removal of legal barriers; and greater security of medical data to convince practitioners and patients of the value of EMRs.

© 2006 Elsevier Ireland Ltd. All rights reserved.

1. Introduction

A number of recent studies suggest that fragmented and inaccessible clinical information adversely affects both the cost and quality of health care as well as compromises patient safety. Information technology has been proposed as an essential tool in solving these problems and promoting better health care [1–3]. Information technologies (IT) such as electronic health records, e-prescribing, decision support systems, electronic management of chronic disease, and bar coding of drugs and biological products have been shown to reduce health care costs and medical errors.

For example, studies have shown that an electronic medical record that facilitates computerized physician order entry can significantly prevent serious medication errors [4]. Electronic prescribing has been shown to reduce prescription errors and improve compliance with managed care formularies [5]. Point-of-care decision support tools can provide providers with alerts for contraindicated medications [6].

However, implementation of these information technologies has lagged in most European nations as well as the U.S. In 2001 only 29% of primary care physicians in the European Union have implemented electronic medical records; while in

* Tel.: +1 765 494 4703; fax: +1 765 496 1476.

E-mail address: andersonj@purdue.edu.

URL: <http://web.ics.purdue.edu/~janders1>.

1386-5056/\$ – see front matter © 2006 Elsevier Ireland Ltd. All rights reserved.

doi:10.1016/j.ijmedinf.2006.09.016

the U.S. less than 17% of primary care physician routinely use EMRs in their practices [7].

A recent report commissioned by the Health Information Network Europe (HINE) indicates that hospitals in 15 European nations spend only 1.8% of total revenue on information technology. As a result IT use in hospitals in Europe is similar to the U.S. Only 2.2% of European hospitals have implemented computerized physician order entry systems with clinical decision support compared to 2.5% of American hospitals [8].

Until recently, IT products available for healthcare providers were mostly designed for large organizations and were costly. Recent advances in technology have made IT applications more available to primary care physicians in smaller practices [9]. As a result, the introduction of computers and IT applications into primary care in countries with favorable Government policies and financial incentives has been rapid [10-12]. The Harvard School of Public Health and the Commonwealth Fund's International Symposium survey of primary care physicians found that the proportions of primary care physicians in the following countries who were using electronic medical records were: U.S. (17%), Canada (14%), Australia (25%), New Zealand (52%), and the U.K. (59%). The survey also found that use of electronic prescribing by primary care physicians was: U.S. (9%), Canada (8%), Australia (44%), New Zealand (52%), and the U.K. (87%) [13].

The U.S. trails European countries as well in the use of information technology in primary care. Overall 29% of general practitioners in the European Union use electronic medical records compared to only 17% in the U.S. Only three OECD countries, Portugal, France and Spain, lag behind the U.S. [7]. Despite its potential to improve efficiency and quality of care, use of information technology in health care lags behind other sectors of the economy in the U.S. In 2001 most of the \$20 million invested in health care information technology was used to computerize financial systems [14]. Less than 10% of U.S. hospitals had adopted electronic medical record systems and less than 5% had implemented computerized physician order entry by 2001.

2. Perceived benefits and barriers

Physicians, in general, perceive potential benefits from implementing IT. A recent survey of U.S. primary care physician found that almost 75% indicated that these applications could reduce errors; 70% perceived IT as potentially increasing their productivity; over 60% indicated that IT tools have the potential to reduce costs and help patients assume more responsibility [15].

Over 80% of primary care physicians surveyed reported the lack of financial support for IT applications as a major barrier to adoption. This was followed by their perceptions that vendors fail to deliver acceptable products as primary barriers to implementing these tools (79.3%). In general, physicians perceived these barriers as difficult to overcome. Almost two-thirds of the physicians surveyed also cited the lack of a strategic plan for implementing applications and difficulty in recruiting experienced IT personnel as major barriers while over one-half cited lack of sufficient knowledge of IT as a barrier to implementation.

A key barrier to implementation of EMRs and other clinical IT applications appears to be the high initial costs and uncertain payoffs to physicians. A recent study of primary care physicians found that physicians who perceive lack of financial support and high investment costs required are much less likely to have implemented EMRs, electronic prescribing and decision support tools [15]. Upfront costs of EMRs in ambulatory care are estimated to range from \$16,000 to \$36,000 per physician. Additional costs are incurred for maintenance of the system and decreased revenue from patients during the transition from the paper chart to the EMR [16].

A second barrier is the complexity of EMRs and clinical IT applications. Surveys have found that physicians cite the time and effort involved in learning to use these technologies as a significant barrier. One survey found that 86% of the physicians surveyed stated that vendor's inability to deliver acceptable products as a significant barrier to implementation of IT in their practices [15]. Also, because of the many vendors, interoperability represents another major barrier to implementation of EMRs and other IT applications. Lack of ability to exchange clinical data with laboratories and hospitals is a major barrier for smaller physician practices.

Unlike the health care systems of many western countries, the U.S. system is composed of private, independent individual and group providers, hospitals, ambulatory care and long term care centers that compete with one another. The system is non-centralized with multi-payers. Information technology adoption decisions are made independently and there are few if any incentives to share information concerning patient care. Moreover, there are many competing vendors each with their own products. In contrast, in the U.K. a research team developed the PRODIGY system specifications and knowledge base and the five largest General Practice system suppliers covering 85% of the market integrated the software into their clinical systems. Currently this system is being implemented by all 27,000 general practitioners in the U.K. [12].

Privacy concerns are another barrier hindering implementation of IT since many EMR systems are Web-based, many physicians and patients fear that medical records may not be secure. This is even more of a concern when wireless Internet is used to transmit records to multiple locations [17].

Security breaches of data banks are far more frequent in the U.S. than in Europe. This is due to the fact that European countries have a comprehensive set of national privacy laws and officers of data protection [18]. In contrast the U.S. has a confusing, sometimes conflicting, patchwork of federal and state laws and agencies that deal with the protection of data. Also, the U.S. has a large private data collection industry with companies like ChoicePoint and Acxiom, that collect, analyze and sell consumer data. In Europe, private companies are severely restricted from collecting personal data without individual consent.

Legal barriers to IT adoption also exist in the U.S. Various laws related to fraud and abuse, antitrust, federal income tax, intellectual property, liability and malpractice and state licensing create a climate of uncertainty for health care providers in implementing IT [19]. For example the physician self-referral law and the anti-kickback law present barriers to hospitals that would like to pay for electronic software for affiliated physicians.

3. Addressing barriers

Overcoming the cost barrier will be difficult and may require incentives by payers and the government. An example is New Zealand, Australia and the U.K. that have introduced government funding programs to stimulate adoption and use of EMRs [13]. Professional associations can also facilitate adoption of IT. Professional physician organizations played a key role in the development and rapid implementation of the national electronic medical record system in the U.K. Currently over 95% of General Practitioner practices in the U.K. are computerized [20]. In the U.S. the American Academy of Family Physicians through a nonprofit foundation is developing low-cost, open-source EMR software that will be available to physicians with no licensing fee.

Financial incentives may also accelerate adoption of EMRs and other IT applications. A number of purchasers, health plans, and employers are initiating a quality-based reimbursement programs (pay-for-performance) [21]. These programs reward practices for specific quality improvement actions or use of specific IT applications. A similar program has been implemented in the U.K. Thirty percent of GPs' salaries are based on their performance on a set of measures computed by the EMR [22].

Incentives could also be provided in the U.S. through Medicare, the national social insurance program that provides medical insurance coverage for over 40 million seniors aged 65 and over and people with disabilities in the U.S. Additional payments could be provided for physicians who use specific IT applications. House resolution 747 introduced into 2005 U.S. Congress also would make zero interest loans available to provider groups and would reward those who use EMRs [23].

Certification of vendors' applications may help to overcome another barrier to implementation. Other countries have identified a few vendors for a region and required that they meet certain standards to facilitate transfer of clinical information among health care providers. The development of community-wide data exchanges also can stimulate the adoption of EMRs [24]. These exchanges allow clinicians to view all of their patients' data regardless of provider and care site and thus decrease physicians' time and increasing financial benefits.

4. Conclusion

It has been estimated that the net cumulative savings from adopting EMR systems in U.S. hospitals over 15 years could be as much as \$371 billion and the net cumulative savings from physician adoption could be \$142 billion [25]. But significant barriers impede wide-scale adoption and use of EMR systems. These barriers include lack of access to capital by health care providers, complex systems and lack of data standards that permit exchange of clinical data, privacy concerns and legal barriers. Overcoming these barriers will require subsidies and performance incentives by payers and government. Also, certification and standardization of vendor applications that permit clinical data exchange will be required to achieve greater interoperability. Legal barriers will need to be removed

and greater security of medical data must be guaranteed in order to convince practitioners and patients of the value of EMRs.

REFERENCES

- [1] M. Leaning, The new information management and technology strategy of the NHS, *Br. Med. J.* 217 (1993).
- [2] President's Information Technology Advisory Committee, Revolutionizing health care through information technology. National Coordination Office for Information Technology Research and Development, Arlington, VA, 2004.
- [3] R.S. Dick, E.B. Steen, *The Computer-Based Patient Record: An Essential Technology for Health Care*, National Academy Press, Washington, DC, 1997.
- [4] D.W. Bates, L.L. Leape, D.J. Cullen, N. Laird, L.A. Petersen, J.M. Teich, E. Burdick, M. Hickey, S. Kleeefeld, B. Shea, M. Vander Vliet, D.L. Seger, Effect of computerized physician order entry and a team intervention on prevention of serious medication errors, *J. Am. Med. Assoc.* 280 (1998) 1311–1316.
- [5] W.L. Galanter, R.J. Didomenico, A. Polikaitis, A trial of automated decision support alerts for contraindicated medications using computerized physician order entry, *J. Am. Med. Inform. Assoc.* 12 (3) (2005) 269–274.
- [6] R.A. Miller, R.M. Gardner, K.B. Johnson, G. Hripcsak, Clinical decision support and electronic prescribing systems: a time for responsible thought and action, *J. Am. Med. Assoc.* 12 (4) (2005) 403–409.
- [7] Harris Interactive, European physicians especially in Sweden, Netherlands and Denmark lead U.S. in use of electronic medical records. *HarrisInteractive Health Care News* 2(16) 8, 2002.
- [8] N. Versel, Europe's Hospitals lag U.S. in adopting IT, study says, *Health IT World*, April 5, 2005 (online: <http://www.health-itworld.com/enews/04-05-2005.561.html>; accessed April 5, 2006).
- [9] K. McDonald, J. Metzger, Achieving tangible IT benefits in small physician practices. California HealthCare Foundation, *ihealth Report*, September, 2002.
- [10] M.R. Kidd, Clinical practice guidelines and the computer on your desk, *Med. J. Aust.* 173 (2000) 373–375.
- [11] C.D. Mount, C.W. Kelman, L.R. Smith, R.M. Douglas, An integrated electronic health record and information system for Australia, *Med. J. Aust.* 172 (2000) 25–27.
- [12] I.N. Purves, B. Sugden, N. Booth, M. Sowerby, M. The PRODIGY Project – The Iterative Development of the Release One Model. *Proceedings of the AMIA Annual Symposium*, 1999, pp. 359–363.
- [13] Harris Interactive. U.S. trails other English speaking countries in use of electronic medical records and electronic prescribing. *HarrisInteractive Health Care News*, 1(28) October 1, 2001.
- [14] J. Goldsmith, D. Blumenthal, W. Rishel, Federal health information policy: a case of arrested development, *Health Affairs* 22 (4) (2003) 44–55.
- [15] J.G. Anderson, E.A. Balas, Computerization of primary care in the United States, *Int. J. Health Inform. Syst. Inform.* 1 (3) (2006) 1–23.
- [16] R.H. Miller, I. Sim, J. Newman, *Electronic medical records: Lessons from small physician practices*, Oakland, CA, California HealthCare Foundation, 2003.
- [17] M.C. Rash, Privacy concerns hinder electronic medical records, *The Business Journal of the Greater Triad Area*, April 4, 2005.
- [18] E. Dash, Europe zips lips; U.S. sells ZIPs, *New York Times*, August 7, 2005, 1.

- [19] U.S. Government Accountability Office (GAO), HHS's efforts to promote health information technology and legal barriers to its adoption, GAO-04-991R, August 2004 (online: <http://www.gao.gov/>).
- [20] I.N. Purves, General Practice Computerisation National Survey 1996. NHS Executive, Leeds, 1998.
- [21] D.W. Bates, Physicians and ambulatory electronic health records, Health Affairs 24 (50) (2005) 1180-1189.
- [22] NHS Connecting for Health, "What is QMAS?" (on line: <http://www.connectingforhealth.nhs.uk/prograsmmes/qmas/>; accessed April 11, 2006).
- [23] C.A. Gonzalez, J.M. McHugh, National Health Information Incentive Act of 2005. HR 741, 109th Congress, 1st session 2005.
- [24] R.H. Miller, I. Sim, Physicians' use of electronic medical records: barriers and solutions, Health Affairs 23 (2) (2004) 116-126.
- [25] R. Hillestad, J. Bigelow, A. Bower, F. Girosi, R. Meili, R. Scoville, R. Taylor, Can electronic medical record systems transform health care? Potential health benefits, savings, and costs, Health Affairs 24 (5) (2005) 1103-1117.

Author's personal copy