



Decision Support Project Team

Engineering the System of Healthcare Delivery
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Vincent Balgos
ESD.69

Evidence Base Medicine by J. Michael McGinnis

Introduction

The U.S. is one of the few nations with some of the world's most innovative and effective medical technology in the healthcare industry. In addition, the U.S. spends the most for its healthcare amounting to about \$2.5 *trillion* a year, and is roughly 17% of the GDP. However, there is drastic contradiction of the availability of this innovative technology, and high spending per patient with the overall effectiveness of the care provided. In 2000, a report from the World Health Organization (WHO) who ranks nations of overall health care system performance, the US ranked 37th in the world. Most of westernized Europe, developed Asian, Middle Eastern, and South American countries rank higher than the U.S. The U.S. ranks a little higher than Cuba whose GDP is 0.08% of that of the U.S., a stark depiction that it is possible to attain quality health care at an affordable cost.

Studies have shown that almost 30% of medical services provided in the US are ineffective, and there almost 100,000 preventable deaths a year. In *Evidence-base Medicine* (McGinnis, 2009), the article indicates that some current healthcare systems failures are

- Minimally documented, unjustified, and wasteful variation in medical practices
- High rates of inappropriate care associated with patient
- Unacceptable rates of preventable
- Inability to “do what we know works” practices
- Healthcare delivery inefficiencies leading to waste and increasing cost

With a yearly average of 6% increase in health prices, higher population, and the ever increasing complexity of healthcare regulation, the overall U.S. healthcare system is destined to be unsustainable and is already a current major economical and social problem. However, there are some measures that can improve the quality and effectiveness of the U.S. healthcare system. The emerging trend of evidence-based medicine can alleviate some of these technical and cultural challenges that are inherent in the current system.

Evidence Based Medicine

In 2001, the Institute of Medicine (IOM) released a report, *Crossing the Quality Chasm*, that supported a new methodology of rules of decision making that is evidence based, and not based on traditional training and experience. The use of medical decision rules based on a large collaborative knowledge database allows practitioners to apply “best practices” that may have been overlooked or unknown in the current system and would promote medical treatment standardization. This standardization may help eliminate unnecessary and wasteful variation in treatment of well known, safe and effective practices. The report also emphasized the importance of the patient experience and having a trusted scientific body monitoring the quality of the database to ensure the overall effectiveness of treatments.

A key attribute is the systematic feedback of individual experience into the larger knowledge database to promote continual development. This “learning” health system can help ensure innovation, quality, and drive the process of discovery as a natural outgrowth of patient care. Best practice treatments can be used more readily and not kept in isolation to the fortunate few. The emergent usage of electronic health records (EHR), and information technology has allowed the sustainability of this learning cycle.

McGinnis illustrates how engineering and scientific concepts can be applied to sustain the learning driven care model, and to improve the overall effectiveness and quality of health care. For example, engineering data management systems can be used to generate new and quicker analysis of medical data to better inform decisions. Coupled with EHR, this provides the information pipeline with continual feedback in to the database for grander scale learning and development. McGinnis also discusses other science based concepts for improvements such as:

- Predictive modeling to forecast unforeseen complications in complex treatments
- System Design using the 80/20 rule: Design for the masses in view of for every conceivable variation
- Design for Safety: Quality driven design
- Mass Customization: Improved efficiencies while addressing unique needs of the patient
- Operations Research and Lean practices to reduce waste

While these concept help address the technical and business aspects of healthcare issues, it also introduces a change in the cultural environment. The emphasis on continual learning process on the grander scale is one of the main changes that are epitomized while continuing to adapt to the

dynamic needs of the patient. Changes in decision making process, payment mechanisms, and care planning can also influence the overall outcome. This complementary cultural change is inevitable in addressing the clinical complexity across the entire context and if long term improvements are desired.

The values of the technical and cultural changes are briefly discussed by McGinnis in two real world examples and applications. The Veteran's Health Affairs had historical issues with expensive and fragmented patient care. In 1995, radical reform of the system was introduced which include developing accountable structure, standardize the quality of care, modernize IT, and align the system's finances with desired outcomes. Ascension Health, the largest U.S. non-profit healthcare delivery system, also faced similar problems, and the "Call to Action" reform was initiated that focused on three mantras: Health care that works, health care that is safe, and health care that leaves no one behind. Both case studies showed drastic improvements in the overall quality and effectiveness treatment while reducing cost, and focusing on the patient.

Conclusion

The current U.S. healthcare system is an extremely complex system with various stakeholders each with its own unique needs. The current structure is undesirable and unsustainable since the ever-increasing cost is not justified by the low quality and effectiveness of the medical services it provides. The evidence-based medicine concept discussed by McGinnis shows it may ameliorate some of the cost and quality issues by promoting a continual learning environment that is focused on the patient. This systems thinking approach shows the value of the transition from a "silo" intuitive treatment practice to a "teamwork" evidence-based medicine culture.

Reference

McGinnis, J.M. "Evidence Based Medicine" Information Knowledge Systems Management 8 (2009) 145-157 : DOI 10.3233/IKS-2009-0156

Ralph A. Rodriguez
HST.926J

Electronic Health Records (EHR) by William W. Stead

Introduction

The goal in the US to have an electronic health record (EHR) for each of its citizens is not a new endeavor. As far back as 1958 early pioneers began “writing programs to store and retrieve patient records” *Electronic health records* (Stead, 2009) yet as we approach 2011 this goal is far from completion. What’s different now is that the Obama Administration under the Office of the National Coordinator for Health IT has set on a broad goal to develop the foundation and leadership necessary for broad adoption of EHRs. It is not just a new dictum or politics but \$2B (USD) under Title XIII and \$23B (USD) in Medicare and Medicaid financial incentives to providers who are Meaningful Users of certified, interoperable EHRs (first payment year FY 2011) under Title IV of the American Recovery and Reinvestment Act (ARRA) as well as an overall pledge from President Obama to spend \$50B (USD) over the next 5 years. The reason for this new concerted push for EHRs is one aspect of many parts to lower the national costs for healthcare. The current conventional wisdom is that in having every American with a complete copy of their electronic health record (EHR) there would no longer be medical guess work, prescription discrepancies or repeated tests, for example, for people seeking care because their records would contain a litany of up to date information and a complete history of care. This in turn would lower overall costs and increase the quality of care nationwide.

A radical new view for electronic health records (EHRs)

The author William Stead of *Electronic health records* (Stead, 2009) suggests that this conventional wisdom for EHRs is seriously flawed and points to “Interoperable health information is essential to engineering the system of healthcare delivery.” Additionally, he points to a recent National Research Council (NRC) committee finding that “current efforts aimed at nationwide deployment of healthcare information technology will not be sufficient to achieve the vision of 21st century healthcare, and may even set back the cause” (Stead & Lin, 2009). The obvious question is how could having an electronic health record with a complete record and history of care cause a set back or not achieve the future vision of care? The NRC reasoning is rooted in a mismatch between the technical approach to implementation and the nature of the individuals those records are trying to describe and the clinical work they are trying to document. It calls for a shift in the paradigm from thinking of the electronic health

record as a by-product of automating practice, to thinking of it as a visualization of signals accumulated across scales of biology, time and geography.¹ This new paradigm for electronic health records makes possible the flexibility to continually adapt people's roles, process and the technology in context to the EHR.

A system-supported practice

The Institute of Medicine's vision for 21st century healthcare and wellness calls for a system that is safe, effective, patient-centered, timely, efficient and equitable (IOM Comm Healthcare America, 2001). This vision calls for electronic health records as part of the information infrastructure to support a systems approach to practice. In system-supported practice, the focus is on the system's performance (Stead & Starmer, 2008). Teams of people, well defined processes, and information technology work in concert to produce the desired result consistently.

A new focus is needed with a defined interaction between the patient and the clinician as well as other points of care within the medical ecosystem. This will enable the patient to be a real stakeholder in the process of care. With this approach a sort of closed loop automation process will create context or tactic information about explicit data in a health record such as how a particular medication, for example, made the patient feel as opposed to another similar type of medication. This interactive process between patient/clinician and clinician/patient ensures consideration by the clinician for the patient and his/her judgment and feelings which a automation focused system wouldn't capture yet it doesn't rely solely on the patient because of the clinician's ability to use standardization of collected data and well defined processes of a system of health data. This patient-centered system and approach will enable continuous process improvement and simplified workflows to improve care to ensure a real-time record quality.

The NRC Committee identified several information intensive aspects of this vision (Stead & Lin, 2009, pp. 20-24).

- Comprehensive data on patients' conditions, treatments and outcomes.
- Cognitive support for healthcare professionals and patients to help integrate patient specific data where possible and account for any uncertainties that remain.
- Cognitive support for healthcare professionals to help integrate evidence-based practice guidelines and research results into daily practice.

¹ May 13, 2009 In Press: Rouse WB and Cortese DA, eds, Engineering the System

Stead, Electronic Health Records of Healthcare Delivery. Amsterdam: The IOM Press, 2009.

- Instruments that allow providers to manage a portfolio of patients and highlight problems as they arise within both individual patients and populations.
- Rapid integration of new instrumentation, biological knowledge, treatment modalities, etc., into a “learning” healthcare system that encourages early adoption of promising methods but also analyzes all patient experience as experimental data.
- Accommodation of growing heterogeneity of locales for provision of care, including home instrumentation for monitoring and treatment, lifestyle integration, and remote assistance.
- Empowerment of patients and their families in effective management of healthcare decisions and execution, including personal health records (as contrasted to medical records held by care providers), education about the individual’s conditions and options, and support of timely and focused communication with professional healthcare providers.²

The reality of this vision

The paper’s author points to the NRC Committee’s findings across 8 health systems and their lack of success. In addition I am currently working across 11 hospitals in New England as part of The New England Congenital Cardiology Association (NECCA), Children’s Hospital and research as part of the Obama administration (ONC). Like the findings of the NRC the reality is a series of disparate systems, both proprietary and homegrown, outdated processes and workflows, legacy data structures and inoperability as well as a litany of system design issues.

Some of the NRC problematic aspects include (Stead & Lin, 2009. appendix C):

- Patient records are fragmented; computer-based and paper records coexist; computer records are divided among task-specific transaction processing systems; users have to know where to look.
- Clinical user interfaces mimic their paper predecessors, without design to reflect human and safety factors.
- Systems are used most often to document what has been done, manually, frequently hours after the fact.
- Support for evidence-based medicine and computer-based advice is rare.
- Biomedical devices are poorly integrated.
- Care processes and outcomes are rarely documented in machine-readable form.
- Work is frequently interrupted with gaps between steps and manual handoffs at seams of the process.

² May 13, 2009 In Press: Rouse WB and Cortese DA, eds, Engineering the System

Stead, Electronic Health Records of Healthcare Delivery. Amsterdam: The IOM Press, 2009.

- Errors and near misses are frequent and use of data to identify patterns is rare.
- Clinical research activities are not well integrated into ongoing clinical care.
- Centralization of management and reduction in the number of information systems is the predominant method for standardization; while innovation requires locally adaptable systems.
- Security and privacy compete with workflow optimization.
- Implementation time lines are long and course changes are expensive.
- Response times are variable and long down times occur.³

The author and the NRC point out that most of the failures to deliver meaningful and useful electronic health records stem from a mismatch between people, process, technology and tools whereby the technical nature or aspect of its design is unable to capture the context and complexity of human beings and the clinical work being considered. What this all means is that with an understanding of the issues mentioned combined with a new view of a system design enables us the capability to create the new paradigm of a patient focused system which takes into account the variability in biological systems and the complexity of clinical work.

Commercial Systems Available for Electronic Health Records

There are many commercially available systems available for hospitals to deploy their EHRs. Some of the top rated ones are:

1. Allscripts Healthcare Solutions
2. Cerner PowerWorks
3. ChartLogic, Inc.
4. eClinicalWorks
5. EHS
6. GE Healthcare
7. Henry Schein Medical Systems/MicroMD
8. LSS Data Systems
9. MED3000, Inc.
10. MediNotes Corporation

They are considered top rated⁴ for several reasons; because they are on track to achieve CCHIT certification, is certified by an electronic prescribing network, is applicable to multiple specialties, integrates with

³ May 13, 2009 In Press: Rouse WB and Cortese DA, eds, Engineering the System

Stead, Electronic Health Records of Healthcare Delivery. Amsterdam: The IOM Press, 2009.

⁴ © 2010 Physicians EHR, Inc. | 2500 Regency Parkway | Cary, North Carolina 27518

practice management systems, and can prove it is interoperable. Again, notice the focus on technology and automation and no mention of the patient interoperability. This is because most implementations of EHRs involved a focus and desire to automate and script care processes.

The rest of the paper can be framed into 3 core themes:

1. Diagnosis and Clinical Work
 - The Nature of Individuals
 - Clinical measurements rarely have precise meaning
 - Diagnoses lack clinical detail
 - The Nature of Clinical Work
 - Clinical work is an opaque ecosystem
 - Perspectives vary by role
2. EHR frameworks, Interoperability, Exchange and Databases
 - SHIFTING THE PARADIGM
 - A Spectrum of Electronic Health Record Frameworks
 - Healthcare entities
 - Regional data exchanges
 - Personal health records
 - Population databases
3. Standards and Taxonomy
 - A Systems Engineering Approach to Standards
 - Standards of practice
 - Reference standards
 - Terminology frameworks
 - Standard product identifiers and vocabulary

Diagnosis and Clinical Work

The diagnosis of an individual is invariably complex and involves many aspects of biological collection and data, observation, logic, experience (pattern recognition) and opinion or assembly of this information into a finding or treatment. Because of this complexity a clinician cannot simply look at a readout or measurement and come to a precise conclusion. Data in and of itself is just that data. Without context or as I mentioned previously “tacit” data such as a person’s mental state and visual observation, key aspects of this data could be missed. For example the paper gives examples of the simple taking of a person’s blood pressure. Without context the clinician wouldn’t know the reason for a higher measurement such as if a person is lying down than if they were sitting or standing. Additionally, it goes up if they are stressed or active. If they are obese, a larger cuff is needed to avoid artificially high readings. The reading itself has little meaning without detailed information about the context in which it was taken in relationship to the explicit data received. Conversely the detail about those observations cannot be inferred from the

diagnosis. The phrase “Clinical work is an opaque ecosystem” was used by the author which succinctly connects the controlled chaos of a clinician’s day to day work where there is no predictability of issues and the ability to correctly react to what’s behind door number 3 directly impacts your next move or patient diagnosis because of the chaotic nature and mixing of roles, process and technology to accomplish clinical work.

EHR frameworks, Interoperability, Data Exchange and Databases

The key point of this core section of the paper was about creating an “interoperable health information” system. The innovativeness of this approach crosses many spectrums on system design. Because of the current views within HER, mainly being the focus of an automation view only the idea of disassembling your data and overlaying actionable based applications such as EMRs, decision support and billing, for example, creates a next generation view that will enable data to be examined in the context of time, raw (quantitative), existing and future scientific knowledge, and the context of the system “asking” the questions so that there is no pre-disposition of the data in order to properly render itself back to the viewer (healthcare provider). This mindset is what drove client-server architecture in the 1990’s to the n-Tiered architecture of the 21st century. In de-coupling the data from applications and then reassembling it will require a purview says the author “First, define interoperable data as data that can be assembled and interpreted in the light of current knowledge, and re-interpreted as knowledge evolves. Re-interpretation requires access to an archive of “raw signal” (voice, image, text, biometrics, etc). Second, require data liquidity — the separability of data from applications so that other applications can use them. Third, limit the use of standard data, by which I mean data that can have only one interpretation, to situations where meaning is explicit and stable over time, e.g. drug ingredients, etc.

Standards and Taxonomy

This core theme is about standards but where it diverges is really the issue about the lack of standards that have deeper context and meaning. Standards are really about a step by step process of how something works and how to interpret the data or information in a way that the last person or group interpreted the information. Said differently, “a standard is an agreement on the minimum required process steps or the minimum required outcome of a process step.” The challenge is that most standards are an agreement from multiple parties and interested people to describe what something means or its context. It is like looking at a large data set where you are trying to make sense of its core meaning. In doing so you justify your way out of problematic data such as the “outliers” as they

don't support or fit the model or vision of what is considered the group standard or vision. The author argues that "Standards are agreements about how to do something where coordinated action is needed." The issue at hand is the "outliers" that everyone was willing to except as exceptions during the standardization process. Reference standards on the other hand are a new concept made possible by computers, (Stead, et al., 2005, pp. 116-117). They allow computers to speak a common language, such as XML, thus facilitating information exchange. The idea is to apply the standard at the point of manufacture instead of applying it at the inter-connections among systems. The overall goal is interoperability between clinicians on the meaning of something and computer formats that can automatically agree on and speak a common language, thus facilitating information exchange.

Conclusion

The idea of an electronic healthcare record that incorporates the many facets of both tacit and explicit knowledge of data is quite a novel ideal. In order to achieve such a system it would require a completely different mindset and goal which incorporates a system that "aggregates multi-source, multi-modal data about highly variable individuals across time, geography and change in biomedical knowledge that can be linked into rapidly evolving patterns of work and support diverse perspectives." The author succinctly says it correctly that this will require a "radically different approach to achieving the goal of interoperable health information."

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EHR Supplemental Material

Electronic Health Record Meaningful Use Stage 1 Final Rule

Health outcomes policy priority: Engage patients and families in their health care.				
Care goals: provide patients and families with timely access to data, knowledge, and tools to make informed decisions and to manage their health.				
Provide patients with an electronic copy of their health information (including diagnostic test results, problem list, medication lists, allergies), upon request.	Provide patients with an electronic copy of their health information (including diagnostic test results, problem list, medication lists, allergies, discharge summary, procedures), upon request.	At least 80% of all patients who request an electronic copy of their health information are provided it within 48 hours.	Enable a user to create an electronic copy of a patient's clinical information, including, at a minimum, diagnostic test results, problem list, medication list, medication allergy list, immunizations, and procedures in: (1) Human readable format; and (2) accordance with the standards specified in Table 2A row 1 to provide to a patient on electronic media, or through some other electronic means.	Enable a user to create an electronic copy of a patient's clinical information, including, at a minimum, diagnostic test results, problem list, medication list, medication allergy list, immunizations, discharge summary, and procedures in: (1) Human readable format; and (2) accordance with the standards specified in Table 2A row 1 to provide to a patient on electronic media, or through some other electronic means.
NA	Provide patients with an electronic copy of their discharge instructions and procedures at time of discharge, upon request.	At least 80% of all patients who are discharged from an eligible hospital and who request an electronic copy of their discharge instructions and procedures are provided it.	No Associated Proposed Meaningful Use Stage 1 Objective.	Enable a user to create an electronic copy of the discharge instructions and procedures for a patient, in human readable format, at the time of discharge to provide to a patient on electronic media, or through some other electronic means.
Provide patients with timely electronic access to their health information (including lab results, problem list, medication lists, allergies) within 96 hours of the information being available to the EP.	NA	At least 10% of all unique patients seen by the EP are provided timely electronic access to their health information.	Enable a user to provide patients with online access to their clinical information, including, at a minimum, lab test results, problem list, medication list, medication allergy list, immunizations, and procedures.	No Associated Proposed Meaningful Use Stage 1 Objective.
Provide clinical summaries for patients for each office visit.	NA	Clinical summaries are provided for at least 80% of all office visits.	1. Enable a user to provide clinical summaries to patients (in paper or electronic form) for each office visit that include, at a minimum, diagnostic test results, medication list, medication allergy list, procedures, problem list, and immunizations. 2. If the clinical summary is provided electronically (i.e., not printed), it must be provided in: (1) Human readable format; and (2) accordance with the standards specified in Table 2A row 1 to provide to a patient on electronic media, or through some other electronic means.	No Associated Proposed Meaningful Use Stage 1 Objective.

Health Outcomes Policy Priority	Meaningful Use Category	EPs	Hospitals	Measure Brief	Change from Proposed NPFM	Stage 1 Objectives				
						POS 23	Unique Patients Denominator	Attest in a Certified EHR System	Y/N/A	Attestation
Engage patients and families in their health care	Electronic Copy of Health Information	●	●	50%	↓	■	■	◆		Provide patients with an electronic copy of their health information (including diagnostic test results, problem list, medication lists, medication allergies), upon request.
	Electronic Copy of Discharge Instructions <i>[Hospital only]</i>	●		50%	↓	■	■	◆		
	Clinical Summaries for each office visit <i>[EP only]</i>	●		50%	↓			◆		Provide clinical summaries for patients for each office visit.
Improve care coordination	Exchange Key Clinical Information	●	●	One test	↔				✓	Capability to exchange key clinical information (for example, problem list, medication list, medication allergies, diagnostic test results), among providers of care and patient authorized entities electronically.
Ensure adequate privacy and security protections for personal health information	Privacy / Security	●	●	Conduct or review security risk analysis	↔				✓	Protect electronic health information created or maintained by the certified EHR technology through the implementation of appropriate technical capabilities.

Commission Announces First ONC-ATCB 2011/2012 Certifications

33 Electronic Health Record Products Meeting ARRA Requirements Are Available to Providers

On October 1, [CCHIT announced certification](#) of 33 complete and modular EHRs. Drummond Group announced 3 certifications.

Meaningful Users must utilize "Certified EHR Technology". There are many questions being asked about the terms "complete EHR certification", "modular EHR certification", and "site certification" as well as the regulatory definition of "Certified EHR Technology" and the requirements to meet the definition. Currently, how this "certification" is achieved, complete, modular, or site does not make a difference according to the rules set forth.

45 CFR 170.102

Certified EHR Technology means:

- (1) A Complete EHR that meets the requirements included in the definition of a Qualified EHR and has been tested and certified in accordance with the certification program established by the National Coordinator as having met all applicable certification criteria adopted by the Secretary; or
- (2) A combination of EHR Modules in which each constituent EHR Module of the combination has been tested and certified in accordance with the certification program established by the National Coordinator as having met all applicable certification criteria adopted by the Secretary, and the resultant combination also meets the requirements included in the definition of a Qualified EHR.

Complete EHR means EHR technology that has been developed to meet, at a minimum, all applicable certification criteria adopted by the Secretary.

EHR Module means any service, component, or combination thereof that can meet the requirements of at least one certification criterion adopted by the Secretary.

For example "all applicable certification criteria" for an Certified EHR Technology designed for an ambulatory setting would be to all certification criteria adopted at 45 CFR 170.302 and 170.304 (general certification criteria, and ambulatory specific certification criteria). For inpatient EHRs it would be 45 CFR 170.302 and 170.306 (general certification criteria, and inpatient specific certification criteria)

Regardless of whether one uses a Complete EHR, a combination of EHR Modules or a Site certification, all certification criteria need to be met in all settings. Said differently, a proper combination of EHR Modules, if seen as a black box, would be a Complete EHR. In order to meet the definition of Certified EHR Technology, no matter how one achieves it (using a Complete EHR, combination of EHR Modules, or Site

Certification) all the boxes need to be checked. See the [FAQ posted by ONC](#).

References

Stead, William W. "Electronic Health Records" Information Knowledge Systems Management 8 (2009) 119-143 : DOI 10.3233/IKS-2009-0140

The Office of the National Coordinator for Health Information Technology (ONC)
<http://healthit.hhs.gov/portal/server.pt?open=512&mode=2&objID=3163&PageID=20779>

Certification Commission for Health Information Technology
[http://www.cchit.org/media/news/2010/10/commission-announces-first-
onc-atcb-20112012-certifications](http://www.cchit.org/media/news/2010/10/commission-announces-first-onc-atcb-20112012-certifications)

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ESD.69

Transforming Healthcare Through Patient Empowerment by Leslie Lenert

Introduction

There is little contention that the healthcare industry in the U.S. has long been globally regarded as the vanguard of developing new drugs, medical devices, as well as other products and services. Despite the various inadequacies and challenges, the industry has served as a breeding ground for an array of medical inventions that has been disseminated worldwide. Though we spend more per capita on health than any other country, Americans often do not get the care they need. Many important services are underused, and adherence to proven-effective therapies for many chronic diseases remains low. Medical errors and other safety problems remain too common, accounting for many thousands of deaths and billions of dollars in health care costs.

The question remains: we clearly value health in this country, but why is the system of such a poor value? One of the biggest reasons is because of the fee-for-service system where there are wide discrepancies in income between generalists and specialists. In particular, it is not the amount that physicians earn that is the problem, but more so the way they earn it. This leads to fundamental conflicts of interest between patients, physicians, and payers. To align the incentives across all parties, there needs to be an explicit focus on actions in the patients' best interests.

Patient Empowerment

Multiple studies have shown that providing more healthcare services is not necessarily better for the patients involved, even though perceptions of quality of care are usually based on the amount of services received. A possible explanation for that claim is that the fee-for-service model provides few incentives for physicians to use clinical judgement in limiting unnecessary services. There is little motivation to use care most efficiently when physicians are paid by volume.

Related to that problem of misalignment is the issue of fundamental knowledge imbalance between the physician and the patient. The structure of information flow is focused on financial reimbursement and provider business process management, rather than the actual patient care management. The locus of control in decision making and the context for information flow greatly impedes the system from achieving greater value at lower costs. One solution to this problem is empowering patients by

adopting a patient centric approach to both decision making and information flow in care management.

In decision models, choice of treatment should be the optimal selection based on maximizing the expected value of the decision relative to what treatment to undertake given the perpetual uncertainty surrounding medical problems. In other words, the decision made should maximize a patient's utility. However, decisions are often also based on results that minimize risk or maximize favorable chances.

Ideally, these decisions should be made purely based on the patient himself/herself by considering his/her background, symptoms, demography, environment, and values. However, realistically, the model rarely only involves the patient. At the most basic level, the model involves two parties: the physician and the patient. Already, the framework is less patient-centric, since it is now the physician's interpretation of the patient's concerns that comes into play while making important decisions.

Additionally, when considering the third party of payers, the system seems to no longer solely focus on the patients' best interest. As multi-parties are involved, the systems inevitably becomes less patient-centric, and incentives are harder to align. Decision making suffers much by having multiple parties pursuing different objectives. From a modeling perspective, removing the financial interests of physicians would simply the model and clarify the distinction between payer and patient interests.

Similarly, removing financial ties between treatment choices and physician's income might also help control costs. This idea was implemented in Health Maintenance Organizations (HMOs) where doctors had salaries (which removed direct financial incentives). Though HMOs did seem to work, they have had limited penetration in the market, largely due to concerns about decreasing quality of care when excessively aligning physician interests and payer interests.

Another suggestion was to develop educational materials to help patients make medical decisions. However, in developing these decision aids (which include systematic tools that would suggest alternative treatment options, present numeric descriptions of probable outcomes, and help patients identify values in trade-offs), the limitation is that the patient is the calculating engine, subject to all the same cognitive biases and lapses. What to do about the inconsistencies in patient responses still remain unknown.

Conclusion

Changing how we make medical decisions can be crucial in moving away from the current unsustainable healthcare system. A medical decision is considered patient-centric (and therefore cost-saving) when the diagnostic tests performed and the treatment chosen both represent and maximize a patient's expected utility. Since the introduction of objectives of other parties inevitably reduce the patient-centeredness in decision making, it is important that strategies to control costs should aim to do the least amount of harm to patient-centeredness in the system. Ideally, the healthcare system should be redesigned with as few corruptions to the patient centric model as possible.

Reference

Lenert, L. "Transforming healthcare through patient empowerment"

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Jenny Son
HST.926J

Engineering information technology for actionable information and better health, by Don E. Detmer

Abstract: Information technology in healthcare (HIT) is being promoted nationwide through the passage of the American Recovery and Reinvestment Act of 2009. The Act seeks to “achieve widespread implementation of electronic health records (EHRs) across the land and assure that these EHRs achieve sufficient levels of ‘meaningful use’ to improve care, reduce costs, and result in better outcomes.” (p. 107) The article reviews current thinking about how HIT will facilitate information flow and communication throughout the system and the potential for HIT to support a learning organization. Finally, it discusses barriers to progress.

Introduction

Quality of care depends on information being communicated to clinicians, patients and managers in a timely, complete, and accurate manner. Such communications can induce compliance in otherwise stubbornly resistant behavior. HIT requires a great deal of infrastructure that will preserve the fidelity of a patient’s narrative while translating the information in a way that enables management of well-described clinical diseases, which creates a need for standard terminology.

Standards

There is an emerging top-down approach to standards, to counter the historical trend of fragmented, bottom-up development of standards. The impending approval and use of standards by large government agencies “essentially creates *a* standard as *the* standard.” (p. 108) Issues that may arise are the failure to incorporate needed standards or unnecessary standards moving forward due to political pressure. HIT standards have yet to be developed in the areas of decision support, personalized care, population health support, semantic interoperability, clinical knowledge models for best practices, and selection challenges.

Workforce

There is critical need for a workforce that can implement these systems – informaticians that are well-versed in both information technology and clinical epidemiology and who have the ‘people’ skills to implement change in organizations. To support this workforce there needs to be an underlying architecture that manages information from three datasets: patient records, personal health records, and public health/population records. Clinicians, managers and informaticians must ask questions and

seek solutions from all three perspectives in order to create a learning healthcare system.

Infrastructure

A robust infrastructure will contain an amalgam of computer-based standards, repositories, and organizational structures to ensure proper change and maintenance over time. These include:

1. Data recording and results retrieval; tracking of progress and outcomes
2. Creation of evidence-based workflow guidelines for decision-support
3. Implementation of workflows that assure high quality processes
4. Implementation of uniform care processes where applicable
5. Reviewing and sharing of results among key stakeholders
6. Evaluation of outcomes and improvement of processes
7. Engagement of patients through secure web portals (pp. 110-111)

Electronic records must be crafted by viewing care as a continuum so that caregivers can integrate care across stages of health, e.g. *healthy, acutely ill, living with chronic illness/disability, and frail/coping with illness at the end of life.*ⁱ

Information and communication

Computer-based electronic health records need to move from information-based to communication-based. Simple exchange of information does not ensure that the information was accurately communicated in a timely, actionable, and effective way. Care is given through actions that arise from communications between the doctor and the patient, and amongst caregivers. Clinical Decision Support is “providing clinicians, patients or individuals with knowledge and person-specific or population information, intelligently filtered or present at appropriate times, to foster better health processes, better individual patient care, and better population health.”ⁱⁱ

Learning Organizations

The ultimate role of HIT is to create learning organizations in which clinicians and patients collaborate to determine circumstances in which a given care protocol is adopted by all providers as the standard for that environment. A great deal of science and evaluation must back up such an approach and continual tracking is necessary to assure that the protocol is as rigorous as possible and compatible with the care environment. Secure web portals that allow clinicians patients to communicate directly will be instrumental in this goal. At a minimum, they should include access to appointments, the problem list, medications, allergies and/or reactions, test results, demographic and insurance information, and educational materials.

Personalized Medicine

HIT will be highly instrumental in the transformation of care based on clinical phenotype (organs and systems) to molecular medicine based upon one's own unique biology. Since such an approach requires a multi-factorial analysis, robust computer-based records will be the norm in such a care setting.

Barriers to Progress

Barriers to adoption by organizations include dysfunctional attitudes and habits, costs, privacy policy and related issues, lack of standard definitions, lack of interconnectivity/interoperability standards, and lack of a well developed program and approach to actionable decision support. (p. 115) Preserving meaning and context while moving from paper-based to electronic systems, having decision support available to patients as well as physicians, and incorporating the human dimension of work processes and change with computer technology are major challenges.

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ⁱ M. Naylor, Transitional Care of Older Adults, in: *Annual Review of Nursing Research*, P. Archbold and B. Stewart eds, New York: Springer, 20 (2002), pp. 127-147.

ⁱⁱ J.A. Osheroff, J.M. Teich, B.F. Middleton, E.B. Steen, A. Wright and D.E. Detmer, A Roadmap for National Action on Clinical Decision Support. Released June 13, 2006 on contract with the Office of the National Coordinator of Health Information Technology, *JAMIA* 14 (2007), 141-155.

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