

**Information Systems for Healthcare:
Why we have not had more success**
The Top 15 Reasons

Kevin J. Leonard, Ph.D., CMA
Department of Health Administration
Faculty of Medicine, University of Toronto
McMurrich Bldg, 2nd Floor
12 Queen's Park Crescent, West
Toronto, Ontario M5S 1A8
CANADA

Tel: 416-978-8364
Fax: 416-978-7350
k.leonard@utoronto.ca

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Abstract

Over the last number of years, I have been asked on numerous occasions: “Why haven’t we had more success in implementing Information Technology (IT) in Healthcare?” Unfortunately, there is no simple answer to this question. The answer is usually heavily dependent on a number of factors that “define” the specific implementation in question. Consequently, the answer is one that is comprised of a number of interrelated factors or components. In order to facilitate this answer process, this paper attempts to identify these individual answer components. At the very least, this will help simplify the process of answering future questions by referring to these components outlined herein. At most, in addition to providing a reference compendium for others, it will assist in increasing the solution implementation success rate by exploring the problem definition in detail: The first step in solving a problem is to have it fully articulated.

Information Systems for Healthcare: Why we have not had more success

The Top 15 Reasons

Information Systems (IS) in Health Care

The Canadian healthcare system is evolving rapidly in order to deal with both financial realities and ongoing scientific progress. In order to ensure that this evolution results in a system that provides the highest quality, there is an increasing need to better understand and manage healthcare. An essential component of successful understanding and management is access to, and appropriate use of, data and information. Researchers and managers need the right information at the right time in the right format. It must be emphasized that the development of information systems requires focus on organizational objectives, design and dynamics as much as it requires focus on the procurement of the most appropriate hardware and software.¹

In some detail, health professionals, across the continuum of care, need to be able to measure the resources they are using to provide quality of care, at what cost, and to what end - and the effectiveness of that care.² Well-developed information systems are crucial as they provide timely, accurate and comprehensive information about costs, quality, utilization, workload, outcomes and satisfaction.³ The need for electronic communication and networking is paramount to ensure successful industry growth.⁴

Unfortunately, healthcare providers currently lack effective information systems. In fact, there is very little agreement on what data we have, what information is missing, what information is indeed needed and what system is needed to generate this support. Consequently, recent

initiatives to address the IS problem have failed due to a number of reasons which are quite complex. This paper discusses the Top 15 of these Reasons.

It should be stressed that the listing included herein is not meant to be exhaustive, but rather a personal perspective of the top 15 reasons. (There are many other “in-house” or “system-unique” factors that exist that, for obvious reasons, can not be included here.) While many of these individual fifteen reasons have been explored in other literature pieces and research initiatives, they have not been compiled and presented in any one collection until now. For these reasons, I have attempted to provide a reference for each topic covered allowing the reader to search for more detailed elaboration in individual areas. Once again, however, this reference list can not feasibly be comprehensive. In addition, this paper is not meant to provide an update on successful initiatives that are taking place, both nationally or globally, due, primarily, to the fact that some of the most recent successes are in their infancy and have not yet been documented in the literature or elsewhere.

Finally, the top reasons explored in this paper relate to the Information Systems and Information Technology perspective. As a result, the discussion centers on electronic health records, networking and database concerns. Further, I examine organizational issues relating to change and the management of new technology. The paper does not, however, examine the debate of whether improved information systems are needed in this industry. As such, we do not explore, for example, a comparison of efficiency gains from moving from old paper files to new electronic records. Over the last five years, the argument for improved information systems has

been presented time and again.⁵ Consequently, this fact is now assumed and the discussion focuses only on the hurdles.

The Reasons

A. Cost-related reasons

These reasons are related to the inherent value that information can provide. Most times this value is implied and thereby is not perceived, and even when it is, its value is not easily weighed against the project's costs which are normally explicit.

- 1. To date, we have not been able to develop accurate business cases (i.e., cost benefit analyses) justifying IT investment in healthcare.***

Most strategic investment decisions incorporate a business case evaluation where all of the future benefits are weighed against current and future costs. The objective, of course, is to only invest in initiatives that have more benefits than costs. During the development of these types of business cases, the accurate evaluation of benefits and of costs is of utmost importance.

Incorrectly calculating the costs or the timing of the benefits may lead to decisions that differ from optimal. Business cases for initiatives surrounding new technology or new information systems (IS) are no different. Although cost components of technology are usually straightforward, such as with the hardware, programming and the like, the benefits, on the other hand, are extremely difficult to measure.⁶ How do you put a price tag on the “ability of someone to do their job better”; or how do you calculate “people enjoying their jobs more and, consequently, being more effective”? What is needed is the ability to create standards of measures of performance such that the resulting benefits of increased efficiency and effectiveness can begin to be evaluated.⁷

2. *There have not been many success stories.*

In the healthcare industry, the main premise of improved information systems is that it will help to increase productivity and improve effectiveness and efficiency.⁸ However, to justify a large expenditure on IS, one needs to illustrate that benefits (as above) outweigh costs. To complete the circular argument, we need to create an information system to illustrate the improvements that can be gained from these information systems. The best way out of this endless loop is to point to other similar projects and successful implementations. This illustrates, aside from many of the other factors involved, the true benefits that can emanate from new technology adoption. Unfortunately, there are too few success stories to point to - therefore, we are faced with the problem of quantifying the appropriate benefits from scratch (Reason #1).

B. Data-related reasons

These reasons pertain to issues concerning data capture and structure.

3. *There has been a lack of industry-wide homogeneous data recording.*

This lack of data capture standards, combined with a lack of a standardized terminology, leads to poor, if not impossible, system networking as well as to inefficient access to and from stored information.^{9,10,11} Further, benchmarking in healthcare (for example, by comparing results on a Report Scorecard) is currently filled with difficulties because of the diverse data capture techniques and the various data coding options. For instance, a comparison of waiting times may be meaningless if two organizations begin “timing the wait” at different points in the encounter. In short, for the most part, hospitals now operate without clear, unambiguous guidelines. As long as this exists without intervention, then:

- meaningful comparisons cannot be performed;
- determination of the optimal process cannot be attained.

There are many initiatives underway in an attempt to solve this data consistency issue, however, the major problem is not in “wanting to solve it” but rather in the need to go back and effectively “re-capture” the data and/or “re-save” it. In other words, the solution to this problem requires massive restructuring of the way most institutions save their data today.

4. There is no generally accepted unique patient identifier.

A unique patient identifier allows providers to access a patient’s health record regardless of where the patient appears in the continuum of care. Once accessed, clinical information is entered in the record as care is delivered which ensures that the record is always current. The fact that providers share an information system means that a provider can review the care that the patient has received from other health providers, eliminating duplicate tests, histories, and so on. Clinical pathways that transcend providers optimizes the care and ensures that patients receive the right care at the right time - the focus is on what is happening to the patient in total and not just a single episode of care.² Without this unique system-wide identifier, a comprehensive electronic (whether centralized or not) patient record will not be possible.

To date, there has not been much success in establishing a unique identifier across institutions. Although provincial health numbers exist and are unique, the health profession has hesitated to use them for confidentiality reasons (see below).

5. *A major area of concern in the use of electronic patient record information systems is security, confidentiality and privacy, all of which need to be tested and evaluated with the development of new and acceptable systems to provide for these needs.*

The fear of the breach of confidentiality has stymied much growth in IT development in this field. Organizations are fearful of creating unique patient identifiers (which are needed to develop patient networks) due to the potential of raising the ire of privacy commissions and the distrust of the patients in general. If patients are worried that their own medical histories will not remain confidential, they will rapidly begin to reduce the information that they provide to health professionals - ultimately resulting in a lower quality of care.

Public concern for confidentiality and security of information must be heard and addressed.^{12,13} For instance, the public should be made aware of the arguments for improved care and reduced cost; both of which have to be achieved in order to preserve the current healthcare system. Most importantly, the public must acknowledge the fact that the system in place today, with accessible filing cabinets and facsimile transmission, is not secure and is very ineffective in ensuring confidentiality; as a result, the public must establish a readiness for improvement. In addition, the patients must be given a forum to address general overall health concerns such as gaps in service. We have to insure that patients are invited to join in discussions with the hospitals, doctors and the Ministry in setting policy and putting plans into action.⁸ In this way, patients are active decision makers rather than bystanders who have little or no input into the future of our healthcare system.

C. Problem definition-related reasons

These reasons relate to the question: “what do you want the IS to do?” and “how do I get it done?” Poorly defining the needs or objectives results in the following problem scenarios.

- 6. Healthcare managers and executives, for the most part, have very little understanding about their own detailed business issues and information needs at the strategic or even operational levels.***

The initial step in developing any type of computer software or information system should be a complete and accurate determination of user needs and requirements. However, a direct approach seldom produces a response that is complete and useful. "What kind of information would you like?" is rarely a good interview tactic. Managers often do not know what information would be useful nor the best way to access or present it. If they did, then they would have generated useful information within effective IS long ago. Thus, an indirect approach is often needed to be successful. This communication, however, is very difficult because most users do not know what it is they need to describe. “Successful leaders often are system thinkers ... they focus less on day-to-day events and more on underlying trends and forces of change. But they do this almost completely intuitively ... [and] they are often unable to explain their intuitions to others, [making them] feel frustrated that others cannot see the world the way they do”.¹⁴ In management theory, much as been written concerning the ability of managers to identify their information needs.^{15,16} This is especially true in healthcare where terminology can be very intimidating to patients and lay staff.^{9,17} Ask any manager what information they would like to have (that they do not have already), and they would be hard pressed to give you specifics; yet most are very clear that there exist shortcomings to the information they do get today. Most people can tell you what they need once they see it (i.e., with a prototype), but most users have not gone far enough along the development process to think about specific design issues.

7. *A communication gap exists between users and technology developers.*

While technology consultants are fluent in technology trends, they are not aware of the types of information that healthcare managers would like to have to support, or sometimes to even drive, their decision making. In addition, managers, clinicians, administrators, executives and directors are not aware of all of the possibilities that technology can offer, either historically or in the immediate and/or near future. Hence, the dialogue between the two parties is often strained. Neither side, normally, is aware of the specific constraints and opportunities that exist on the other side. The IS that are then developed are often quite different from the expectations of the users or they are not developed at all due to poorly defined specifications (see next reason directly to follow). This communication gap (or void) must be bridged. Unfortunately, this bridge is long and fraught with difficulties. Very few institutions, in any industry, have been able to successfully cross it - to develop the information system that fully supports their information needs.³

8. Often, this void in feedback and interaction (between the users and IT) is perceived as not being significant or not even recognized as a problem at all.

This is due to the different mental models that are inherent in the two disparate groups. For example, user/managers may communicate that the information generated on length of stay must be available in an on-line environment two days after the end of the month. The IT developers understand the requirement, but inherent in their expertise lies the knowledge that information this soon after the period end dictates automatically that only a certain limited degree of analysis will be provided. However, the management believes that the request will result in complicated data analysis and representation including graphs and links to other databases and reports. In short, it appears on the surface that these is mutual agreement and a perceived understanding of what will be available two days after end of month. It is only months later, when the reports are not as management had described or they are but IT billed for a much larger amount than anticipated that the communication problem can be identified. Consequently, by the time that the requested functionality actually gets implemented and the communication void gets recognized, the working relationship turns to one of a frustration ultimately causing further delays.³

Some of the more critical areas of misperception and poor communication are related to different levels of experience and expertise within:

- ❑ technological capabilities and future trends
- ❑ costs of computing
- ❑ time and costs to design an IS
- ❑ time to develop and implement systems
- ❑ level of computing and industry knowledge that IT developers need
- ❑ skills and training that are required from the user perspective
- ❑ the re-evaluation of business process and how they can be best adapted to computerization
- ❑ timing of the costs and benefits.

9. Senior management often does not communicate effectively with each other.

The CIO (IS group) is extremely knowledgeable about information systems capabilities. The COO (management and executives) is very competent in describing high-level organizational information requirements. To be effective these two groups must work together to share their knowledge in order to design an effective information system strategy for the entire organization. Unfortunately, these two individuals often do not communicate effectively with one another.¹⁶

Successful IT implementation, one would expect, should be more readily forthcoming at the senior management level. One would hope that priorities would be such that executives would have their information needs addressed. However, for both internal and external initiatives, it appears that IS issues are no better addressed here than they are at lower organizational levels.

D. Strategy-related reasons

These problems refer to the overall objectives related to solving the information needs of the organization.

10. When senior management begins setting IS strategy and developing information systems, they often equate computers with information systems on a one-to-one basis.

Computers play an integral role in the development and operation of information systems, however, the computer-related functions should be primarily supporting (to the information systems strategic objectives) in nature. The essence of the “systems analysis” should focus on the root of the problem, which is the need for **information**. Supplemental discussion, only then, should concentrate on the computer-related issues, i.e., the type of software and the specific hardware that is needed.

Information Systems departments are critical to the survival of any information-intensive organization. Obtaining the correct reports and generating the appropriate measures - on a routine and on-going schedule - is the primary role of IS, not just establishing the necessary hardware support. More and more information, of all different types, is required and requested. Moreover, not only should these reports and measures focus on the functionality of the organization but also on the improved effectiveness derived from the new or upgraded information system. Discussion must move away from “what computer should we buy?” to “what information do we need?”

11. Technology, in itself, cannot provide all of the solutions to the problems identified in the healthcare system.

Buying and implementing new technology is not the panacea that many consultants had predicted it would be in healthcare. Computers are a small, yet basic, component of the strategically supportive Information System. It is important for the healthcare system to realize that computers and technology, in and of themselves, solve very few problems.

Once the hurdle of recognizing the need for information systems has been overcome, the next step is to focus on the form that information must take to be useful. The most common form of information delivery is that of regular, routine reports. However, for the reports to be used and integrated into the routine decision making procedures, they must provide insightful information. Years of improper system design and long delays resulting in inaccessibility of the information has led to a perception that many computerized reports only accomplish to further clutter the many desks and offices within organizations. The acceptance of the role of information systems

and technology as an integral component of a decentralized model, however, delivering a seamless continuum of care, must be recognized.¹⁸

E. Networking-related reasons

This final group examines the issues relating to the need to exchange data and information between partners and stakeholders.

12. The development of separate “silos” of information systems represents a significant barrier to integrating information systems and achieving centralized databases.

To date, there has been very little integration of data across a number of sectors of the healthcare system. This is why it is extremely difficult to get accurate detailed cost information (as an example). Clinical data is usually kept separately from costing data thereby making it extremely difficult to assess “how much it costs to do a CT Scan of the head-and-neck”. There must be more integration of data before successful information can be generated and disseminated.^{10,18,19}

Must a patient health repository be centralized to be effective? Or can a *virtual* centralized database be sufficient? Certainly, an effective health information system consisting of health data from many sources must be integrated at some level. Otherwise, the disjointedness, redundancy and fragmentation that exist today would continue except that it would be electronic (and access time to *incomplete data* would be reduced). However, the only time a complete, efficient database is needed is during a treatment episode or inquiry. At that time, a virtual centralized record can be constructed, almost instantly, with immediate subsequent computerized inquiries to the multiple sites involved. With the appropriate software and algorithms, redundancies can be removed and a comprehensive record provided within seconds.

In short, there are many different formats that could lead to effective IS: There is no one optimal configuration. It should be noted that much of the decision choice would rely on the cooperation and technology available to the partners in the network. Agreeing with the philosophy of a comprehensive, electronic patient record is more critical than the actual data location.

After the successful implementation of such a database, efforts can then begin on a more comprehensive dataset - which will include financial, organizational, physician and patient focused data. If we attempt to develop all aspects of a comprehensive database at once, we will risk diffusion of effort and early mistakes, which may be impossible to overcome in later stages.¹⁰

13. There has been very little success with physician information systems despite the fact that many such systems have been developed and implemented.

Physicians have performed very well for many years without effectively implementing IS. Most of their day-to-day decision making is done in an episodic fashion - i.e., there has been little demand for computerized support. However, as access to data has become more feasible (due to faster data transmission and more comprehensive reference databases), recently there has been increasing interest among physicians to explore IS to assist them in the delivery of healthcare.

Their main area of interest has been on the data capture side where the question that needs to be addressed is: “can you develop a way to reduce my charting time (clerical work)?”

Unfortunately, just about all physician systems developed to date have made the data entry more cumbersome rather than more expedient. Since physicians do most of their analytical work (or diagnosis) in their head and since they can read information from a chart just as fast as they can

read it from a printout, there does not seem to be much benefit in using computers to assist in the data processing or the information generation. What physicians want is better data entry. This is, ironically, the one thing we have not done. In fact, we have made the data entry much more onerous, if anything (for reasons why, see Reason #1 through Reason#12 herein).

Secondly, as most physicians are paid a fee per item of service, there is no financial incentive for them to participate on quality improvement teams, or to promote data collection activities.

However, the patient medical record is the primary source of information for diagnoses and treatments, and the physician is primarily responsible for the quality of information contained in the patient record. Therefore, improved IS throughout healthcare is heavily dependent on the physician doing data entry. Hence, we must develop physician IS that actually improve the data entry function so as to ensure accurate and complete data capture. For consideration, the ease of data entry will impact the volume of information collected, and advances in such technologies as hand writing and voice recognition will facilitate data capture for physicians and other care givers.

14. There has not been a large degree of networking and data exchange success.

Without having a significant track record of success, development of future networks is very difficult (see Reason #2). As a result, there needs to be considerably more testing of connectivity options with different stakeholders and partners within a prototype integrated healthcare delivery system or health network. This may go beyond electronic records to include exchange of data, use of video conferencing and other modes of information exchange, including the internet, to enhance information exchange and education of healthcare providers in an integrated system.²⁰

All these areas pertain to a need to set up information systems with full connectivity to include the full spectrum of players in the healthcare sector. This includes community agencies, hospitals, physician practices, laboratories, agencies providing home care and other community based resources.

Ultimately, the core of future healthcare delivery focuses on the development of a framework for an *electronic patient health record*.^{1,2} If health administrators and care givers (across all providers in a community) knew *which* of their activities were having a positive impact on the quality of their patients' lives, if they knew *how* their activities were impacting that quality and by *how much*, then those administrators and care givers would be able to reallocate current resources to achieve more. Or perhaps they could maintain the current level of service with fewer resources. In addition, incorporating a collaborative attitude toward information management throughout the community could affect increased efficiencies and improve quality of care. All of these resulting possibilities stem from a first step of the creation of a comprehensive electronic patient record.

15. There is no place where the healthcare system could go to develop IS without incurring large risk associated with the cost of failure.

We need to be able to test ideas with leaders in IS and in healthcare management. These ideas should be examined in facilities that will truly allow the industry to explore options in technology. As mentioned, most managers are not aware of what the ideal information system would look like (see Reason #6). This type of education and support initiative is critical as it interacts directly with the perceptions and expectations of all the constituents regarding

communication of new ideas and the ability to affect change in the Health Care field.

There is a need for continuing acquisition of information about, and research into, the types of information and reports that would be useful to different disciplines and healthcare providers.

The range of optimal formats and the best modes of translation of research findings into day-to-day practice will be explored.

In some detail, hospitals, as an example, need information but they need to first determine *what* information. Data needs are difficult for managers to assess, and even more difficult without a clear understanding of what the objectives of the hospital should be and how it defines quality.

We must seek to address these initial questions and to ultimately develop a methodology for data collection and transformation into useful information.

Conclusions

This paper has outlined the *Top 15 Reasons* why we have not had more success in technology adoption in healthcare. This is not meant to be an exhaustive or comprehensive list.

Unfortunately, it must be acknowledged that there are other reasons, some less prevalent than those listed here, which can affect IT development and implementation.

Moreover, this paper attempted to categorize the reasons into five groups: cost, data, problem-definition, strategy and networking. This was done so as to facilitate the concept of these issues by demonstrating different components within them. Once again, it is acknowledged that these groupings are not necessarily an exhaustive representation.

In short, the objective of this paper is to raise the visibility of IS in healthcare and to illustrate how complicated the process of implementing successful IS can be. By identifying some of the reasons for failure, it is hoped that the rate of successful implementation will improve as a result.

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