Health Informatics

Series Editors: Kathryn J. Hannah · Marion J. Ball

Naakesh A. Dewan
John S. Luo
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Information Technology Essentials for Behavioral Health Clinicians

Springer

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I would like to dedicate this book to my wife, Devaki, who inspires and supports me every single day.

Naakesh A. Dewan, M.D.

I would like to dedicate this book to my wife Karen and daughter Kristen for their support, patience, and understanding while this book was being written. My love and thanks to them always and forever.

John S. Luo, M.D.

Dedicated to the people who work hard to keep our society balanced! I hope that the informatics-based concepts and systems outlined in this book support you in your efforts.

Nancy M. Lorenzi, Ph.D.

Foreword

On March 8, 2010, the Division of Clinical Informatics (formerly the Center for Clinical Computing or CCC) now led by Charles Safran, celebrated 40 years of innovation and excellence in application of the computing tool in clinical care, teaching, and research. The story began even earlier. Warner Slack and colleagues at the University of Wisconsin conducted the first direct patient–computer interview[1] and began to use computers routinely in the clinical laboratory.[2] In Boston, Howard Bleich's computer program systematically evaluated acid–base disorders (happily sparing physicians the task of solving the requisite quadratic equations)[3] and soon added guidance for correcting them,[4] creating sophisticated computer consultation for a complex clinical problem. Howard and Warner joined together to form the Center for Clinical Computing at Beth Israel Hospital in 1970. Cultural differences required Warner to change the last of five Wisconsin Progressive patient response options from "None of your damn business," to Boston Brahmin acceptable, "Skip it." "Yes, No, Don't know, and Don't understand" had been acceptable in both cultures and other amusing differences were readily overcome as productivity of the CCC sky-rocketed.

In short order CCC produced the Miniature Information Storage and Retrieval (MISAR) data base system,[5] hospital-wide email, an early word processor, Paper Chase[6] which was a direct forerunner of Pub Med. By 1977, fifteen of the papers describing CCC's work appeared in the New England Journal of Medicine, a measure of the programs' quality.

CCC not only created and proved these programs' value, they shared them! Paper Chase in various versions has been used since 1974 in the Madison Institute of Medicines' Bipolar and OCD Information Centers[7,8] now holding more than 65,000 citations to those disorders and their treatments. MISAR, much modified, was an important element in EPIC System's first Electronic Medical Record (EMR).

The Beth Israel Hospital had arguably the first effective hospital-wide EMR[9] – competition with Massachusetts General Hospital was keen and constructive. The Beth Israel's EMR was built not from the top down, but bottom up, from clinical department to department with integral involvement of those using the system. "Hotel" administrative and financial programming trailed clinical programming, and the immediate use and acceptance of the program by clinicians led to a second EMR evolution at Peter Bent Brigham Hospital where it was found that institutional differences could be as great within Boston as between Wisconsin and Boston. The successful development and continued use of these EMRs has been a proof of the concept and value of EMR in clinical care and a stimulus for their extension across clinical practice.

The future these pioneers forecast with their early programs is arriving at a rapidly increasing pace. Most of their principles remain remarkably vibrant: direct patient–computer interviews give time and structure for patients to be interviewed as clinicians would interview when we are on our best form – never tired, hurried, cross, forgetful or out of our areas of mastery; direct patient–computer self-help programs provide outbound interactive education, advice, information, and many treatments that are available when patients have time to care for themselves and without having to commute to the clinic for guidance; computers speed routine functions (laboratory, x-ray, finding records, etc.) that often slow and impede quality care; they make possible new standards of care, providing tireless systems that surpass humankind's persistence and endurance; when found faulty, computer programs have no ego distress as the faults are identified and corrected and the corrections are lasting, in contrast with predictable slippage of humans sent to do a computers work; the computers speed in consulting vast databases splints our memories, consistently checking for possible drug interactions as but one obvious example. Simply put, well-designed clinical computer programs developed at CCC permit clinicians to practice better medicine.

Consonant with work at the CCC, Information Technology Essentials for Behavioral Health Clinicians brings us up to date on the important achievements since it's a seminal predecessor volume and addresses foreseeable remaining issues in the applications of clinical computing in behavioral health.

Certain tensions remain constant across the decades: all medicine, as politics, is at some level local. Balancing the benefits of standardization possible only by using computers with the benefits of individual clinician experience and hands-on contact with patients remains a challenge. Acceptance is growing as programs prove their worth and continue to be improved. Fundamental truths are reified: a clinical computing program should not get patients or clinicians home later for dinner; many current computer programs work well enough to be implemented – discerning how to implement them is a larger immediate problem and may require nonclinical professional skills as well as deep knowledge of local clinical practices and politics.

The authors of this second edition are to be commended for their thorough and conscientious review, summarization, and forecasts for the future. I look forward to their third edition.

John Greist

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Preface

Information Technology is only beginning to innovate and transform the practice and performance of clinicians in behavioral healthcare. Minimal investments in information technology research and development are fundamentally altering the lives of millions worldwide. This promise and future of behavioral informatics is outlined in the chapters that follow.

The book is divided into parts that can serve as "modules" for the reader. Parts cover broad conceptual issues, clinical practice, patient and client-centric issues, and finally organizational efforts. The authors are physicians, psychologists, informatics executives, researchers, social workers, engineers, and sociologists. This diversity of perspectives brings richness to the book and will keep the reader interested and focused.

In the first part, the authors offer an overview of the entire landscape of behavioral informatics, which includes practical technologies and discussions regarding privacy and security. The next part focuses on the clinician; their knowledge, care, and technology developments and tools. The next part is dedicated to technologies driven by the recipient of care. Clients, patients, and consumers are the really drivers for change. The final part focuses on the organization and leaderships issues involved in transforming a behavioral health care organization into modern technology-supported systems of care.

In this book, Naakesh A. Dewan, M.D., an international leader and pioneer in quality improvement, consumer empowerment, and behavioral informatics, joins with John S. Luo, M.D., an academic innovator and teacher of technology, and Nancy Lorenzi, Ph.D., a world renowned champion of technology and the field of organizational issues in health information technology. The editors have crafted a book in collaboration with nationally recognized experts in the field in order to fill the discipline's tremendous void.

This book is essential for students and faculty in departments of psychiatry, psychology, social work, other human service disciplines, and informatics departments. It is for clinicians, administrators, IT executives, and consumers who wish to know what is possible today and what lies ahead as both technology and behavioral health care converge.

We hope this book will be considered a "must read" in the field of health informatics, and feel that it is a necessary reference book for any educational, public, or personal library.

Naakesh A. Dewan
John S. Luo
Nancy M. Lorenzi

Series Preface

This series is directed to healthcare professionals leading the transformation of healthcare by using information and knowledge. For over 20 years, Health Informatics has offered a broad range of titles: some address specific professions such as nursing, medicine, and health administration; others cover special areas of practice such as trauma and radiology; still other books in the series focus on interdisciplinary issues, such as the computer-based patient record, electronic health records, and networked healthcare systems. Editors and authors, eminent experts in their fields, offer their accounts of innovations in health informatics. Increasingly, these accounts go beyond hardware and software to address the role of information in influencing the transformation of healthcare delivery systems around the world. The series also increasingly focuses on the users of the information and systems: the organizational, behavioral, and societal changes that accompany the diffusion of information technology in health services environments.

Developments in healthcare delivery are constant; in recent years, bioinformatics has emerged as a new field in health informatics to support emerging and ongoing developments in molecular biology. At the same time, further evolution of the field of health informatics is reflected in the introduction of concepts at the macro or health systems delivery level with major national initiatives related to electronic health records (EHR), data standards, and public health informatics.

These changes will continue to shape health services in the twenty-first century. By making full and creative use of the technology to tame data and to transform information, Health Informatics will foster the development and use of new knowledge in healthcare.

Kathryn J. Hannah
Marion J. Ball

Acknowledgments

We would like to thank our authors for their superb contributions to this book. They are all leaders and pioneers who are shaping the technology landscape of today and tomorrow. We also thank our publisher Springer for their long-term support of informatics and to behavioral health in particular. Finally, we thank Cate Rogers, Grant Weston, Kathryn Hannah, and Marion Ball for their guidance and insights.

Contents

Part I Overview

Part II Clinical Practice Issues

Part III Patient and Client Centric Technologies Section

Part IV Organizational Issues

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Part I

Overview

The Promise of Health Information Technology in Behavioral Health and Informatics: An Overview

1

Naakesh A. Dewan, Nancy M. Lorenzi, and John S. Lou

Promises are like the full moon, if they are not kept at once they diminish day by day.

German Proverb

Behavioral health conditions are leading causes of disease burden around the world. Informatics innovations play a role in reducing that disease burden through accelerating neurobiological, neuroimaging, and health services, and epidemiological research efforts. Information technology itself is creating social connections and social experiences that promote well-being. Informatics efforts for clinical purposes are however adopted at a much slower rate than those that support research.

If behavioral health clinicians do not adopt technology at a quick enough rate, translating knowledge into practice will be slower than in the past, and consumers who suffer from biopsychosocial impairments will again lag behind those with medical disorders. At the same time, the behavioral health field can lead on issues such as privacy, ethics, consumer adoption of technology itself, and intelligent use of quality and utilization data. Behavioral health can also lead in areas such as change management and the science of adoption of technology. Finally, behavioral health can define the standards of evaluating the success itself of systems that support care. This book is about the emerging issues, tools, and technologies that will shape behavioral healthcare in the twenty-first century.

Privacy

The issue of privacy is deservedly unique in behavioral health. Across cultures, there continues to be a stigma related to mental health disorders. Furthermore, patients will never be

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able to share their inner most thoughts or symptoms if there is a potential for privacy violations.

Technologies

The past decade has seen dramatic changes in hardware, applications, and communications technology. The Internet, since 1990, has grown at an exponential rate and web sites have grown at an exponential rate as well. Adoption of Internet technology has outpaced the adoption of previous technologies such as the telephone, VCRs, and even DVD systems. As chip capacity grows, application and software development capacity also grows. This creates a tremendous burden on both the purchaser and user of behavioral health information systems. The growth of communication tools and the capacity of existing hardware to be able to handle a tremendous amount of data traffic including full-screen video will be changing the way distance learning and “distance therapy” is conducted. Technologies for interactive voice recognition systems will be able to detect subtle changes in voice patterns and determine the internal affectual state of the individual speaking and add both knowledge and confusion to the behavioral health landscape. Optical fiber and switch technology will make “terabyte” traffic possible.

There are, of course, tremendous risks in technology innovation. The problem with rapid advancement is that there is not enough time to study, to evaluate, and to ascertain whether a given technology is reliable and valid, and whether it is used in similar ways across patients and across treatment settings. This “variation in the use of technology and variation in the adaptation of technology” will continue to add complexity to the delivery of health care, which is a fundamental quality issue that all healthcare care systems face. While it is somewhat cumbersome and rudimentary to develop standards, the standards development in behavioral healthcare information technology is greatly needed. The medical and surgical world has gone through these standards development processes, and behavioral healthcare needs to begin this journey.

Clinical Practice

In the clinical arena, multiple issues have either been addressed or identified with the advances and implantation of health information technology. In the past two decades, the traditional psychotherapies have also included computer-based psychotherapies. Computerized therapies for depression, anxiety, and stress management, and emerging computerized initiatives in manual-based addiction treatment and schizophrenia will surely come of age in the next 5 years.

The field of behavioral health care has always emphasized, in both psychology and psychiatry, the need to codify and quantify diagnosis in severity of illness and need for treatment. A plethora of psychometric instruments exists to help clinicians evaluate and treat those consumers in distress seeking behavioral health services. These instruments are now available either in software packages or over the Internet. New measures such as the HSI developed by Bangara and colleagues will surely become the standard in Managed Care.

Clinical decision support systems, however, have not been the focus of behavioral health care until recently. Only recently have the issue of guidelines and other decision support tools come into the foreground. The behavioral health care field is significantly further behind the surgical and medical informatics field in this area. This is also important for accessing knowledge at the point of care. However, computer-assisted assessment systems are very much available. Given the rich system of psychometric measurement in the behavioral health care field, these systems will soon be the norm in practice settings.

Organizations as well as clinicians are being impacted by health information technology. Today, we are seeing more and more clinical practices beginning to explore the possibilities offered by health information technology.

Beginning in 1990, the behavioral healthcare field embraced the concept of outcomes measurement. Over 75 companies exist today throughout the United States that offer, for sale, clinical assessment and outcome measurement capability. The specific event that created such a growth in this outcomes measurement industry was the mandate by the Joint Commission Accreditation of Healthcare Organizations to require accredited healthcare organizations to have a performance measurement system in place. Over the next few years, there will certainly be consolidation in this field as mergers and acquisitions occur. Depending on industry trends and requirements, regulations may change to demand less or more in performance measurement.

During the same period in the past decade, because of the growth of managed care systems that offer and sell greater access, affordability, and accountability to payers, clinician and professional profiling has become the norm. This profiling occurs mostly on using administrative data rather than clinical data, for instance, professional profiles of average number of visits on an outpatient setting, or average number of days in a hospital for inpatient settings. Multiple challenges exist in the private sector to integrate diverse data sets and applications.

In the public sector, there has been a 30-year trend to develop, through the mental health statistics improvement program, information systems that really do support performance measurement and accountability in that sector. Unfortunately, federal standards that are developed are often refined and customized to both the state level and community mental health center level giving disparate ways of collecting, analyzing, and representing data at over 2,000 community mental health centers in the United States. The emphasis on "getting local stakeholder buy-in verses creating a national standard" is a debate not only in health care but also in all sectors of the US economy (i.e., education, tax codes, or laws about speed limits). New federal initiatives are once again being promulgated with the hopes of establishing a "uniform" decision support vehicle.

Another recent trend in the clinical area has been the development of clinical prescription systems. Both physicians and consumer advocates have raised a number of concerns. The pharmaceutical industry and the pharmacists around the country are pushing for online prescriptions. The backdrop for this is a struggle for professional "turf", where maintaining the "physician/patient relationship" and the human contact is seen as an essential part of treatment. The Internet and other information technologies – telephonic prescriptions, mail-order prescriptions – replace that human interface. The capacity of on-line prescriptions and distance prescription systems really pressures professionals into thinking "out of the box." Utilizing technologies to complement and integrate into usual practice is the real behavioral health dilemma for the field.

The transformation and the introduction of information technology, in the clinical area, have raised a number of ethical concerns. Behavioral healthcare has prided itself on treating every patient as an individual with unique needs, perspectives, and backgrounds. Yet, these quantified assessment treatment-monitoring systems tend to reduce the perceived influence of the clinician. Mandatory sharing of information with payers has continued to be a tumultuous area.

Organizing and Managing Care

The multibillion dollar behavioral health industry has gone through dramatic changes during the last several decades. Managed behavioral care systems will grow to cover over 200 million lives in the context of parity and health reform in the United States. This will include those with private as well as public insurance such as Medicaid. This trend will most likely spread to the 50 states and all territories in the United States. Over two thousand federally funded community mental health centers are considering embracing and transforming their center through the use of health information technologies.

There are over 5,000 organizations providing behavioral health services in the United States. These organizations include group practices, hospital-based delivery systems, community mental health centers, and medical hospitals providing behavioral health services through partnerships with behavioral health entities. One common theme, through this alteration of the financing and delivery of behavioral health care, has been the need to have information technologies and systems that can transform the access, coordination, and accountability of these systems of care.

The behavioral health care industry has suffered the same perception of payers as the medical and surgical industry: "a tremendous amount of dollars are spent with limited value and accountability." Throughout this book, examples and trends in the field of biomedical informatics will be reviewed and discussed. These examples will provide the reader an overview of the enabling power of information systems to really drive the transformation of the delivery of health care, and help systems achieve the goals of access, affordability, and accountability.

One area that information technology and the rapid evolution of communications, hardware, and software capacity will greatly benefit behavioral healthcare is the ability to design and implement systems of care. As was stated previously, the tremendous growth of managed care insurance companies to cover lives in this country will certainly grow. Definitive partnerships and collaborations must be established. While there may be differences in terms of risk sharing, reimbursement rates, and provider and network makeup, it will be essential to have a common communication language and common data standards to ensure that the public receives efficient and cost-effective care.

Unfortunately, planning such large-scale implementations takes more time than is available in today's behavioral healthcare market place. There will certainly be some very difficult and painful experiences noticed by a number of organizations. While the redesign of the financing and structure of behavioral healthcare moves rapidly, the use of information technology has been an opportunity to either buffer that tremendous change or to even cause more stress. It will be essential to have very detailed and crisp systems and IT planning in these new behavioral healthcare environments. Enabling technologies such as XML will certainly allow disparate systems to "talk to each other."

Acceptance, of course, of information technology in previous research has proven that failure is not necessarily due to the technology, but to the degree to which the individuals in organizations have a chance to provide input and to work with each other. This has always been a very important part of most behavioral health organizations, and it is the behavioral health field that has really impacted medical and surgical fields in the informatics area and "the organizational psychology of systems." Behavioral healthcare has always been an interdisciplinary environment and has the ability to create greater successes in information technology acceptance.

Another area where advances in technology can greatly benefit and improve the quality of health in healthcare for individuals suffering from mental illness is in the area of education and research. Standardized patient psychotherapies can greatly enhance problem solving skills and the learning of professionals. There will be a tremendous boom in the development of CNS medications in the next twenty years due to pharmaco-genetic research. The amount and quantity of information available will be exponentially greater than what has been available in at least the psychiatrist's armamentarium in the past four decades.

This explosion in the new sciences and medication development will put increased stress on the knowledge demands of all professionals. The technologies, especially the Internet technologies that make knowledge available, are credible, easy to use, and must be frequently updated.

Traditional information systems have always been used for back office functions. Information technology, historically on a national scale, has evolved from defending national security, to financial and banking systems, and finally into entertainment. Now in healthcare, the same kinds of progression are evolving where technology is used for ensuring the security and financial survivability of an organization. However, due to the growing demand of quality accountability, coordination, and access to care issues that are prevalent in the twenty-first century, systems must be able to provide real time knowledge and decision support as well as on-going strategic decision support for both clinicians and administrators.

There are a number of ways through which information technology can improve quality of care. This book reviews a number of such ways. It cannot be said that qualitative research and research that goes on outside of the actual setting of data capture from information systems will not be important. Behavioral healthcare, just like any field in healthcare, is a mixture of art and science. There are times when not all data are capturable through quantitative needs. Qualitative research will still be very important in this field, but will not receive the amount of financial support that it has traditionally received. Outcomes research integrated with structural and process research will be the dominant research that will be conducted in the twenty-first century. Historically, initial emphasis in the 1960s and 1970s was placed on structural, in the 1980s in the process, and in the 1990s, the outcomes arena. The new millennium with data-warehousing and intelligent analytics will pave the wave for patient, system, and provider-centric improvements.

Massive Health IT Expansion and Financial Incentives

For a number of years, there were people in the US Department of Health and Human Services who believed in the role of Health Information Technology. Dr. William Yasnoff was an early pioneer in advocating this role within the Department of Health and Human Services. He focused on moving beyond the CHINs (Community Health Information Network).

In 2004, President Bush signed an executive order to create the Office of the National Coordinator for Health IT (Information Technology). David Brailer was appointed as the initial National Coordinator of this Office. The Office was provided with approximately $50 million in resources and had a mandate to create the seamless integration that was perceived as needed. The second National Coordinator was Dr. Robert Kolodner. Dr. Kolodner was very successful with implementing informatics infrastructure and increasing the presence of informatics in the Veterans Administration Healthcare System.

In 2009, President Obama signified a change in the Office of the National Coordinator. Early in the Obama administration, he appointed Dr. David Blumenthal as the National Coordinator. The Office was allocated approximately $2 billion. At the same time, the Obama administration committed more than $35 billion over a number of years to create a massive infrastructure and to provide incentives for the use of Health IT. The following represents some of the early efforts in this area, and like many topics in a fast moving environment, they are constantly changed; so, this represents a "point in time" to look at this massive US effort.

On December 30, 2010, the US government took several critical steps toward a nationwide, interoperable, private, and secure electronic health information system. The Department of Health and Human Services (DHHS) released two proposed regulations affecting HIT (www.healthit.hhs.gov). The first, a proposed rule making, describes how hospitals, physicians, and other health care professionals can provide quality for billions of dollars of extra Medicare and Medicare payments through the meaningful use of electronic health records (EHRs). Second, an interim final regulation, describes the standards and certification criteria that those EHRs must meet for their users to collect the payments.

The next section continues reporting from the Launching HITECH, an article by Dr. Blumenthal.

> Third, Congress instructed the Secretary of Health and Human Services to make the requirements for meaningful use more demanding over time. The current NPRM defines only stage 1 that focuses on collecting critical data elements in electronic form, sharing key information with other providers and with patients, and reporting quality measures to the government. The proposed evolution of meaningful use in stages 2 and 3 would emphasize rewarding providers for using EHRs to improve processes of care and outcomes, respectively.
>
> Several initiatives will help providers choose and implement EHRs. The companion regulation to the NPRM on meaningful use establishes interim standards and criteria that EHRs must meet in order to be "certified." Together with a certification process that the DHHS is developing, this regulation will define minimum capabilities for EHRs and help ensure providers that they are purchasing technology that can help them attain meaningful use.

> Perhaps even more important, to overcoming providers' technical and logistic problems, the government has committed almost $650 million under the HITECH Act to the creation of a network of up to 70 Regional Health Information Technology Extension Centers. Focusing initially on primary care providers in small practices, these centers will offer advice on which EHR systems to purchase and then assist physicians and hospitals in becoming meaningful EHR users. To address the lack of infrastructure for the exchange of health information, the federal government is channeling more than $560 million in HITECH Act monies to state governments to lead the development of exchange capabilities within and across their jurisdictions.

Impact Issues

The behavioral health technology movement, as noted above, will significantly impact the knowledge base and knowledge delivery vehicles for all those involved in behavioral healthcare, from consumer to provider to payer to insurer. Given the tremendous diversity of organizations providing behavioral healthcare, knowledge will be gained through how different sectors of the behavioral healthcare economy respond to technologies. Questions regarding the differences between community mental health centers, private group practices, managed behavior companies, and hospitals will be developed. This knowledge will be essential in terms of efficient and effective implementation of technologies in these settings.

One of the biggest dilemmas in the behavioral healthcare arena, especially due to the recent policy mandates of integration with medical care, is the aspect of information privacy, specifically mental health privacy. While there may be a need for a primary care physician to understand the medical and some of the psychiatric aspects of the person being treated in behavioral healthcare, there is a resistance in practitioners to share. Unfortunately, this resistance to share contributes to the "distrust" and "lack of value" that behavioral healthcare practitioners are perceived. It will require a great deal of organizational group processes and organizational change strategies to implement these technological systems.

In summary, behavioral healthcare is unique. The communication that goes on between provider and patient forms a great part of the therapy or the cure of the illness. This is most unlike any other specialty in all of healthcare. The surgical approach by a therapist, to search, dissect, discover, and "suture" the pains of the past and present will surely be enhanced by the adoption of information technology in the new millennium.

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Current Technologies for Behavioral Healthcare Clinical Practice

2

John S. Luo

Introduction

In today's electronic era, the thought of using only paper in clinical practice is not very high on the behavioral healthcare practitioner's list of ways to be efficient and modern. However, paper has its use for taking notes during sessions as it lends itself more naturally to maintaining eye contact and has less distraction without the clicking noise of the keyboard. Computers today offer many compelling reasons to be utilized in the office setting with easier access to information, transmission of data, and storage. For many practitioners, computer use has primarily been focused on electronic communication, marketing with a web site, or creation of documents with office productivity suites. This chapter reviews some of the computer hardware and software that will enhance clinical practice in this digital age.

Hardware

Some would argue that the age-old issue of Mac vs. PC still exists. Nowadays, it is a matter of preference to determine which operating system rules the office. In the past, Mac operating system computers were considered for personal and educational use and for use in creative professions, whereas PCs were the dominant force in traditional businesses. With increasing Apple market share in all types of business, especially as the ease of use and increased availability of relevant Mac operating system (OS) software for business has developed over the years, trying to decide between Windows vs. Mac OS is a moot issue. In fact, as more applications are being developed for web delivery such as electronic medical records, even a computer based on Linux OS has its place in the behavioral healthcare office. Today, the more challenging question is to consider a desktop computer vs. laptop.

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Desktop Vs. Laptop

The advantages of desktop computers are quite obvious in terms of higher performance for less cost. Large screens provide ample real estate to view multiple windows to facilitate looking at various aspects of an electronic health record, or to be able to send e-mail replies while reading lab results. The standard computing power available today in both laptops and desktops far exceeds the needs of most behavioral health practices unless viewing magnetic resonance imaging (MRI) from a picture and archiving system (PACS) is a must.

Utilizing a computer during a patient encounter such as clicking on checklists to document can be distracting and potentially takes away from the mindfulness of being with the patient. The frequent need to shift eye contact from patient to computer screen creates a frame that documentation, not the patient, is more important. Even tablet computers, which can mimic the process of taking notes on paper, can alter the delicate patient-provider frame. In behavioral health, establishing rapport in the first encounter is critical, so that the patient feels able to confide in and trust the provider. The patient can fill out an intake form in advance of the visit, which allows the face-to-face time with the patient to validate and clarify this information. If a computer is going to be used directly in the encounter to capture information, it is important to ensure that it does not distract from establishing rapport. In contrast, using the computer during the patient encounter to demonstrate their progress, such as a chart demonstrating an improved Beck Depression rating over time or even showing their labs online does not distract from the encounter, but engages the patient and fosters that sense of connection. Once the need to illustrate a data point is over, the encounter should return to the traditional face-to-face discussion.

Placement of desktop computers next to patients at the bedside in the hospital has been established as an important factor in establishing quality of care and patient satisfaction[1]. However, in the office setting, studies have shown that communication patterns of providers using an electronic medical record (EMR) vs. paper were not significantly different; however, providers using an EMR spent more time clarifying and ensuring completeness of information, and initial visits using the EMR took longer, on average, 37%, than using paper[2]. In behavioral health, placement of the computer is important such that it supplements the encounter frame and does not create a barrier. In this scenario, laptop computers and especially tablet computers have the clear advantage over desktop computers since they are less intrusive in the office setting.

Another obvious advantage of a laptop computer is its ease of transport. If the practice has several locations, it may be the best method to assure that records are available unless an online-based electronic health record is used. One problem with laptop computers is what to do when the hard drive fails. Regular backup is essential to avoid loss of data; however, laptop computers rarely have a redundant array of inexpensive disks (RAID) setup, whereas with desktop computers, this feature is much easier to arrange. In a RAID setup, there are two hard drives where one drive is constantly mirroring the other. In the event that one of the hard drives fails, the other drive can take over, decreasing downtime as well as having a direct backup. Laptop computers therefore can best manage their backup with an Internet or local network drive-based backup system that continuously backs up critical files in the background.

Internet Security

With regards to Internet access in the office, there is continual significant debate whether wired or wireless is preferable. The advantage of standard wired Internet access is that there is a physical barrier towards access of the computer network system. However, this system is still vulnerable to hackers on the Internet who may be using various programs such as viruses and "trojan horse" to gain access to computers with potentially useful information for sale. Wireless networks such as 802.11b and 802.11n are certainly vulnerable to access attack by savvy computer hackers using software such as AirSnort, which enables them to crack the encryption key on the wireless network for access[3]. With the pressures of security mandated in HIPAA, one can imagine then that a standalone computer without any Internet access would be best for security; however, there is a significant price to be paid with regards to losing the convenience of finding information online, electronic claim transmission, accessing an online EMR system, and sending prescriptions electronically.

The best way to avoid intruder access to a wireless network is to use a media access control (MAC) address filter on the wireless access point and router[4]. In this setup, the router has a list of known computers, each with a unique MAC address, that have been authorized to access the wireless network. Whenever a wireless computer or device attempts to connect to the network, the router checks and grants access only to those devices whose MAC address has permission. In addition, a firewall on the network helps keep intruders out. Much like its traditional counterpart, which keeps flames at bay, a computer firewall keeps intruders out from access to a computer inside a network. In the past, a specific computer was given the task to run the specialized firewall software; however, today, this function is built into the router, which provides Internet access that is shared across multiple computers. The firewall is preconfigured to keep external users on the Internet from accessing computers on the internal or office network. It blocks certain 'ports' which are like roads into the network but keeps some roads open for applications such as a web browser to operate. Whenever a computer program has trouble accessing the Internet, it is likely that the firewall has to be reconfigured to permit access. Another way to limit access to a wireless network is make it hidden. This privacy is accomplished by setting the service set identifier (SSID) or network name to not be broadcast, so that any computer searching for the network will not discover it. Therefore, only users who know of its existence can discover and gain access. More significantly, use a difficult to figure out security key (known as the wired equivalent privacy or WEP, Wi-Fi protected access or WPA, or WPA2 key) for access. It is highly recommended that the default key is changed, and that the new key is not too simplistic. Although it sounds like all of the above recommendations are difficult to implement, many of these configurations are nowadays conducted via the web browser access to the settings of the router. It is far less a headache to setup security properly at the onset than to discover later that a breach has been made. Once the setup is done, it does not have to change unless new computers or devices are added.

Antivirus and antispyware/Malware programs such as Norton Anti-Virus[5], Sophos Anti-Virus[6], Spybot Search and Destroy[7], and Malware bytes Anti-Malware[8] or similar programs are important for maintaining computer health and function with the hazards encountered via the Internet. Once installed, these programs check e-mail and file download for viruses, malware, and Trojan software that can hijack your computer for information or to convert it into a “zombie” that will carry out the instructions from the hacker such as making multiple requests of a computer server to force it into a crash. In particular, malware is often a challenging program to determine that it will be a nuisance and potential threat to computer security. Typically, malware programs announce that they have scanned your office computer and determined that there are multiple problems that it can solve when in fact, the malware program is the problem. Purchasing the program often does nothing to alleviate the troubles, especially when there are actually none to be fixed. One way to determine that malware has been installed on your computer is when a software program claims it has scanned your computer and it constantly warns about problems and demands payment for fixing them. Although one security program running in the background may be sufficient, it may be helpful to have another one installed and ready to be used if the primary program is unable to disable the virus or malware software. Having multiple security programs running in the background is not advisable since the load on the computer may slow it down and therefore become less productive. The goal is to have sufficient security without becoming burdensome to the computer.

Hardware/Software Security

Although preventing intrusion from the Internet or someone who is “wardriving”[9] (driving around town with a computer to discover wireless access points that are open and therefore available for public use) is an obvious concern, direct physical access to the office computer may be more helpful. There are several methods to keep the computer safe from unapproved access. First, it is important that every person who has access to a computer has his/her own logon account. This creates a mechanism to identify who was last on the computer, and to track file access on the computer as well. In addition, each logon must have its own password as well as privilege. This means that only certain users should have administrator’s rights, which permit them to change settings, create/modify accounts, and install/delete software on the computer. All other users should have limited rights on the computer related to their job description.

A more secure logon would require the user to not only have the password for access, but also a physical object such as a key, known in the industry as two-factor authentication. Computers in the past had traditional keys built in to protect access, but this created additional bulk to the computer as well as difficulties replacing lost keys. Nowadays, a universal serial bus (USB) flash drive has replaced the key using software as a security key. Rohos Logon Key is an example of a software product that converts a USB flash drive into a USB logon token for both Windows and Mac.[10] It also works with Yubikey,[11] a unique USB-key that doesn’t work as a USB flash drive, but emulates a keyboard by transmitting keystrokes with a particular code. These hardware keys are much easier to replace, and the software provides for bypass mechanisms when the keys have been lost.

Another layer of security is encryption of the information on the computer. Both Microsoft Windows 7 Ultimate and Mac OS X Snow Leopard[13] include encryption in the OS. The majority of Windows computers available do not have the Ultimate version installed, so when preordering, purchase the upgrade ahead of time and have it installed if possible. The BitLocker feature of Windows 7 Ultimate can encrypt the entire drive, which includes both the data and the OS.[12] In addition, the BitLocker To Go, a new feature, provides encryption for USB flash drives and external hard drives. Mac OS X Snow Leopard has FileVault,[13] which allows encryption of the home folder, the main location of user documents. The advantage in enabling these encryption mechanisms is that encryption/decryption is constantly being done in the background. However, one caveat is that the encryption key file, a special file full of numbers, and the user password must be used. Losing either one will render the information in the encrypted disk or section unreadable. A master password can be set in the event that a user loses his/her password, and the key file should be backed up in a safe location somewhere else as well. The whole disk or folder encryption works well when the majority of the contents need to be encrypted; otherwise, doing so may not be an efficient use of resources in light of risk that encryption can cause loss of data with its constant writing, erasing, and rewriting. In these circumstances, encrypting just the file needed may be a better mechanism. There are numerous programs out there that can encrypt files, but AxCrypt[14] for Windows and Encrypt This[15] for Mac OS X are great because of their ease of use.

Data security via logon keys and encryption should be sufficient for a behavioral health practice, but for some users, ultimate piece of mind means doing everything possible to avoid jail time and fines due to HIPAA violations from lost data. When laptop and desktop computers are stolen, they can have the data on their drives destroyed remotely in a secured fashion, thereby providing the penultimate layer of security. Software installed on these computers continuously sends a signal to the monitoring center, usually when they are connected to the Internet. When it does not receive a return signal, it assumes that the computer is stolen until it receives the "all clear" signal. Depending on the configuration, the software then begins to broadcast via Wi-Fi or GPS its location and freezes data access. Ultimately, after a defined period of time, it will then go through a data destruction procedure. These services are often bundled with online data backup as well as asset management, which includes user identification, physical location, and software/hardware installation. Absolute Software's Computrace Complete[16] and Beachhead Solutions' Lost Data Destruction[17] are providers of these data security services, and offer a variety of solutions with different features.

Similarly, when it is time to upgrade the office computer, protected health information data must be deleted securely from the old computer. Garfinkel and Shelat, two Massachusetts Institute of Technology graduate students, analyzed 158 disk drives purchased through EBay's auction site, swap meets, salvage companies, and at computer stores.[18] They found that 117 (74%) of the drives had old data that could be recovered and read. Another 57 (36%) had been recently formatted but still had data that could be recovered. Only 12 drives (9%) had been properly cleaned or "sanitized." Some of the sensitive information retrieved from the disk drives included medical records, e-mail, love letters, corporate and personal financial reports, and pornography. The U.S. Department of Defense (DoD) National Industrial Security Program Operating Manual specification for sanitizing files requires that every single location on a magnetic media device be written to three individual times, first with a fixed value of (0x00), then its complement (0xff), and then with a random value.[19]

There are numerous programs from various vendors on the market that will wipe and sanitize hard disks according to the Department of Defense standard and other methods. LC Technology's product, FILExtinguisher for Windows, meets the DoD standard as well as the Peter Gutmann Secure Deletion method,[20] which requires writing a series of 35 patterns over a shredded region, using 27 random-order passes with specific data and eight passes with random data, an extremely thorough but time-consuming process. White Canyon Software offers various products that securely wipe PCs, Macs, USB drives, memory cards, and other media.[21] In addition to these commercial products, free software is available that use the same methods. Permanent Eraser for Mac OS X[22] uses the Gutmann Method and Darik's Boot and Nuke[23] is a self-contained boot disk that securely wipes the hard disks of Windows computers.

Backup

The hard drive is the most likely component of the computer to fail. Unfortunately, it is also the most critical component as it contains the OS and software to run the computer as well as the data. The best backup system is to have a RAID level 1 configuration for mirrored disk content in a desktop computer as described previously as very few behavioral healthcare practices can afford much downtime.[24] It is possible to setup a RAID via software, but a hardware-based implementation is better, because the drives can be 'hot swapped' and software-based setups may have trouble with the boot process. Laptop computers can have a RAID configuration as well, but this typically requires sacrificing the optical drive. MCE Technologies sells an OptiBay hard drive adapter to reconfigure MacBook Pro, MacBook, and PowerBook laptops for two hard drives.[25] For Windows OS-based laptops, the Dell Alienware M17x has the capacity for two drives for RAID 0 and RAID 1 setups.[26] This laptop is quite powerful in processing images with its options to have dual videocards and its 17″ in. LCD screen, but it is quite hefty at 11.7 lb. The HP Elitebook 8530w may be a better option with its 15.4″ in. screen at 6.3 lb.[27] With more features such as RAID, laptops become less portable and desktop-like.

An alternative to having a RAID configuration for immediate backup is to create a disk image of the existing configuration. Many laptop and desktop computers have a "clean install" DVD set stored on a separate partition on the hard drive for use when it is desired to return the computer hard drive to its "new from factory" state. However, this setup is not what is needed for the office to get backup to speed with specialized software and data. Instead, a disk image created with all of the software packages installed is a fairly quick way to get going again in the event of drive failure, and recently backed up data files can be restored quickly. The disk image is a static copy of the existing drive state once the image is created, and it is not dynamically updated. Once an image is made, it can then be transferred onto a different hard drive, which functions just like original. Images can be created either on DVDs or another hard drive. It is better to create a disk image backup on a separate hard drive kept in a safe location, so that it can replace the original drive when needed. On Mac OS X computers, creating a disk image is already included in the operating system using the program Disk Utility,[28] but SuperDuper[29] offers more features including incremental backup. For Windows computers, numerous commercial and free drive image products are available such as DriveImageXML[30] and Macrium Reflect.[31]

To keep the office running with the latest information, disk image backup must be paired with ongoing data backup. Backing up just the data files is much more efficient, since backing up the entire computer with the operating system takes time. Nowadays, backup programs will do incremental backups, but restoring data files may take some time since the software has to check various backup sets to ensure that the latest files are restored. There are numerous places to backup data, including network-based or local USB/Firewire-connected external hard drive storage, online, and DVD or Blu-Ray disc. The advantage of external hard drives is that they are relatively inexpensive, and often come bundled with backup software. For example, the MyPassport SE[32] for Mac 1 TB portable hard drive from Western Digital is $199. However, even external drives are vulnerable to failure, so a RAID 1 setup in an external drive may be desired as seen in the WD My Book Mirror Edition.[33] Both Windows 7 and Mac O S X have built-in backup features, called Backup and Restore[34] and Time Machine,[35] which work best with a second drive either installed internally on the computer or connected either via the network or USB/ Firewire. Another and more sturdy option is to backup to DVD or Blu-Ray discs. Depending on the amount of data, DVD with 4.7 GB may be sufficient, but if more space is needed, Blu-Ray offers 25 GB per disc. One of the key issues with backup systems is that they need to be automatically done in the background in order to not interfere with daily office activities. In addition, the backup files need to be available both on-site as well as off-site. This means that a copy should be in the office for immediate use and one at home or other location. The off-site backup can be the week's end set, and the local copy should be a daily one. By taking these steps, no matter what the catastrophe – hard drive failure, office theft, earthquake, or flood, the office will be ready to go with little downtime.

One backup method that is particularly handy is to backup online. This method works well because it keeps a backup off-site and also it is done continuously in the background. Most of these services require a relatively fast Internet access upload speed to be useful. Mozy[36] and Carbonite[37] are well-known online backup systems that work for both Mac OS X and Windows 7 computers. Once the initial backup is done, the services back up only new or changed portions of the files, which decreases the load on the Internet bandwidth and helps get backups done quickly. The amount of Internet bandwidth can be specified so that high-priority programs are not impeded. All data are encrypted on their server and so is the transfer connection between the data center and your computer with a 128-bit secure socket layer (SSL). Some users have concerns about ownership of information, but these companies have policies stating that they do not sell or share your information, nor do they analyze it. The advantage of these accounts is that they provide unlimited backup capacity for about $5/month. In contrast, online services such as Dropbox,[38] ZumoDrive,[39] and SugarSync[40] work a little differently. These services allow multiple computers to be synchronized to the same online account. Once the software is installed, a special folder or drive is created. Anything in that folder/drive will then be synchronized to the server, and whenever a different computer with that service installed goes online, those files will be automatically updated in the background. In this manner, each computer connected to the service online serves as a backup, in addition to the company's server. These services don't offer unlimited backup but have different-sized capacities and pricing reflecting that size. One advantage of this type of service is that they offer iPhone and Google Android applications, which allow the user to access and read their files, as well as share them by sending a link via e-mail for download. Certain folders can be designated for sharing with specific users, so that each one will have an updated version of the files in the folder. Whenever there are conflicts due to the same file being worked on simultaneously, the services will save two versions for reconciliation.

Mobile Devices

In this decade of the smartphone, it is much more than just a device to call back your patients. With e-mail, web browsing, medical information, and more, the right smartphone is as good as having a personal assistant. There are a lot of issues to consider before choosing between the Apple iPhone, various Blackberry devices, and the increasing number of Google Android OS-based phones. Various issues such as the data plan cost, ability to tether and provide Internet access to your computer, applications available, size of screen, virtual vs. thumb keyboard, security, etc. must be evaluated. In general, the Blackberry devices are the best with push e-mail, and synchronize well in real time with Microsoft Exchange servers for e-mail, todo lists, notes, and contacts. If e-mail and calendar are all that you need, the Blackberry is tough to beat. Although the Apple iPhone can synchronize with Microsoft Exchange servers, it is only compatible with the latest version and as a phone it does not have the best cellular signal strength on the AT&T network, often dropping calls. The Google Android does not have as many applications compared to the number that have been developed for the iPhone, but this sector is quickly growing. One problem has been that numerous phones created by different manufacturers run different versions of the Google Android OS, which creates compatibility issues for software applications and accessories.

One benefit of a smartphone vs. standard mobile phones is the ability to access the Internet with its web browser and specialized applications. Although some web sites are not well viewed on the screen either due to size or compatibility with specialized code such as Javascript or Adobe Flash, the majority of information is still viewable. Some online-based EMR systems such as LifeRecord[41] and eClinicalworks[42] permit mobile devices to view and edit elements of the EMR as well as issue prescriptions and view images. The free electronic prescription system from the National ERx initiative[43] is compatible with the browsers on the Apple iPhone, Palm Pre, and Google Android phones, but not with the Blackberry browser. Dictation for transcription can be accomplished via a phone call to the transcription center; however, Nuance now offers its real time speech recognition and dictation capabilities for the Apple iPhone and Google Android.[44] Once the dictation has been transcribed via the web-based service, it can then be pasted into the clipboard for pasting into the online EMR.

Numerous medical applications have been developed for the Apple iPhone and Google Android phones. These include medical references such as Taber's Medical Dictionary,[45] various medical calculators, drug reference guides such as Epocrates,[46] charge capture, encounter coding tools, DICOM radiology image viewers, continuing medical education, practice management, and even handheld EMRs. What is great about these programs is that they provide information at the point of care. For example, using Epocrates Drug Interaction Checker is extremely helpful in determining whether an antidepressant medication will have an interaction with medications prescribed by other physicians. When providers explain why they are using their mobile device to patients, patients then rate their interactions with their physicians more positively.[47] As long as the use of the smartphone doesn't interfere with the patient encounter in terms of eye contact and attention, the "just-in-time" perception of patients contributes to the overall satisfaction with the provider.

Software

There are a variety of important software programs and web sites for the behavioral healthcare clinical practice. Nowadays, an online "shingle" is important for many reasons: prospective patients would want to view your background information, office location, and attempt to gain insight into your practice style to determine if there will be a good fit. Many of them would have done an Internet search on your name to see what information is available. It therefore makes sense to create a practice website as the home source of information. Many providers find that website design is not their forte, but many templates exist that are readily modified with content describing your practice. If that is too daunting, there are many web masters and web designers who are willing to do the work at a variety of price levels. For example, 123triad.com[48] creates websites starting at $480. It also helps to augment the demographic information on the website with forms for new clients as well as policies.

Website Components

To market your services, it helps to be listed on a variety of provider listing sites. Psychology Today[49] is one site that helps providers get new patients. It takes the provider profile and helps index the provider in the major search engines, and also uses its network of partner sites such as WebMD,[50] MSN Health,[51] and Mental Health America[52] to help patients find you. PsychSites[53] and TherapistSites[54] are also great places to be listed and even create a basic website. Physicians can check the American Medical Association's Doctor Finder[55] and update the information there. This site is an important one as many physician referral and rating sites have started off with information from this database. Vitals.com[56] is primarily a physician-rating site, but it also gives physicians the opportunity to enter information such as training, board certification, specialty focus, and awards. The longer a web site exists and with more links to it, the majority of search engines will increase its ranking.

If the practice uses an online EMR, such as Practice Fusion[57] and Valant Electronic Medical Record,[58] it has appointment-scheduling built-in, usually entered by administrative staff or providers. However, a true time saver would be to allow patients to independently reschedule or schedule their appointments directly online without staff intervention. Patients would prefer this online method since they would waste less time trying to speak with the provider or staff. Companies such as SCI Solutions' Schedule Maximizer,[59] Appointment Quest,[60] NetAppointment,[61] and Appointment-Plus[62] offer these services. Patients will only be able to see available times and do not see appointment times occupied by other patients. By logging in anytime, patients can setup how they want their appointment reminders, such as e-mail or phone. Payments, co-payments, and additional information can be captured online during the appointment scheduling. For backup, many of these systems can export the schedule into a Microsoft Outlook calendar or a simple spreadsheet. Appointment analysis can be run to determine which patients cancel or change their appointments the most.

Another feature to consider on the web site is for patients to take screening tests such as the Quick Inventory of Depressive Symptomatology-Self Report.[63] This screening test has already been converted into an online form that patients can fill out prior to the office visit. Once the score has been calculated, the questionnaire can be printed out to be brought into the meeting. This site offers many screening tests for adult attention deficit and hyperactivity, schizophrenia, mania, and alcoholism, which can be linked to the practice site without creating additional cost in purchasing them.

Communication

Today's patient is often technologically savvy enough to use e-mail and web browsing, and many have begun to rely upon e-mail as a common means of communication. The Pew Internet and American Life Project did a national survey in December 2009, which demonstrated that 74% of American adults (ages 18 and older) use the Internet.

Communicating via e-mail is not just for the young; even patients who have retired have begun to use e-mail.[64] Slack noted that even his elderly patients see e-mail as a benefit because it enabled him to write a question directly to his physician, instead of calling by telephone and potentially being delayed by leaving messages. The patient only wrote once every 2 weeks, but found that being able to read the e-mails were helpful to remember issues brought up. The patient's physician believed that the e-mails replaced conversations that would have happened on the phone anyway without an excessive commitment of time.

The nature of communicating via e-mail is very much different than both a direct encounter and even a phone call. Many contextual cues such as tone, facial expression, and body language are missing, and e-mail is not necessarily the best method of communication, especially in emergencies or with sensitive matters. Guidelines by Kane and Sands[65] in 1998 for the clinical use of e-mail with patients outline principles developed by the American Medical Informatics Association Task Force on Guidelines for the Use of Clinic-Patient Electronic Mail. The American Medical Association has also created guidelines for Electronic Communication as well.[66] Communication guidelines include establishing what types of transactions, such as appointment scheduling and medication refills and what types of subject matter sensitivity are permitted; expected turnaround time; informing patients about privacy issues such as who has access to these messages and that these e-mails are part of the medical record; and placing such communication in the paper chart.

Medico-legal and administrative guidelines include obtaining informed consent for e-mail, using password-protected accounts, providing instructions about when and how to switch to phone calls, reviewing if the security mechanisms are in place, separating professional e-mail from personal e-mail, using encryption or documenting patient's waiver of such, and not forwarding patient identifiable information to third parties without the patient's permission. E-mail may be quick and easy, but security is difficult to establish.

Security via encryption in standard e-mail client software remains user unfriendly and impractical, but there are alternative solutions to ensure that electronic communication between patients and providers is secure enough to maintain privacy. LuxSci[67] and 4SecureMail[68] are companies that provide Health Insurance Portability and Accountability Act (HIPAA) compliant e-mail solutions. One method is using a secured "escrow" account where both patients and providers go online via an SSL connection to the company's e-mail server to read/write all messages there. Alternatively, both companies also offer secured SMTP (simple mail transfer protocol) relaying services so that providers can use an e-mail client such as Microsoft Outlook or Eudora to send encrypted e-mail with transport layer security. RelayHealth also provides a secure communication portal where patients can leave specific messages for providers, but also frames the query into request/cancel appointment, request a lab/test result, request medication refills, send a note to the doctor/office staff, or request a referral.[69] The company also offers web visits, where patients can enter specific queries or consultations on nonurgent topics. Providers respond to these queries using a template-based reply system to save time. RelayHealth typically provides services for large organizations. For offices with a single provider and on a limited budget, TeleHealth Connect provides a free secure communication system for providers with their patients using the basic account.[70] TeleHealth Connect accomplishes this security by partnering with Microsoft's HealthVault, a personal health record system, so that all secure messages and attachments are stored in HealthVault. Patients always use the TeleHealth Connect system at no cost and providers do not pay for the basic version.

Electronic Medical Records

One way to avoid all of these issues is to utilize an EMR product that encompasses the needs for patient scheduling, billing, electronic communication, and record keeping. Unfortunately, in the sea of vendors, there is an overabundance of systems out there, both for large healthcare organizations and for solo practice providers. It is almost anxiety provoking to think about choosing an EMR product to use; however, a few guiding principles should make the process less daunting.

A useful place to start is to determine whether the EMR product has been certified by the Certification Commission for Health Information Technology (CCHIT).[71] The commission was founded in 2004 to establish a comprehensive and practical definition of what capabilities were needed in EMR systems. This volunteer organization consists of 21 commissioners who represent health care providers, academia, private sector, governmental agencies, and nonprofit organizations and also come from provider, payer, vendor, clinical researchers, informatics experts, and governmental agency stakeholder groups.

While this certification does not guarantee that the product will serve every need, it certifies that the EMR system will enable providers to meet certain meaningful use objectives. Systems are rated using test scripts that describe scenarios such as login as a particular provider, and receive lab results for a patient, designated as normal and abnormal. Products at the minimum must meet federal standards requirements – such as those specified in the Health Insurance Portability and Accountability Act. The paths toward certification may be at the site, which helps providers/hospitals qualify for American Recovery and Reinvestment Act incentives; modular, which allows providers and hospitals to combine technologies from multiple certified sources; and comprehensive, which meets all use objectives and significantly exceed minimum Federal criteria and standards. At this path, the product must be successful at multiple sites with excellent usability. Products at the Certified Comprehensive level should provide maximal assurance of EMR capabilities and compliance to hospitals and providers. A list of certified products for 2011 is found on the CCHIT site.[72]

Another key guiding principle to consider is whether the EMR vendor has been in business for an extended period of time. Providers who were frustrated with existing products have created an EMR system for themselves, and then decided to see if their efforts could turn a profit. This landscape unfortunately is littered with many systems that have come and gone. Therefore, an important factor in longevity and success are the years in business as well as number of current and satisfied customers. One key feature of CCHIT certification is an interoperability standard, which means that practice data can be migrated from one vendor to another as needed.

After evaluating CCHIT certification and long-term survival of the company and product, the next guiding principle is to consider how your practice works. This careful evaluation will dictate the priorities of certain features, such as Web-based vs. office installation, need for mobile device access, e-prescribing, and psychotherapy note exemption. For example, if the practice is located at multiple sites, then a Web-based EHR system makes the most sense. Therapists who only do psychotherapy may find a product such as Notes444 helpful since e-prescribing is not needed.[73] Practice management for psychotherapists may benefit from Therapist Helper, which handles electronic claims and scheduling.[74] Psychiatrists may find that general EMRs don't fit, so mental health specific modules in EMRs are important as found in Practice Fusion or a system designed just for psychiatrists such as Valant EMR.

Once you have screened a few of the systems using the guiding parameters described above, the choice should be determined by the results of a "test drive." It is helpful to read reviews of EMRs if you can find them, but more importantly, the question is about your experience. Workflow, terminology, and process are often setup by the programmer, so the intuitive nature of how the system is used is important. In general, if the system doesn't work well "out of the box" and requires extensive training, it is not a system to consider for you.

If an EMR system is not necessary and free form note writing using office productivity suites is sufficient, e-prescribing is available at no cost to US-based physicians with a computer and Internet access. The National ePrescribing Patient Safety Initiative (NEPSI) is a web-based electronic prescription service provided by NEPSI and Allscripts. The goal of NEPSI is to reduce medication error by providing legible electronically generated prescriptions along with secure electronic transmission over the Internet to pharmacies via the Surescripts network. After the registration and setup process, entering patient information is simple. Prescriptions are generated after selecting the patient and entering the medication name. Drop down check boxes are selected for standard directions on how to take the medication or the physician can edit custom directions. Prescriptions can then be printed or sent electronically to participating pharmacies.

In addition to generating prescriptions, the Allscripts ERx service is able to check for drug–drug interactions, prior adverse reactions, duplicate therapy, and dosage problems. Drug utilization review can also be set for a maximum and minimum duration and dosage. Reports that can be generated include patient prescription history, pharmacy utilization, and patient account access. The electronic prescription system also provides options, such as linking to many available online EMR systems for easy data transfer. Some states, such as California, require tamper-proof paper for certain prescriptions. NEPSI has arranged for Micro Format to provide the specific paper required for each state.

Conclusion

It is quite daunting to consider and implement many of the hardware and software tools described in this chapter. However, the digital age is here and now paper plays only a limited role. Ease of use has not traditionally been associated with computer technologies, but the Apple iPhone and now the iPad along with various web-based applications have even changed that landscape. With the younger generation of digital natives setting the tone, computers in healthcare is the standard that will evolve over the years to come. It may be frustrating for the behavioral health clinician that many of these technologies change and even become out of date. To keep up with this ever-changing landscape, it helps to maintain the attitude that technology changes or upgrades make sense only to learn or purchase when the new features or capabilities save time or simplify the workflow process. Without question, today's behavioral clinical practice has "gone digital," leaving the analog to the patient–physician interaction in the office for now.

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Privacy of Technology and the Behavioral Health Professions

3

Robert M. Plovnick

Introduction

Behavioral healthcare involves the collection, utilization, and disclosure of sensitive information pertaining to mental illness and substance use disorders. Though the public perception of mental illness has shifted in recent years, patients remain more hesitant to seek treatment for mental health issues than for physical illness due to stigma and fear of discrimination[1] and the potential for emotional, professional, social, or financial harm. The presence of sensitive information and the need to protect it is not limited to behavioral health. Concerns have been raised about reproductive health, sexually transmitted and other communicable diseases, pediatrics and adolescent privacy,[2] and genomics.[3] Ultimately, it is the patient's unique perceptions and circumstances which will dictate which health information is potentially sensitive. The clinician's obligation to handle sensitive information with care, whether recorded on paper or in electronic form, has been understood since the time of Hippocrates. A significant consequence of traditional paper-based record keeping is that sensitive information remains undisclosed not just due to intentional protection, but because fragmented, disjointed communication makes sharing difficult. While paper records were designed to capture information mainly for use within a single setting, electronic records are envisioned to be outward facing and facilitate communication among all of the widespread clinicians treating a particular patient. One of the key advantages of information technology is its ability to facilitate information accessibility and dissemination at the point of care, but this also puts privacy at increased risk. In order to preserve the therapeutic rapport that is critical to the delivery of mental healthcare, as well as maintain the public's trust in health information technology, it will be critical to balance the advantages of improved data exchange with earnest efforts to protect information from inappropriate disclosure. The clinician can assist in realizing this balance by maintaining a familiarity with the capabilities and limitations of health information technology to safeguard patient privacy.

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Privacy, Confidentiality, and Security

The terms "privacy," "confidentiality," and "security" are often used interchangeably, but they represent distinct though related concepts.[4] *Privacy* refers to the individual patient's wishes. It incorporates the patient's right to control access, use, and disclosure of their personal information. An example is a patient's wish that information about their treatment for major depressive disorder not be disclosed to their employer. *Confidentiality* refers to the obligations of the stewards of health information to respect the privacy interests of those to whom the data relate. This term incorporates the actions taken to protect information from disclosures that are not compatible with the patient's privacy wishes. An example would be a psychiatrist declining to respond to a family member's inquiry about a patient's care, based on the patient's preferences. *Security* refers to the physical, technical, administrative, or policy mechanisms used to protect health information from inappropriate disclosure. Examples of security safeguards include password protection and encryption of health information that is stored on a laptop computer.

Categories of Health Information Compromise

Whenever information is documented, there is a risk that it will be disseminated beyond its intended audience. Paper-based medical records are subject to loss, theft, or alteration. Electronically rendered records are susceptible to many of the same risks as paper-based charts, but often at a greater magnitude. Some of the characteristics which make information technology appealing for application to healthcare, such as the persistence, searchability, accessibility, and portability of information, are accompanied by increased risk of compromise. Electronic privacy breaches have increased in frequency as compared to paper-based breaches, and involved a larger number of records.[5] This is not surprising, as the equivalent of an entire storage room of paper charts could fit on a single compact disc or laptop computer. While theft or inappropriate access of paper-based records requires physical proximity to the unique copy of the record, electronically-based records exposed to the Internet are potentially accessible anywhere in the world. Whereas reproducing paper-based charts is a potentially laborious and expensive process, copying electronic files is instantaneous and inexpensive. Breaches of healthcare-related information occur with some frequency and often receive mainstream media attention. While infiltration by hackers or thieves receives much attention, inappropriate access by internal system users with legitimate access is also common. Major types of information breach are described below.

Access by an External Party

The breach of healthcare information by a nonauthorized party that does not have legitimate access, such as a hacker or thief, is one common form of health information compromise. Examples of this type of compromise include the 2006 theft of a laptop containing the identifying information of over 28 million individuals receiving care through the US Department of Veterans Affairs[6, 7]; the 2007 loss of a compact disc containing information on almost 3 million Georgia Medicaid patients when it was shipped to the wrong address[8]; and the 2009 hacking of a Virginia state database with 35 million prescriptions and social security numbers of patients and clinicians, with hackers demanding $10 million for the release of the information.[6] Breaches of this type typically result from inadequate security precautions, such as insufficient network protection or omitting the use of encryption. A poorly secured network can render patient identifiable information accessible to anyone with an Internet connection. Further, portable storage devices such as laptop computers, external hard drives, compact discs, USB thumb drives, and handheld devices are all frequently used to transport health information, and are susceptible to physical theft. Measures to protect the information they contain, such as password protection or encryption, are frequently eschewed. Oftentimes, when these devices are stolen, the sensitive nature of the contents is unknown to the thief. Health information in electronic record systems or email accounts accessed using unsecured public computers, such as those in hotels or coffee shops, can also be at risk if malicious software that capture keystrokes or screen views is installed,[9] and information accessed over an unsecured wireless network is also susceptible to interception. Records have also been inadvertently posted on unsecured sections of university and hospital websites, making them available to anyone with an Internet connection.[10] Medically focused weblogs, or blogs, are increasingly popular. Clinicians often post sufficient information on medical blogs to identify themselves, use these forums to post positive and negative comments about specific patients, and in some cases, include sufficient information to identify specific patients,[11] which is then available to the Internet-viewing public.

Access by an Internal Party Without Legitimate Cause

The wide range of stakeholders who may be authorized to access electronic patient record systems subjects sensitive information to the risk of access by authorized electronic system users who do not have a legitimate reason to do so. Members of hospital staff motivated either by curiosity or potential financial gain have been detected accessing records of high profile individuals such as Britney Spears[12] and George Clooney.[13] While these individuals are often caught and disciplined due to increased attention to VIP patients, it is not difficult to imagine that access to records of less well-known individuals by curiosity seekers also occurs undetected and unpunished.

Access by an Internal Party with Legitimate Cause

Even individuals who are involved in the care of a patient may be exposed to sensitive information unnecessarily. Healthcare delivery in the United States is a complex and multifaceted process for treatment, payment, or healthcare operations.[14] Members of the treatment team may include physicians, psychologists, nurses, students, pharmacists, therapists, social workers, or technicians. Support staff such as administrators and schedulers will also require access to information. Payment and business operations may include access by payers, health insurance companies, information technology staff, software vendors, and others. Patients and families are also increasingly able to access aspects of their own medical record. While all of these individuals will have legitimate access to aspects of the longitudinal record, it is unlikely that any individual would have a cause to view everything. However, just as it is difficult to parse access to different sections of paper-based records, so too is it challenging to limit access to certain aspects of the electronic record. The varied individuals who legitimately view a patient's electronic record may be inadvertently exposed to sensitive information that they did not even require. Those with legitimate access to sensitive information reviewing patient data on laptops or handheld devices in public areas could make information available to anyone within sight of the screen. As information is passed around to various stakeholders and is further removed from the point of origin, there is a greater potential of accidental or intentional release of information to nonauthorized parties.

The use of deidentified health information for clinical research is another example of legitimate access that may put information at risk. The breadth and depth of data made available by electronic records open exciting possibilities for research and discovery. Unfortunately, methods used to remove identifying information such as name and numeric identifiers from health information are not foolproof. Several studies have shown that birth date or year, ZIP code or region, and gender combined with publicly available databases such as voter registries can be used to reidentify patient identities and addresses from deidentified data,[5, 15–18] including in one instance, the governor of Massachusetts.[19]

Categories of "Sensitive" Health Information

The effective delivery of healthcare requires patients to reveal personal and potentially embarrassing information. This information is then documented in the medical record to inform current and future treatment decisions. During the course of treatment, potentially stigmatizing findings and diagnoses are discovered and recorded. The presence of potentially "sensitive" information in clinical documentation applies to all areas of medicine, including physical and mental health. Health information technology may introduce a layer of structure to records that renders all types of information, including information that a patient deems sensitive, easier to locate, and disseminate. As was discussed above, many stakeholders have access to electronically rendered information, and not all will have legitimate access to all aspects of the record. It is not possible to identify a definitive list of "sensitive" physical or mental health information, as this will vary widely depending on the individual patient's preferences and circumstances, but reviewing the sections typically present in an electronic record shows that many areas may contain information the patient considers sensitive.

Many elements of the electronic health record may explicitly or implicitly indicate the presence of stigmatizing diagnoses. Electronic health records typically contain structured *problem/diagnosis lists* and *medication lists*. These problem lists may include potentially stigmatizing conditions, and medications such as antidepressants, antipsychotics, and antiretroviral medications which imply specific diagnoses. Records of electronic prescriptions could also be used to extrapolate diagnosis. Similarly, *orders for procedures or laboratory or psychological testing* and *test results* are also typically well demarcated in electronic health records. For example, an order for electroconvulsive therapy or lithium blood level results could be used to deduce the presence of specific diagnoses. As the field of genomics expands, *genetic information* stored in electronic health records may also be used to deduce the presence of or susceptibility to specific diagnoses. *Past medical history* may also contain information about previous treatment that could be used to infer the presence of specific diagnoses or types of diagnoses. Previous hospitalization in a freestanding psychiatric hospital, for example, would imply the presence of current or previous mental illness.

Aspects of the electronic record may contain potentially sensitive information beyond the connotation of a specific diagnosis. *Family history* may communicate not only personal susceptibility to illness, but may also compromise the privacy of family members. *Copies of communications* with the patient, family, or other clinicians are often included in electronic records, and may contain direct or implied reference to personal details. These communications may take the form of emails, scanned letters, or summaries of telephone calls. With the increased use of telemedicine in mental health and other areas of medicine, electronic records may also contain *recordings or transcripts* of entire clinical encounters.

There are many types of notes included in a typical electronic record that may include sensitive information. While not as structured as the items discussed above, electronic representation often makes it easier to search for and manipulate narrative, free text documentation. *Summaries of specific encounters* may contain sensitive information, and *summaries of group or family therapy sessions* may pertain to multiple individuals. *Psychotherapy notes* have specific legal protections as defined in the Health Insurance Portability and Accountability Act (HIPAA) of 1996. The 2003 Privacy Rule under HIPAA codified the special protections for psychotherapy notes recognized in the 1996 *Jaffee v. Redmond* Supreme Court case, which affirmed that the trust required for the special relationship between therapist and patient would be compromised with the threat of disclosure of these notes.[20] Under this rule, in most instances, psychotherapy notes can be disclosed only with the patient's permission, as long as the notes are maintained separately from the medical record. While this is relatively straightforward to implement in the physical paper-based environment which predominated when this law was enacted, the line that differentiates various aspects of clinical documentation is not as clear in electronic documentation. *Documentation of substance use disorder treatment* faces similar legal protection and similar technical ambiguity.

Protecting Privacy in the Health Information Technology Environment

Isolation

There are a range of approaches that can be taken to protect the privacy of electronic health information. One of the most straightforward is for clinics or hospitals which tend to deal with sensitive information to remain isolated from electronic exchange. Inpatient psychiatric units sometimes maintain separate electronic systems from the rest of the hospital, or may not utilize electronic systems at all. Similarly, outpatient mental health settings may implement electronic systems that do not exchange information externally. Currently, there are no uniform technical standards or networks for exchanging most types of electronic health information in the United States; so, remaining isolated from electronic exchange is a realistic option. However, with growing momentum toward national exchange of health information, it may become increasingly difficult to utilize health information technology without participating in some form of information exchange. The remaining option would be to decline to implement an electronic record keeping system altogether, thus abstaining from all of the benefits and risks of information technology.

Policy

Privacy policy, or the rules and procedures that dictate how information is disclosed in a particular setting, is another approach to safeguarding privacy. Policy is informed by setting specific values and requirements, as well as federal, state, and local laws. One such law is HIPAA, which along with subsequent Privacy and Security Rules regulates when protected health information can be disclosed, including explicit protection for psychotherapy notes. Not all entities that handle electronic health information are covered by HIPAA, which permits information exchange for treatment, payment, and healthcare operations.[14] It is likely that nationwide health information exchange will allow the flow of information between entities that are covered and those that are exempt from HIPAA. It is often difficult to track breaches of HIPAA, and enforcement of the law and the imposition of penalties are uncommon. The American Recovery and Reinvestment Act of 2009 extended many of the privacy protections in HIPAA, including new requirements for notifying patients when security breaches occur; granting states expanded enforcement authority; expanding requirements for personal health record vendors and other entities; expanding the "minimum necessary" standard for disclosing information; giving patients the ability to opt out of electronic sharing of health information with their insurance company if they paid for services out-of-pocket; and calling for additional research in approaches to protecting sensitive information.[21] Many of these additional provisions will be not be effective until clarified by regulations and then implemented technologically in the coming years. Another federal standard is the US Department of Health and Human Services Regulation 42 CFR Part 2, which mandates that programs receiving federal financial assistance may not use or disclose information about an individual receiving treatment for alcohol or drug abuse without patient's express permission.[4, 22]

While HIPAA serves as the federally mandated minimum protection for health information, many states have additional more stringent requirements which are layered on top of it.[23] These laws cover specific categories of sensitive health information in addition to psychotherapy notes, though protections vary widely by state.[24] These additional protections may pertain to drug and alcohol abuse; genetic tests; HIV/AIDS; communicable and sexually transmitted diseases; mental health; abuse; neglect; domestic violence; and sexual assault. State rules governing the access to the records of minors by parents,[25] how patients can control disclosure of certain types of sensitive medical information,[24] and how patients can access their own records[25] vary widely. Many of these laws were designed to address information stored in the paper-based model of medical record-keeping, where protected information may be contained within a single record over which one maintains physical control, and do not translate easily into the electronic approach where the information is less tangible. The lack of consistency and clarity makes it difficult to exchange information in whatever form, either paper or electronic, within and between states. Lack of clarity also makes it challenging to design and implement software and communication standards that can comply with these varied requirements.

Requiring special protection for specific categories of information will be very difficult to manage if the underlying technology cannot support it. The regulation of personal health information under federal and state law is fragmented, complex, and incomplete, leading to a great diversity of privacy policies that vary depending on local rules and practices. National level efforts have been undertaken to overcome local differences in policy to encourage information exchange.[24–27] However, the predominant mechanism by which policy protects sensitive information may be by producing reticence to release information due to confusion, misinterpretation, or fear of breaking the rules. When this results in preventing a legitimate and potentially beneficial exchange of information, this is a disservice to the patient. While policy alone is likely insufficient to prevent confidentiality breaches, it is an important means of clearly communicating the approach of a particular setting with regard to privacy protection, and serves as a guide for the development of effective technical protective measures.

Audit Trail

Another means of protecting privacy is to maintain and frequently review an audit trail of access to health information. This is a means of protection that is mostly unavailable in paper-based record keeping, where a casual flip through a chart can go unnoticed and undocumented. The intent is to monitor instances where an authorized system user does not comply with established policy and views information without a legitimate reason. This is most applicable in settings where there are a large number of authorized users, such as hospitals. This approach has been effectively employed to discover curiosity seekers who accessed the records of celebrities and other high-profile individuals. However, given the sheer quantity of legitimate accesses to health information, audit logs tend to be quite large and require a great deal of memory storage. There is no standard format for capturing audit logs,[28] and no standardized approach to review them for incidents of inappropriate access.[29] Depending on how it is structured, the audit log itself may contain sensitive information that must be protected. While it may be a manageable endeavor to review the access logs of access to the information of VIPs, it is an exponentially larger effort to review audit trails of all records for inappropriate access by curious neighbors, family, or colleagues. Another challenge with this approach is that it is reactive; the breach is discovered only after the fact and when potential harm has already occurred. An additional issue is that patients may be granted access to an audit log and become confused or alarmed by the large number of individuals, many of whom they never saw in person such as lab technicians, who may have legitimately accessed their health information.

Role-Based Access

One of the most common mechanisms for protecting health information is to limit access to certain sections based on the role of the person accessing the information, e.g. attending physician, dietician, or social worker.[29, 30] Clinicians may have access to clinical notes, for example, whereas administrative staff may be limited to demographic and financial information. A variation of role-based access is identity-based access, in which access rights are granted to specific individuals rather than entire classes of individuals.[31] One of the challenges with the role-based approach is that roles can shift, overlap, and vary over time and in different circumstances.[28] The appropriate level of access to what a given role "needs to know" may be difficult to operationalize. Another challenging situation is when information is accessible beyond the point of origin, that is, in a national health information exchange. Since there is no universal mechanism to identify roles beyond a single setting, role-based access may be challenging to apply in these circumstances.[28]

Granular Access Control

If the United States realizes the vision for nationwide health information exchange, a variety of clinicians including physicians, dentists, pharmacists, and optometrists could have access to comprehensive, longitudinal records of patients. While many stakeholders will have legitimate reasons to access this information that will lead to direct benefits to the patient, it is unlikely that many will require complete access to the entire record. A still mostly conceptual approach to respecting patient privacy wishes in this environment is granular access control, where access restrictions are defined at the level of the specific data element. Most often, this approach assumes that the patient determines how information will be accessible, although known sensitive data elements like HIV status or mental health diagnosis could be protected automatically. Allowing individuals to limit access or transfer of their own sensitive information is included in the national health information technology plans of several countries,[32, 33] and the National Committee on Vital and Health Statistics (NCVHS), a federal advisory body, identified individual control over sensitive information as the most important privacy issue tied to national information exchange.[4] HIPAA allows patients to request restrictions of disclosures of medical information, but does not require the clinician to comply. The American Recovery and Reinvestment Act of 2009, which includes a financial incentive program for clinicians who are "meaningfully" using electronic health records, requires that electronic health records incorporate "technologies that protect the privacy of health information and promote security… including for the segmentation and protection from disclosure of specific and sensitive individually identifiable health information with the goal of minimizing the reluctance of patients to seek care (or disclose information about a condition) because of privacy concerns."[21] These requirements will be implemented through regulations over a period of several years.

Two different approaches for capturing patient preferences for access to their information are "opt-in" and "opt-out".[28] With the "opt-in" approach, patients would be required to explicitly grant permission before their information is shared. In the "opt-out" approach, consent to share information is implied unless the patient specifies otherwise. Both approaches have strengths and weaknesses. The "opt-in" model could make it insupportably burdensome to exchange information if permission is required for every transaction, whereas depending on how the “opt-out” method is implemented, it may be difficult or cumbersome for the patient to express their wishes. There is no consensus as to how patients would like to control access over their information, or of specific elements over which patients must have control, but preferences are likely to vary widely and technology would need to be flexible to capture diverse wishes.[34] Capturing patient consent for access to sensitive data elements would be technically challenging, but proposed approaches have included expressing preferences in a “patient portal” access to the electronic record; in Internet-based personal health records which may communicate with other systems where health information is stored; at the regional data exchange level, where a patient indicates how information would flow within a community; or in a health data bank, which is emerging as a model for storing and accessing health information similar to how financial data is handled.[23]

Technically, this approach has been likened to a “lockbox,” “sealed envelope,” or “safe,” whereby sensitive information is sequestered from the rest of the record and accessible only under certain conditions. Typically, it assumed that protected information would be accessible in an emergency situation under a “break-the-glass” policy, where the details of the access are captured for later review.

There are a host of policy ambiguities and technical issues that will need to be resolved before granular access control could be effective. For instance, if access rights to certain data elements are assigned to a specific individual, and circumstances change, e.g., clinician retirement or death, it is not clear how access rights would be reassigned. Another key challenge is determining how patient consents for information sharing will be captured. Complex electronic interfaces may exclude certain populations of patients, such as the severely ill or those without Internet access. Another open question is whether or not clinicians will be informed that the record may not contain complete information, and addressing the patient safety and medical malpractice liability concerns stemming from clinicians acting on incomplete information. Depending on the mechanism used, revealing that information of a certain category has been masked may be equivalent to revealing the information. Capturing the identities of clinicians and patients granting and receiving authority to access information will also be challenging, as there is no universally accepted way to uniquely identify individuals in healthcare in the United States. From a policy standpoint, in most cases, patients do not have a recognized authority to control access to their information, which rests instead with clinicians and payers.[23] Finally, in the national health information exchange model, information may flow between multiple settings. There is no clear approach for ensuring that specific access restrictions follow the data and can be honored as it is transferred from setting to setting. Granular access control is a potentially promising, patient-centric approach to protecting privacy, but it will require a great deal of time and energy if it is to become practical and scalable.

Security

Security is a core element to protecting sensitive health information from unauthorized access. Security safeguards include protected physical location and authentication mechanisms such as password and biometric protection and encryption of data stored on hardware such as desktop computers, laptop computers, servers, and handheld devices. Additional measures include network security such as firewalls,[35] computer virus protection, and data back-up. Security measures must be balanced with practicality. Security measures that are too cumbersome, such as frequently changing or complex passwords, will inevitably result in workarounds by users that may inadvertently compromise the system, such as taping passwords to computer monitors.[29] Another challenge with security measures is that responsibility for implementing them often falls on the health information technology end-user. While large systems and practices may be able to maintain information technology and security experts on staff, in smaller settings, it is often technically inexperienced clinicians and staff who are responsible for ensuring that their electronic resources are secure.

Combining Approaches

Ensuring that privacy is protected in heath information technology often involves a combination of the approaches described above, which have varying degrees of effectiveness and impact on the technology end-user. Regardless of the approach used, enforcement of defined policies and proper use of technical solutions are critical to successful implementation. Ensuring that any electronic information is properly protected involves a delicate balance of restrictive measures intended to prevent inappropriate access and ensuring that information is readily accessible in situations where it is needed.

Concerns and Consequences of Inadequate Privacy Protection

Erosion of Trust

Trust is a critical element of an effective patient-clinician relationship. Healthcare involves sensitive, highly personal information by nature. The delivery of excellent physical and mental healthcare requires clinicians to subject their patients to probing physical examinations and open, honest conversation about highly charged and potentially embarrassing topics such as sexual and dietary habits, powerful emotions, inexplicable urges, and intrusive thoughts. Because one of the primary goals of health information technology is to overcome fragmentation and improve care coordination by making clinical information more available, this introduces new potential to inadvertently or inappropriately disclose sensitive information and betray patient trust. Surveys in several countries including the United States have consistently shown that patients are supportive of the concept of electronic health records and the potential benefits, but that there is real concern that sensitive information will be vulnerable.[26, 36–44] Surveys have also demonstrated that if they do not have confidence that sensitive information will be protected, significant numbers of patients will engage in avoidant behaviors, such as withholding information or giving inaccurate information to clinicians; avoiding or delaying treatment; seeking a different provider; or asking the clinician not to record or to misrepresent information in the record.[26, 36–38, 40] Many patients rated the protection of health information as equally important or even more important than protecting their financial data.[36, 45] Concerns about limitations of protecting health information in an electronic environment are not limited to patients. Surveys of clinicians, particularly but not limited to mental health practitioners, electronically.[46–49] High-profile accounts and breach notifications after compromises of large blocks of health information confirm suspicions and further erode both patient and clinician trust in the ability of health information technology to protect sensitive data. Gaining and maintaining trust will be critical to the overall acceptance and success of health information technology, and to lessening avoidant behaviors by patients or incomplete documentation by clinicians that can be detrimental to healthcare delivery.

Identity Theft

Inappropriate disclosure of health information can lead to the risk of financial and healthcare identity theft. Medical records often contain identifiers such as name, address, and social security numbers that can be used to commit financial identity theft. Healthcare identifiers such as health insurance policy numbers have been used for individuals to assume others' identities to obtain healthcare services.[50] In addition to clear financial implications, this type of activity can further endanger the patient by having the health information of the thief, including blood type or medications, integrated into the patient's legitimate record.

Stigma and Discrimination

While the perception of sensitive conditions such as mental illness has improved dramatically in recent years, stigma and fear of discrimination remain. Patients continue to fear personal, professional, and financial consequences and embarrassment with the disclosure of sensitive information to friends, families, employers, or insurers.[1, 49] Disclosure of inadequately protected electronic health information has the capacity to perpetuate these types of consequences.

Concerns and Consequences of Excessive Protection

A balance must be struck between unnecessary disclosure that breaches patient privacy and obstructed flow that diminishes the accessibility of medical information in situations where it could improve healthcare delivery and patient outcomes. Electronic exchange has the capacity to make available critical information such as diagnosis, current medications, and previous medication trials in situations like emergency room or outpatient encounters, where it is often unavailable due to the limitations of paper-based recordkeeping and patient self-reporting. Having incomplete information at the point of care could lead to consequences such as preventable drug interactions, wasteful duplication of previously completed testing and treatment, and medical malpractice liability. If the exchange of information deemed "sensitive" is perceived as too cumbersome from a technical or legal standpoint, there is the real concern that entities will decide to exclude it from electronic exchange and its benefits altogether. For example, after Hurricane Katrina struck the Gulf Coast in 2005, in an effort to minimize treatment disruptions to individuals fleeing to disparate parts of the country, a prescription database was established by commercial pharmacies and others so that current medications could be deduced.[51] This was to support treatment continuity in frequent situations where regular clinicians and records were unreachable and individuals could not recall complex medication regimens. However, certain medications, including those for the treatment of psychiatric disorders, substance use disorders, and HIV, were excluded from the database because of concern about varied state laws, with no capacity for even patients to authorize access to this information.[52] The permanent database established to serve in future times of crisis similarly excludes these medications.[53] It is not difficult to imagine the potential benefits that medication continuity could have provided to vulnerable patients with mental illness in a time of crisis, as well as the potential difficulties in stabilizing such patients without knowledge of current medications. In addition to perpetuating the stigma associated with mental illness and other sensitive conditions, these types of exclusions could diminish the potential benefits of health information technology attainable for certain patient populations.

Privacy Limitations of Paper-Based Record Keeping

While there are numerous concerns and challenges to protecting the privacy of electronic health information, paper-based records have significant limitations as well. In addition to inherent disadvantages in exchange (the ability to send and receive information), integrity (susceptibility to damage or loss), and availability (paper-based information is often available only in one location for one individual at a time),[54] paper has significant privacy limitations. Whereas audit trails can record detailed information about every instance of access to electronic records, no such mechanism exists for paper charts. Similarly, there is no counterpart in the paper environment to the sophisticated role-based and context-specific access controls that electronic systems are capable of supporting. Typically, a paper record is exchanged as a single document, and anyone who is in close physical proximity is free to access all of its contents without any form of authentication. Alterations or deletions are also easier to monitor and control in the electronic environment than with paper. While it is more challenging to abscond with large numbers of paper-based charts than electronic records, paper can be stolen or misplaced. Prescription records have been stolen from trash cans behind commercial pharmacies,[55] and discarded medical records with medical and financial data were even spotted blowing in the street as part of a movie filming in Toronto.[56] Risks to privacy inherent in paper records will probably never be eliminated. Even "paperless" systems involve printouts intended for temporary use and receive paper-based medical information from outside sources.

Current and Future Developments

There has been momentum towards increased adoption of health information technology in the United States in recent years. In 2004, President Bush issued an executive order for near universal use of electronic health records by 2014.[57] Several federally recognized entities have formed in subsequent years to realize various aspects of this goal, including the Office of the National Coordinator for Health Information Technology (ONC) under the US Department of Health and Human Services.[58] In 2009, the Health Information Technology for Economic and Clinical Health (HITECH) Act of the American Recovery and Reinvestment Act (ARRA) allocated funding and described new initiatives and incentives to promote health information technology adoption and the electronic exchange of health information.[21]

The issue of privacy has not been delegated to a single entity in this movement, and many bodies have weighed in and addressed various aspects. In 2007, the US Government Accountability Office criticized the Department of Health and Human Services for not having an overall plan for integrating various initiatives and defining an overarching strategy protecting privacy of individuals' electronic health information.[59] In 2010, a chief privacy officer was appointed to ONC to advise on privacy, security, and data stewardship of electronic health information and coordinate with various federal, state, regional, and foreign initiatives.[60] Table 3.1 lists some of the national entities that have contributed to activity surrounding privacy issues.

Table 3.1 National entities that address privacy

Name	Role
Office of the National Coordinator for Health Information Technology (ONC)[58, 61]	Coordinates national HIT activity, including privacy initiatives
Health Information Technology Policy Committee (HITPC)[62]	Statutorily defined federal advisory body addressing policy issues surrounding HIT. Includes a privacy and security workgroup
Health Information Technology Standards Committee (HITSC)[63]	Statutorily defined federal advisory body addressing technical standards needed to support HIT. Includes a privacy and security workgroup
National Health Information Network (NHIN)[64]	This is the proposed model for health information exchange in the United States. Rather than a central database of health information, the network will connect local healthcare settings where health information resides
Health Information Technology Standards Panel (HITSP)[65]	The panel was formed to identify and harmonize and integrate technical standards, including privacy standards, to promote sharing information among organizations and systems
Certification Commission for Health Information Technology (CCHIT)[66]	One of the entities that identifies and verifies the functionality, including privacy and security features, that HIT solutions must exhibit in order to meet national standards
Health Information Privacy and Security Collaboration (HISPC)[24, 25, 67, 68]	A collaboration of states and territories intended to explore local variations in privacy and security practices and policies and identify best practices to overcome them and facilitate information exchange
National Committee on Vital and Health Statistics (NCVHS)[4, 69]	Subcommittee on Privacy, Confidentiality, and Security periodically provides guidance to the US Department of Health and Human Services on privacy issues

There are other rapidly evolving areas of activity in addition to national initiatives and policy developments which will have an impact on the future of privacy in health information technology. The development and adoption of new technical standards to support more sophisticated privacy protections such as granular access control is likely to have an impact. Another significant area is the trend toward Internet-based software and data storage ("cloud computing"), where the software and information is accessed through the Internet, as opposed to the traditional model where the software and accompanying data reside with the end-user. While cloud computing has potential advantages such as potentially reducing cost, simplifying software upgrade, and reducing hardware requirements at the point of use, there are ambiguities as to where health information is physically stored, who has ownership and control over it, and how well it is protected.

Recommendations

It is important to *understand how information flows in and out of your clinical practice, and how access is granted*. If transitioning to an electronic system, be able to describe how information moves, how access should be granted to the various internal and external parties who may have access to clinical information, and what information they should have access to. As health information exchange expands in the United States, information stored in electronic health records is increasingly likely to be externally accessible.

Familiarize yourself with the policy and technical safeguards offered by the health information technology system you are evaluating or currently using. Many breaches occur because existing capabilities were not employed or were used improperly.

Anticipate that patients are likely to harbor concerns about how their sensitive information will be safeguarded, particularly in an electronic system, and may withhold or avoid care if they have doubts about the capacity to protect it. Be able to discuss with patients the policy and technological approaches employed to protect their privacy, the potential risks their information may be subjected to, as well as the potential ramifications and consequences if information is not shared externally.

Keep apprised of evolving national programs, technical standards and capabilities, local policies, and other HIT developments. As health information technology expands, the policies, laws, and technologies concerning privacy protection are likely to evolve rapidly. The Office of the National Coordinator for Health Information Technology (ONC)[58] is a reliable resource for comprehensive information and new developments in HIT in the United States.

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Part II

Clinical Practice Issues

Knowledge Delivery and Decision Support for Behavioral Healthcare Professionals

4

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Healthcare is the largest information business in the US economy. One third of its multitrillion-dollar cost is that of creating and processing information.[1–3] The lack of standards makes it difficult, expensive, and time-consuming to establish the simplest forms of communications. If it is difficult for patients to get a second opinion or to compare outcomes data for different institutions or procedures, imagine how difficult is it for a clinician to scan the qualifications of specialists in order to make a referral. This chapter is about the science, history, and trends related to information and knowledge sharing and how technology will transform the behavioral health "knowledge worker" in the years to come. The unique challenge for behavioral health professionals is the responsibility to gain knowledge themselves as they try to help others, and keep committed to the principle of life-long knowledge improvement and now patient and practice-centric knowledge acquisition and internalization. Fortunately, a plethora of decision support tools, information access and knowledge management technologies, and educational innovations are primed to support the behavioral health clinician.

The function of our brain and nervous system is to gather, understand, utilize, and communicate information, and we then emulate these processes in our external environment. As we have become sophisticated information processing systems, the prime directive remains the same as that of the single neuron – *to receive, process, and transmit information*. These are the basics of communication and shared knowledge. Knowledge acquisition requires interaction and connections.

To some extent, our survival as a civilization has been dependent on our ability to communicate with others and cooperate, collaborate, and combine resources and effort. So also, in the way we develop our technology, we have begun making many more demands for more sophisticated tasks. We have been connecting computers to other computers in order to share information. These connections form the backbone of business, educational computing, and information systems and they continue the process of sharing human information that began with the neuron.

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With the advent of computer networks, the everyday workplace has also become a shared computer environment. There are local and wide area networks as well as virtual private networks that are active in workgroups sharing projects or video conferencing. Thus, with the Internet and the World Wide Web, the global connection continues to grow.

Our continued mission to communicate and connect presented itself as our next challenge. How do we record and transmit knowledge? Some of the first writings on stone, and later papyrus, were used to document transactions between people, tell stories, and educate. With the advent of written information came the ability to take this information to great distance and carry the original message through many generations. In order to transmit recorded information to many scholars during the Middle-Ages, manuscripts were painstakingly copied by hand until Gutenberg devised a method to duplicate information in a fraction of the time. The dissemination of information had been an important function for all civilizations and now it could reach many more people as printed material. Other than religion, which also spoke of behavior and tradition, legal and medical texts were considered as some of the most important text books in history.

Knowledge Delivery Today

As healthcare and behavioral healthcare information is made available, the more traditional and popular forms of information sources (books, journals, monographs, letters to the editor, newsletters, etc.) are being supplanted by on-line versions. These on-line versions are easier to access and have capabilities that their paper counterparts do not. They can be searched across multiple volumes. They can quickly accommodate requests for other articles by an author, even link to Medline abstracts or other forms of information. Most on-line versions offer access to full text.

Virtually all of the traditional journals have an online counterpart. While some offer free access, most extend on-line access as part of the subscription fee. Other types of information offered by professional websites include journal reviews that summarize salient articles in the leading journals, drug information, and specialty or general health news. This is an evolutionary period for print journals, and the demands of the Internet (speed, ease of use, new ways of combining information) present new challenges for traditional publishers. Continuing along the evolutionary pathway, many of the newer journals are only e-journals. The process from review to publication has been dramatically shortened thanks to the ease and speed of on-line publishing.

Since the Internet is a democracy, anyone can publish anything one wishes. The message to all is “reader beware!” Search engines can find everything from a sophisticated book chapter to someone’s hate mail. We need to consider information from respected sources. It is worth taking a few moments to check the integrity of a website. Who runs it? Who owns it? What editorial procedures are used? Are the posted articles written by healthcare professionals or credentialed medical writers? Is there an editorial board? Are the articles peer reviewed? These are some of the questions that one should be asking about information on the Internet, especially healthcare and behavioral healthcare.

Since the Internet is such a pliable medium and offers many ways of presenting information, it makes sense to translate many types of knowledge acquisition to fit this platform. In addition to traditional books and journals, there are other methods of learning that healthcare professionals consider beneficial to their development. These are conferences and meetings of the various organizations and associations that comprise the various disciplines. Rooted in tradition, these well-attended specialty meetings are where colleagues exchange ideas, learn from each other, and update their training with continuing education (CE) or continuing medical education (CME) courses. These are being translated into the domain of the on-line world. Conference reports, treatment updates, symposia, and review courses are transcribed and made available to many professionals who are either unable to attend a conference or who missed a particular session and wish to learn about what was presented.

Knowledge and Information Dissected

We have a complex relationship with knowledge, especially clinical information. We gather facts into discrete units and then combine them or compile them into impressions. The discrete unit is initially important and remains so only if we attribute weight (value) to it; the importance of the discrete unit depends on the degree of impact on the impression or whether or not it has impact on other aspects of clinical work.

For example, obtaining information about a patient's sleeping patterns or habits during their interview might reveal a sleeping problem (insomnia). This sleeping problem may be a result of increased alcohol intake or a symptom of an anxiety disorder. It may also be secondary to a physical problem (asthma or gastro esophageal reflux). The sleeping problem may ultimately result in poor job performance, irritability, and difficulties in interpersonal relationships.

Learning to use diagnostic decision trees or following treatment algorithms has offered a tremendous benefit to the clinician. Decision trees offer an organized and structured way to gather and understand clinical data. The treatment algorithms present a structured systematic guideline for assistance in making treatment decisions.

How is it possible to translate clinical information into knowledge that can be an on-line resource? Let us take this challenge one more step. How can we get on-line clinical information at the point of care? Understanding what information is important in a simplified model is easy. Clinicians know what they need to do a competent job. However, this model becomes quite complex as we realize the speed of change in clinical information. We now have to deal with the latest treatment approaches, newest pharmacological interventions, or most recent research findings as they are made available. Integrating constantly updated information into a current knowledge base can be an information-processing nightmare.

To help solve this dilemma, we need to revisit the concept of weighing information. In order to publish an on-line article on the latest review of treatment-resistant depression, important elements of the article need to be "tagged" and prioritized to allow for rapid retrieval, perhaps even at the point of care. This creates more work up-front. The author and/or the editor must consider important aspects of the presented clinical information and create a tag or link that can be retrieved, indexed, and synthesized at a moment's notice.

A psychiatrist is working with a patient who has a treatment-resistant depression. At the point of care, while reviewing the on-line electronic medical record, he can look up a clinical website that has just published an article by an author he respects on the latest review of treatment-resistant depression. Since time is of the essence in this situation, he just wants the highlights. His query offers two possibilities: (1) change to a particular group of medications since recent studies show efficacy. (2) initiate cognitive-behavioral therapy to supplement the current medication regimen. He makes a decision feeling confident that he has embarked on a better treatment plan for this patient. If he has more time, either before or after seeing the patient, he can review a Medline abstract or read the full article offering strategies for handling the difficult-to-treat depressive disorders. He can also review the evidence-based material on the success of various treatments.

This line of sophisticated questioning requires a new understanding of the value of knowledge and information and that we plan ahead to allow subsets of the information to be utilized. We also need to insure the integrity of the information and make sure that the data is in context and communicates sound clinical data. This is possible if we look at the information in greater detail. Like a good chef, the more work that goes into the preparation, the easier the assembly. We generally do not think in these terms. It requires viewing many types of information as a data set that can be queried. The Semantic Web that was pioneered by[4] the inventor of the Internet takes the Web one step further and beyond links to describing the relationships of information. He states "if HTML and the Web made all the online documents look like one huge book, … inference languages will make all the data in the world look like one huge database".[5]

The Future of Knowledge Acquisition: The Final Frontier

The challenge to past and future civilizations has been and will always be the pursuit of knowledge. To be precise, how we acquire it, how we use it wisely once we have it, how we store it, and finally, how we disseminate it to others.

Knowledge acquisition accompanies curiosity. Seeking information on many different levels gives humans the ability to search for many more things. Multiple levels of information add not only complexity to our quest, but also add layers to the second aspect – using the information. Learning the impact of information on other aspects of information is of tremendous value. For example, a therapist in group therapy needs to understand not only each of the individuals in the group, but also the group process, which is an entity of its own. In addition, we need to be aware of discussion's impact on the process, as well as on each individual. This layering of information creates a rather complex interaction and a challenge to even the most skilled therapist. The point is that information or knowledge rarely stands alone. So, many characteristics or qualifiers, some more important than others, need to be considered.

Many medical students learning patient interviewing in a psychiatry clerkship want to jump to a diagnosis in the first 5 min. They have not yet learned that every clinical encounter cannot be condensed into a one-line diagnosis, and have not yet appreciated the value of details with regard to better understanding the patient. In their desire to quickly understand and fix the presenting problem, they often overlook salient points and subtleties of behavior that a more sophisticated interviewer would not miss. This is partly due to the structure of teaching in medical schools, but a new approach is being used to gather and integrate information more effectively. Case-based teaching offers a broader view of a patient in the context of the various systems in which they function.[6]

Direct Knowledge Acquisition

The tradition of exchange of information since the time of the early shaman or of the Greeks and Romans has been the mentoring/supervisory relationship. This has always been the premiere way to communicate quality information. Trade apprenticeships, such as physician mentoring, used the information that was passed down in order to learn necessary skills and methods needed for performing procedures particular to their trade. This is still an important method of direct exchange of information to this day. This method, as a rule, ensures quality and integrity of information. The supervisory or mentoring relationship has been considered the pinnacle of training and has developed into a time-revered tradition to many who recall significant experiences in their education. Communicating knowledge by supervision and first-hand experience has been the basic premise of medical training.

Other types of direct exchange include classroom instruction, association meetings, and conferences. Other than a one-to-one supervisory relationship, a traditional method of communicating scientific or clinical information is through the specialty conference. In this setting, leaders in a particular field offer words of wisdom to eager participants. Often, participants will pay for CME or CE courses in order to obtain the specialized knowledge that is difficult to obtain elsewhere. This method is still present, relatively unchanged from its early Greco-Roman roots and has been the academic standard for communicating knowledge. This method is often supplemented with books or manuscripts, but the primary method is direct exchange.

Indirect Knowledge Acquisition

Indirect methods of gathering knowledge include books, journals, manuscripts, and letters. These utilize the written approach to disseminating information and offer a well-organized way to present information. The advantages of this method of exchange are that it is replicated readily, reaches a greater number of people, and is easily transported to great distances. Medical school is a prime example of combining the indirect method with the direct. Here, books supplement classes and supervised lab or clinical experiences.

Knowledge Acquisition Today

Building on history, today's information takes information from traditional forms and recombines it in new ways. Today, we build on our historic roots of tried and true methods of knowledge exchange and enhance them with various technologies. Although classrooms remain an important place to learn from the masters, today, we can extend the classroom beyond its walls through recording techniques, interactive teleconferencing, and other technical enhancements. The concept of a "university without walls" can now have a global reach.

We can also combine information in new ways to change learning. We can change views or perspectives on information instantly by using computer technology. For example, in a discussion of an illness's epidemiology, a lecturer can display a graph and instantly change data elements for "what-if" scenarios. This can also be transmitted simultaneously into a lecture hall, to individual networked computers, or across the globe. Interactive video conferencing and telemedicine can dissolve the walls of distance and location.

People can interact in a variety of ways, not only with a mentor, but also with each other. Much as students gather after class to discuss what they have learned and share insights with each other, we can enhance this learning process via technology. E-mail, chat technology, list serves, and other forms of electronic communication offer ways of augmenting knowledge acquisition without the limitations of time or place. These electronic discussions can take place at any time or from any place. Thus, teachers can interact with a group or on a one-to-one basis.

The ability to supplement information has also changed dramatically. In a typical school setting, a student would traditionally seek reference material in a library. Today, information can be gathered in class, at home, or anywhere else with a computer connection. In a less direct fashion, courses can be set up for self-instruction. Courses are available via computer where an individual can learn at their own pace and at a time they choose. Many of the major universities offer free access to numerous lectures and seminars.

Internet and the World Wide Web: How They Changed Knowledge Exchange Multimedia, Hypertext, Ease of Use, Reach, Standardization

Around the globe, billions of people are connected to the Internet and many use it as their primary source of information.

Standardization

What makes all of this connectivity possible was the establishment of standards. When the Internet was established, part of the wisdom that allowed for its universal adoption is a set of standards or protocols (TCP/IP) that established a simple and relatively inexpensive global communication system.

Hypertext, Multimedia, Nonlinear Learning

Part of the magic of the World Wide Web is its inherent style of interaction. Hypertext (meaning “beyond text”) links allow movement or “jumps” to other pages of related information and to other websites regardless of location.

When we read a page in a book, we may come across a word that we find interesting or unusual. We stop reading, think about the word and perhaps how it is used in context or in another context, maybe even look it up in a dictionary. After this digression, we go back to the page and resume reading. That is how hypertext works. It allows for interaction with knowledge in a way that is more analogous to the way we think. We can jump to a hypertext link (digress) or follow a logical sequence and interact easily with multimedia elements to enhance learning.

This changes the way we acquire knowledge and the way we interact with information. By design, a web page allows many types of media including text, pictures, sound, video, and animation. These are also the elements of multimedia and enhance our interaction with knowledge in ways that are closer to the way we naturally learn.

Nonlinear Learning

Nonlinearity offers a learning style and interaction with information that is more “natural” and emulates the way we interact with the world. Nonlinear interaction allows the person to explore information from any point. Unlike a book, which has a beginning, middle, and an end, a nonlinear approach offers the opportunity to start in the middle or anywhere else to explore information. Hypertext allows for this approach and offers a new mode of opportunities for learning and interaction.

Technology Versus Knowledge

Marshall McLuhan has pointed out that we should not be blinded by technology.[7,8] We are currently enamored with technology. Because the computerization of information is still in its infancy, we amuse ourselves by attempting to obtain the fastest computer processor or the largest monitor available on the market. We often forget that the whole point of technology is its ability to lead us to the information, then accumulate, and process it for us. In some ways, it is akin to driving a car. After we learn to use the vehicle, we no longer think about the process of driving. It becomes an automatic process and we focus instead on where the machine will take us. We need to focus on the tasks of learning and interacting with knowledge, not on the technology itself.

We are often impressed with the dazzle of special graphics on a website or an elegant design of an instructional DVD; but other than demonstrating an imaginative interface, does it assist us in gathering information? This brings to mind a clever cartoon showing a person standing in front of a colorful and ornate web page. The caption reads: “This is great but where is the door?” Designing with the transfer of information in mind is still uncharted territory. The interface should not impede or complicate the acquisition of knowledge. Facilitating learning should resemble a clearly marked road; we ought to be able to navigate ourselves to the information we want quickly and easily. Presenting information in a palatable and friendly way is more difficult than it sounds. A tremendous amount of planning and testing goes into creating an interface that the user finds simple to use and easy to navigate. In actuality, it is quite difficult to make something look easy.

Technology can either enhance or interfere with knowledge acquisition. We need to encourage colleagues and trainees in the development of educational programs, algorithms, guidelines, clinical reference tools, and study materials. We also need to encourage people to follow the principles of good design in the creation of new programs.[9] One must always remember that the goal is to *inform* and *educate* rather than *impress* or *dazzle* the reader.

As we move forward, we find that technology can facilitate knowledge in many ways. The concept of “always on” connections is spreading from the university and business world to the home computer with high-speed connections. This creates vast possibilities for information exchange. Individuals can now make their personal libraries available for searches, catalogues, and data engines. For example, suppose that Dr. Smith spent a year researching panic disorder in adolescents or that Dr. Jones did her dissertation on Post-Traumatic Stress Disorder (PTSD). With appropriate security measures, they could then make their research notes, reference lists, and background material available on-line. This can save other clinicians and scholars innumerable hours of replicating the same work. New information or findings can also be shared with Drs. Smith and Jones and help to enhance their own knowledge bases. Some of the major academic journals offer supplemental notes from the authors.

As various technologies merge, such as local and wide-area networks, and mobile personal and wide-area networks, their corresponding information appliances (Internet-ready cell phones, hand-held computers) proliferate; any information can be available from anywhere at any time.

“Language serves not only to express thoughts, but to make possible thoughts which could not exist without it”.[10] Bertrand Russell believed that unique and novel ideas and forms of expression were born from new combinations of familiar elements. The Internet has given us opportunities and interaction with knowledge that have expanded our abilities and created a unique subset of communications that may not have been possible otherwise.

Empower Yourself before Empowering Others

Part of empowering ourselves through knowledge is learning about available tools that help us understand the data. If we rely on others, such as information management staff, to tell us what information we can obtain and how we can view it, we are doomed to a dependency that will leave us somewhat helpless and only partially informed.

Learn the tools that you need to manipulate the data yourself. It is truly the only way to have adequate control over the data. If you wish to evaluate a particular data set and look at its impact on other variables, or run a “what if” scenario, you can accomplish this only after a short learning curve. For example, if the staff in a psychiatric emergency room (ER) record demographic and clinical data into a database, perhaps a number of "canned" reports can then be generated. However, if you knew how to question and manipulate the data yourself, you could then create your own queries and ask questions like, "how many females between the ages of 18 and 25 have come to this ER with a presenting problem of suicidal ideation and no previous history of depression?" You could then possibly change one variable in the query and learn new ways of looking at information. You now have power over your data.

Another scenario from the same emergency room data set suggests that perhaps you can track the pattern of patients who arrive at the ER. Which days are heavier with visits than others, which shift gets the most patients, and dozens of other questions can now be asked? Staffing patterns can then be adjusted to optimize the resources in the ER and put manpower where it is needed the most.

In Order to Obtain Empowerment over Your Data You Must

Gain an understanding of the data set that you are using. Know the data sets and the fields used to collect information. This way you will know what is being collected and what information can be extracted. Learn to use the tools that will assist you in directly manipulating the data. If you are not using the tools yourself, understand their power and capability so that you know what questions to ask. If you do not know what to ask or what to get from your data, you must rely on someone else's judgment about what you might need or want.

What kinds of tools can you learn to use? They range from the simple database or spreadsheet to the more complex statistical package. Any of the popular databases or spreadsheets can import or export data and offer you the tools you need to query, view or graph your data in a variety of ways. The learning curve is the approximate couple of hours spent learning the interface. With a statistical package, the learning curve is steeper and is generally for the student serious about data or those interested in research.

Evidence "Knowledge"-Based Clinical Information

One of the goals of sharing knowledge is learning from the accumulated wisdom of others. In clinical practice, standards are established for the various assessments, therapeutic approaches, and treatments. Keeping current with the latest clinical and scientific findings in the field of mental health is a formidable task. A method is needed to synthesize information and evaluate the best scientifically verified treatments due to the very diversity of treatments in mental health, often for the same disorders. This is the domain of *Evidence-Based Practice*. In a serious attempt to narrow the gap between research and practice, clinical practice is being influenced by evidence-based practice guidelines and clinical reviews as seen in the Cochrane Library by utilizing the tools from clinical epidemiology, biostatistics, and information science.[11] Evidence-based practice is derived from evidence-based medicine. According to Sackett et al., "evidence-based medicine is the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence-based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research".[12]

The American Psychiatric Association published the *Diagnostic and Statistical Manual* in an attempt to develop a more scientifically rigorous set of criteria using well-documented clinical research.[13] The use of standardized criteria allowed for a wealth of research that was not previously viable. In the last few decades, we have accumulated an unprecedented amount of epidemiological, genetic, neuroanatomical, and clinical data.

These beginnings led to the recent interest concerning mental health in Evidence-Based Practice (EBP). One of the fundamental tenets of EBP is that specific study designs are best able to provide unbiased answers for different types of clinical questions. For example, good quality randomized trials (either single trials or meta-analyses of several comparable trials) for treatment produce the most valid estimates of a treatment's effectiveness.

Behavioral Healthcare Professional Information Needs

The following is a list of the types of information and knowledge that the behavioral health professional requires:

- Patient data including: mental status, history, testing, and treatment plans. Physical findings including: laboratory data, x-ray, diagnostic imaging, and special tests
- Field reports: ER, hospital, caseworkers, ACT teams, home health, urgent care centers, caregiver/patient information, and employer
- Behavioral health and medical knowledge, research
- Medical, psychiatric, and behavioral health news
- Medication information
- Patient education information for dispensing to patients
- Referral information
- Insurance information

These are very complex data needs that require a great deal of integration and coordination of information. A true challenge for this decade is getting all of this information in one place for the clinicians so that they may be well informed and make good treatment decisions. Solutions such as the enhanced electronic medical record can offer ways to manage and negotiate the complexities of these informational needs.

Patient/Consumer Information Needs

Patients will gain increased access to their clinical information and participate in clinical decisions and treatments. Patient access to their information through patient portals is becoming very common today. A question that the behavioral healthcare professional must ask is, what types of information should be available to patients. The following is a potential example:

- Patient data including laboratory data, X-ray, and diagnostic testing
- Hospital, ER, field reports
- Medication information
- Consultant reports
- Educational materials
- Behavioral health and medical knowledge and research
- Medical, psychiatric, and behavioral health news
- Referral information
- Insurance information

What to Expect

In the late 1400s, Leonardo DaVinci conceived airplanes, helicopters, and parachutes, all as sketches in his notebooks.[14] It took centuries for these concepts to come to fruition because in DaVinci's time, the distance between what his mind could imagine and what technology could deliver was immense. Today, our technological capabilities are much more sophisticated. However, with our need for "immediacy," we become similarly frustrated because what we imagine – continuous speech technology and software that acts on our behalf – might take a few years to become a viable reality.

So, what does the future have in store?

The primary issues that will drive progress will be communication and information, not processing power. Of course, e-commerce will facilitate progress; it will also open pathways to information and communication that would have been otherwise unaffordable.

We are currently in the accumulation, or early, phase of information gathering. This is much like starting a library, where the first phase is obtaining books and journals. We are acquiring and storing information of every imaginable type – from sports stadium seating plans to world news that changes continuously. The goal is to make this information available to anyone who wishes access to it, 24 h a day.

The second phase of information acquisition is organizing the material in a way that provides easy access. The online world has been described as the "Library of Congress with no card catalogue." In order to search or index effectively, we will require not only clever software, but also a set of standards for cataloguing all of this knowledge.

The third phase is to let the information work on our behalf. In addition to sophisticated indexing of information, we need to give information catalogues the ability to "think for themselves." Such catalogues will be able to act independently and solve problems or recombine information in ways that were not previously possible.

We can now concentrate on more sophisticated software programs that can assist us in the gathering and organization of our information. In addition to the search for information that improves practice, we have traditionally relied upon systematically developed self-report questionnaires and scales that provided the decision support for our clinical actions. The next section describes some elegant examples of how the concept of measurement-based care has been part of our clinical decision support for many decades.

Measurement-Based Decision Support in Clinical Care

The informatics revolution in behavioral healthcare opens the door to data-based therapy management using real time clinical decision support tools. In most settings, however, the application of an empirically based continuous quality improvement approach to clinical care is far from the reality. Clinical decision support tools are the keys to unlocking this potential.

Clinical decision support tools are a broad class of procedures designed to support behavioral healthcare providers with information as they make important decisions about patient care. In a sense, this is not a new idea. We have had decision support tools from the very first computer-generated interpretive reports for the MMPI (Minnesota Multiphasic Personality Inventory), although we did not initially use that terminology.[15] Many of today's tools go much further in recommending specific courses of action. Such actions include: level of care determinations, recommendations about types of therapy or treatment techniques that may be most efficacious for a given disorder or set of patient characteristics, patient readiness to step down in the continuum of care to a less restrictive and less expensive setting, or even recommendations for discharge or termination of outpatient treatment. With so much at stake in terms of patient welfare, as well as the economics of providing behavioral healthcare services, it is important to critically evaluate these tools. This chapter reviews four major areas of concern in evaluating clinical decision support tools: research quality, implementation issues, ethical/practice issues, and cost. A discussion of the five types of decision support tools is also added.

There are many different approaches to decision support, and the relative advantages and disadvantages of each can be judged with respect to research quality, implementation issues, ethical practice issues, and the ratio of direct costs to indirect cost offsets. There are at least five broad classes of decision support instruments available on the market today. These are matching diagnosis with goals, matching patient and therapist characteristics to treatment techniques, the use of longer but more psychometrically sophisticated instruments, automated treatment formularies, and the modeling of recovery curve trajectories.

The first method involves matching diagnostic problems to specific treatment goals. This approach takes a problem orientation and seeks to link specific presenting problems to observable and measurable goals. With practice management software, it becomes possible to track progress of these goals and to graphically view client progress plotted against important clinical variables such as number of sessions, type of therapy, and type of medication. At the individual level, the practitioner can see the effects of changing medications or adding group or couples therapy on the client's goal attainment, and use this information in making decisions about continuing, changing, or terminating a particular clinical path. At the aggregate level, one can observe trends in the number of sessions required to successfully treat specific diagnostically related problems and use this information for establishing treatment guidelines and clinical protocols used to support and guide clinical decisions in the future.

This approach is usually easy to implement and presents few ethical practice problems, because it is consistent with how clinicians typically think about these problems. It is also consistent with the movement of various regulatory agencies toward problem-oriented medical records. Because this approach simply tracks progress on goals linked to problems, there is little need for a strong research base. The issues that support the logic in the software application need to be addressed, however, once the aggregate information is used to develop guidelines for clinical care.

The second class of decision support tools involves matching patient characteristics to particular therapeutic techniques or levels of care. Here, the clinician assesses critical patient variables, such as degree of reactance, coping style, “extraversion versus introversion,” motivational distress, and the degree to which the presenting problems are complex and thematic versus noncomplex and symptomatic. Depending on the patient’s relative standing on each of these variables, he or she may be more or less likely to respond to different treatment approaches. For example, a patient who is low in reactance and extroverted with noncomplex symptoms may benefit from a directive approach like cognitive behavioral therapies that focuses on particular external behaviors. On the other hand, patients who are highly reactant, introverted, and thematic may respond well to less directive forms of treatment involving an insight orientation or focusing on interpersonal dynamics. Levels of motivational distress indicate the extent to which the therapist should employ supportive techniques versus other techniques designed to arouse the client. This approach is most associated with Larry Beutler at the University of California, Santa Barbara.[16,17]

The body of research supporting this approach is quite large and of good quality. This type of patient to treatment matching may be difficult to implement because of the need to collect considerable patient information on each of these variables. Practice issues abound in locating therapists skilled at each of the recommended techniques and ensuring that they are properly trained and are correctly implementing the techniques. However, the clinical division of the American Psychological Association is moving toward promoting and disseminating manuals about empirically validated therapies for specific disorders to therapists, thus possibly providing a solution to the training dilemma.

A third category of decision support tools involves the use of longer, but more psychometrically elegant, instruments. There is much literature on treatment planning with the MMPI, for example, as well as many other traditional clinical instruments. Systematically assessing patient characteristics known to facilitate or impede the treatment process can be very helpful in predicting and controlling length of stay or the number of outpatient sessions. For example, closed mindedness, low expectation of therapeutic benefit, lack of social support, problems in relationship formation, and self absorption are all variables that research has shown to impact the course of treatment. Individuals, who are closed minded and self-absorbed, for example, will likely be difficult cases requiring higher levels of clinical supervision, more intensive case reviews, and a greater number of sessions to work through these hindrances in order to treat the presenting symptoms. This approach is evident in the Butcher Treatment Planning Inventory, which measures patient characteristics and correlate them with treatment process issues.[18]

The quality of the research supporting these types of assessments is consistent with a long history of psychometrically sophisticated instrumentation with good reliability and validity. Proper use of the information would seem to raise the bar for clinical practice.

While some practitioners may not be aware of the methods for working with patients who present with these types of road blocks, the early identification of these issues, combined with effective clinical supervision, may prevent futile sessions where significant behavioral healthcare resources are utilized but no clinical progress is made.

A fourth class of decision support tools involves comparing automated reviews of treatment plans against an electronic treatment formulary. Here, the organization's treatment formulary is programmed into algorithms in a central server. Provider's treatment plans are sent electronically to the managed care organization where the plan is run against the formulary. If there is a positive match with the formulary, an authorization is returned electronically to the provider, or more information is requested. If the plan is inconsistent with the formulary, it is automatically assigned to a live case manager for review. This approach is taking shape with a number of software applications.

The major advantage of this approach is in the implementation. Care requests are approved more rapidly, with fewer case managers, and with assurances that authorizations are consistent with approved formularies. Those responsible for creating the formularies at each of the managed care organizations are responsible for the quality of the literature reviews, thus largely impacting the research quality. Ethical practice issues are of real concern, however, in that, some organizations may seek to automate denials of care without live reviews. It is essential that in these cases, knowledgeable case managers evaluate the exceptions and extenuating circumstances with good judgment to clinical input. A few practitioners may also "learn the ropes" and fashion their requests in ways that would gain automated approval. Such gaming is, of course, unethical and is a potential problem any time strict treatment guidelines are implemented.

The final class of decision support tools under discussion here is the type that seeks to monitor patient progress and rate the clinical significance of the patient's improvement against some standard. The work of Neil Jacobsen and Paula Truax of Washington University leads the field in conceptualizing this approach.[19] Traditional outcome studies have looked only at the statistical significance of the change between pretest and posttest scores. However, with large sample sizes, even very small changes in mean scores can be statistically significant. This is why the current draft versions of the Standards for Psychological and Educational Testing strongly encourage researchers to move away from a rigid reliance on statistical significance and place more emphasis on effect sizes. In other words, assuming the finding is significant, the subsequent question is "what is the size of the effect?" In the arena of outcomes research, Jacobson and Truax have taught clinicians to ask, "how clinically meaningful is this outcome?" They propose a series of possible methods for answering this question based on the relative probability that the posttest score is more likely to be drawn from the normal distribution or the clinical distribution. These methods have been adapted and computerized for the,[20,21] and several others. Clearly, knowledge that a particular patient's progress in treatment can be reliably assessed as "positive but insufficient" or "very favorable" provides the clinician and case manager with objective information. The information can be used to support clinical decisions about continued authorizations of treatment, stepping down in the continuum of care, or termination of treatment.

This approach is strongly based in quality research data. Implementation issues may surface initially with the need to have patients tested repeatedly, but provider resistance can be mitigated by the availability of useful clinical feedback in real time. Cost is also an issue with repeated testing, but is now being made affordable through paperless administrations. Studies that evaluate these direct costs as compared to the potential long-term indirect cost savings from reducing relapse rates and lengths of stay, as well as medical offset studies need to be conducted.

A significant challenge with decision support has been adoption of its recommendations despite the benefits they may bring to clinical practice. There are numerous barriers, such as hardware, technical support, training, integration into workflow, timeliness, and relevance of clinical messages.[22] The Texas Medication Algorithm Project in 2004 demonstrated better clinical outcomes for patients whose physicians used paper-and-pencil algorithm versus standard care; however, observation determined that implementation and fidelity to the algorithm was inadequate.[23] The computerized decision support system of this algorithm was much more successful in maintaining user adherence to the algorithm, and it also demonstrated statistically greater symptom reduction in patients whose primary care provider utilized the computerized clinical decision support system. Its success, in large part, was related to physician adoption based on opinion that it was relatively easy to use and was perceived to be useful.[24] Transitioning from direct patient care to practice-based, patient registry-based or population-based decision support requires sophisticated data mining.

Data Mining

Data mining is the process of data processing using sophisticated data search capabilities and statistical algorithms to discover patterns and correlations in large preexisting databases.[25] One of the challenges in acquiring and representing medical knowledge is that there are vast sources of information, but identifying and retrieving relevant information efficiently is difficult. Poluzzi and colleagues used data mining of the US FDA adverse event reporting system to determine risks of antimicrobials and the risk of torsades de pointes.[26] Epstein demonstrated that text-based data mining of scientific literature can refine therapeutic hypotheses, which may decrease the cost of drug development by identifying unknown relations.[27] DuMouchel and collaborators also used the FDA adverse event reporting system to determine the association of antipsychotics with glycemic events.[28] Although behavioral health has not been a traditional arena for data mining, Panagiotakopoulos developed a contextual data mining approach that assisted the treatment of anxiety disorders via data collected for long-term monitoring.[29]

Although the individual practitioner and small-group may perceive that data mining is for large data sets collected in large healthcare settings, the principles are the same. It focuses on the use of historical information in data to learn. An example is reviewing the various reports from an e-prescribing system such as[30] for a medication report that identifies how often a drug is prescribed or a patient medication report. This new information may actually inform the prescribing physician about potential trends that do not follow evidence-based guidelines or perhaps an oversight with regard to potential drug interactions based on medications prescribed by other physicians. Many pharmacy benefit management companies are using data mining to analyze their databases for prescribing trends. They send this information to the providers with the goal of improving the quality of care in addition to managing its cost.

Knowledge Management

With all of the knowledge gathered from various methods of research, data mining, databases, and relationships described previously in this chapter, how to manage that knowledge has become a field by itself. Knowledge management (KM) is the process of sharing and making existing knowledge available in a comprehensive and easy to understand manner. Through KM, institutions transfer knowledge from practitioners to others, so that they do not have to reinvent a process, or capture and disseminate best practices. There are numerous definitions of KM; however the primary focus is how to capture and generate information. While KM often utilizes information technology to store, capture, process, analyze, and deliver knowledge, KM by itself is not information technology.

KM systems can be anything that helps the dissemination of knowledge. For example, Sullivan and colleagues describe a Resource Hub, an intranet-based electronic information service designed to improve knowledge management and staff satisfaction in the Inner North Brisbane Mental Health Service.[31] This internal network has a large range of electronically stored resources and clinical information, including direct links to approved Internet sites, psychoeducation resources, fact sheets, resource lists, and details of current service research projects. It is designed to increase over time, and regular review of its contents maintains its relevancy. Although many consider[32] to be merely an online encyclopedia, it encompasses KM principles in the mechanisms of information capture, process, exchange, and dissemination.

Sittig et al. evaluated clinical knowledge management systems using a clinical knowledge management site inventory.[33] They surveyed six geographically and organizationally different hospital networks with regard to determining what were the keys to success of their clinical decision support systems. There were four tools determined to be useful for KM: external repository of clinical content with web-based viewer; online, collaborative, interactive Internet-based tool to facilitate content development; enterprise-wide tool to maintain controlled clinical terminology concepts; and tool for clinical decision support (CDS) users to provide feedback regarding specific CDS interventions. With these tools and features, KM systems can manage CDS content with greater adoption and efficiency.

Summary

Information and knowledge sharing is essentially the core function of behavioral healthcare professionals. The capture, analysis, storage, and retrieval processes and technologies, both personal and technological, have permanently changed. Evolution requires thousands, sometimes millions of years. The field and tools of decision support and knowledge management are forcing us to travel at warp speed with no brakes in sight. The clinician must adapt to keep up with their clients and patients.

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Insights on Telehealth and Virtual Reality

5

Thomas J. Kim

Introduction

The technologic transformation of health care is far from a novel enterprise. Some have pointed to ancient Greece and the use of smoke and fire as advancing coordinated distant communication.[1] While an intriguing origin that invites examination through the ages, this chapter will explore communication technology in healthcare (i.e., telehealth) within the current era. Such an exploration is predicated on the nature of progress as purposefully driving emerging technologies rather than the reverse (i.e., innovating for the sake of innovation). This critical distinction seeks to differentiate the transformative property of innovation from just the technologically possible.

This chapter will distill a collection of clinical and program development experiences toward a suggested conceptualization of telehealth that may prove helpful to those seeking to engage technology in health care for themselves. In an effort to complement the insights found elsewhere in this publication, this chapter specifically considers the notion of remote "presence" or how technology has transformed the way individuals come together.

Orientation

To begin, there is an issue with terminology.[2] The application of technology in health care has resulted in a continually expanding lexicon of descriptors (e.g., tele-, e-, i-,) that serve to confound rather than support a sense of shared effort or understanding. Moreover, the issue of terminology also highlights the isolated nature of telehealth efforts to date. This assertion is far from unique to telehealth and reveals the global challenge of silofication in health care that telehealth, ironically, seeks to improve. Beyond prefixes, there are two terms that bear mentioning:

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Telehealth

The Health Resources and Services Administration (HRSA), Office for the Advancement of Telehealth defines “telehealth” as

> The use of electronic information and telecommunications technologies to support long-distance **clinical health care**, patient and professional health-related **education**, public health and health **administration**. [Emphasis added]

“Telehealth” is favored given its broad inclusiveness of potential activity. Inclusiveness is essential both to shared understanding and effort alignment toward sustainability. From this term, it is easy to describe a specific activity without losing the sense of shared purpose (e.g., a clinical psychiatric versus an educational cardiovascular telehealth encounter).

Synchronicity

Synchronicity refers to the nature of telehealth engagements. If participants interact in real time, the engagement is “synchronous.” While easiest to imagine in terms of clinical activity (e.g., synchronous neurologic telehealth care versus asynchronous radiologic services), synchronicity qualifies all telehealth activity and impacts design, operation, and support.

Those with even a passing appreciation of telehealth efforts would likely agree that the Internet and videoconferencing technologies (VC) have led to evolutionary advances in healthcare solution development. A closer review, however, reveals less than glowing results and a scarcity of generalizable conclusions.[3–17] Also of note is the finding that telehealth initiatives have emerged whether or not providers actively participate.[18–22] So despite considerable effort in the final decades of the last millennium, telehealth failed to achieve widespread sustainability and acceptance evidenced by publication decline as a proxy for limited growth.[23] This admittedly grim review is offered as an appeal to learn from rather than repeat the lessons of our past. Independently designed telehealth “pilot” projects continue to demonstrate effort or resource replication and lack a clear sustainability plan. The HITECH ACT of 2009,[24] however, offers an unprecedented investment of resources and renewed political will creating an incredible opportunity that should not be squandered. A new telehealth development strategy is required.

General Considerations

The call for a new strategy is not to suggest that one optimal telehealth model exists and has simply been ignored. In fact, the contrary is true where a multitude of variables contribute to telehealth success. Of these, there are two that are not often or fully considered: situational awareness and risk assessment.

Situational awareness answers the question of how the part fits into the whole, the whole being adequate and sustainable health care for all. While easily asked, the answer is rarely sought after in the health care sector where branding and market share typically discourages looking beyond one's own backyard. The consequence of this is far reaching and has contributed to the quantity-based, disconnected, maldistributed, and costly delivery models we currently enjoy. This attribution is also not restricted to the abstract medical–industrial complex.[25] It still applies at the individual level where misaligned incentives impact decision-making, which, in turn, steers us away from realizing the societal need for basic, affordable health care.

It is acknowledged that invoking a call for an aware citizenry, including large-scale enterprises, risks derailing the dialogue into partisan finger pointing or pragmatic hopelessness. But irrespective of belief or agenda, the current untenable future of health care ensures that everyone loses. So, whether seeking to realize a social good, creating new markets of opportunity, or simply responding to community needs…the act of looking over one's fence is a good first step toward engaging in telehealth pursuits.

An example of situational awareness supporting telehealth can be found in the aftermath of Hurricanes Katrina and Rita. A Federally Qualified Health Center (FQHC) in southern Louisiana[26] sought assistance from a relief organization,[27] which endorsed the value of synchronous telehealth solutions, particularly in response to postdisaster mental health needs. Collaboratively, a number of early successes were achieved supporting sustainable telehealth maturation:

- HRSA confirmation that any FQHC telehealth provider qualifies for cost neutral malpractice protection under the Federal Tort Claim Act.
- Avoiding the trap of redundant connectivity solutions by partnering with a struggling call center next door and sharing Internet resources.
- Appreciating the broad potential of VC capabilities toward increased utilization across all three HRSA-identified activities.

What these successes point to is the power, efficiency, and value of striving to see the larger picture.

Risk assessment is related to situational awareness, but speaks to filtering telehealth development through the consideration of true risk. Such consideration has the virtue of tempering the ambitious and encouraging the skeptical. Striking a balance between risk and reward is also less about completing an action and more about maintaining a perspective.

Experience with telehealth development in a variety of settings reinforces the elusive nature of achieving risk balance. The difficulty is largely due to an environment lacking the means to guide or even accommodate new forms of care delivery (e.g., reimbursement, licensure, malpractice). But more than financial and regulatory concerns, the novelty of synchronous telehealth care has, at times, sparked less productive debate regarding how to proceed.

A common approach to validating telehealth solutions, for example, is to compare its equivalence with face-to-face options. This comparison has largely generated qualitative support for telehealth with intentions of adding rigor to comparative model design. This evaluative design, respectfully, only makes sense if access to both care options is available equivalently. As telehealth typically targets access barriers to care, a risk-based approach would compare telehealth with available care options (i.e., often limited to none). Framing this risk consideration in terms of access rather than distance is also deliberate to reinforcing awareness of widespread access challenges whether 600 miles or six blocks from the nearest provider.

Evaluating telehealth in terms of risk assessment also has the virtue of reframing historically stalled challenges. Cost benefits, for example, whether in terms of return on investment or the management of spiraling costs have been difficult to demonstrate without external sources of financial support to either initiate or sustain telehealth efforts. This reveals the disproportionate shifting of risk to end-users. By way of example, the telecommunications industry initially assumed a great deal of risk in building broadband infrastructure and recouped said risk with significant connectivity costs in the early Internet days. At present, broadband costs have come down considerably, but there remains an unfavorably high cost to value ratio with broadband throttling and last mile limitations. Recognizing that broadband should be viewed more like a utility than a commodity, governmental and private initiatives are now seeking to encourage more complete infrastructure development.[28,29] In doing so, the goal is to encourage innovative ways of adding value to broadband use rather than limiting this value to broadband subscription.

Having adopted a widened perspective and reframed challenges through balanced risk consideration, the path to sustainable telehealth is by no means assured. Challenges remain in a still largely unmarked development path. But though unmarked, there is a growing momentum within the technology, government, and payer sectors pushing hard to adopt innovation in response to the health care crisis at our collective doorstep. Among providers and patients, a shared interest exists, but behavioral change is difficult, and limited historic participation from these key stakeholders runs the risk of the tail continuing to wag the dog.

Before delving into specific insights, there are two more constructs that offer some general assistance when considering telehealth development: Adopter Categorization and The Hype Cycle.[30,31]

Rogers stratifies the adoption of innovation into five user categories that follows a basic Gaussian distribution: Innovators, Early Adopters, Early Majority, Late Majority, and Laggards. Setting aside the social science implications, this construct is helpful at the individual and population level in directing the investment of resources. In terms of engaging collaborators, even critical need is likely to be insufficient among the few Laggards. The much larger Early Majority group, however, represents the key to driving widespread telehealth diffusion as they build on the niche efforts of Early Adopters.

The Hype Cycle describes technology adoption as following an early peak of interest followed by the "Trough of Disillusionment." From here, only a fraction of innovative technologies are able to dig out onto the "Plateau of Productivity." At present, VC is predicted to be on the verge of such a plateau. In short, the time is now.

Insight as Allegory

Reflecting upon practical telehealth insights, both learned and observed, led to the notion of allegorical guidance. Storytelling is an essential though underappreciated skill set cultivated over generations in order to distill cultural zeitgeist and preserve collective knowledge. Though typically ascribed to artisans, storytelling is routinely practiced in health care whether to assist patients' understanding of complex processes or colleagues collaborating with each other. Far from discounting the scientific method and borrowing from Justice Oliver Wendell Holmes, insight as allegory seeks to find simplicity on the other side of complexity.

Approach – http://runningahospital.blogspot.com

For those unfamiliar with Paul Levy, his efforts at transparent discourse through social media (e.g., blogging, tweeting, and friending) has helped to improve his institution's operations, but more interestingly, advance the dialogue on key health care issues such as patient safety and end of life. He accomplished this by openly sharing the failings of his 600-bed hospital. Rather than focusing on technology's transformative potential, he set about transforming health care by stepping out in front with technology.

Some may still question the bravery and brilliance of this chief executive storyteller to adopt untested vehicles in order to publically communicate mistakes, but herein lies a lesson in the value of an open and transparent approach to encounters outside of conventional organizational pathways. To put a finer point on it, the mission of Beth Israel Deaconess Medical Center is not dramatically different from other academic medical centers. The comparative distinction is moving past intention toward engaging others in novel ways that are either encumbered or impossible by traditional means.

A critical descriptor associated with a transparent approach is appropriateness. Consider any historic synchronous telehealth initiative with a disastrous outcome. There are not many, which are attributable either to the yet unproven stability of telehealth (less likely) or telehealth's limited operational scope (more likely). The high profile cases that do come to mind typically demonstrate an inappropriate approach to health care services independent of the technology. For example, scrutinizing e-prescribing or telehealth itself when a provider authorizes a prescription without a therapeutic relationship that results in an unanticipated death is comparable to blaming the paper industry for prescription pads used by unscrupulous individuals to illegally obtain or dispense controlled substances. So while a great many things are possible through technology, simply defying convention is insufficient both in terms of approach and appropriateness.

Expectations – Pandora

The story of Pandora often comes to mind when confronted with the growing number of concerns swirling about the open box of telehealth transformation. But lest we trap hope by closing the lid too soon, negotiating a path to sustainable telehealth can be achieved through realigning expectations.

Discussion of expectations casts a light on the broader challenge of presumed perfection in health care. Within telehealth, this sort of presumption has led to an enormously high threshold for acceptance. A number of years ago, considerable attention was devoted to VC technical aspects for fear of missing nonverbal cues or limiting rapport. Though not entirely unreasonable, a story told by a colleague recalled a early telehealth adopter who queried when the last time a patient asked their doctor for a vision and hearing test result prior to a face to face encounter.

More recently, Moore's Law has driven down the price points for high-end VC technologies with concurrent growth in low-end software-based VC solutions. One such solution has even achieved the elite distinction of being used as a verb…Skype. Though there are legitimate concerns with privacy and security in using Skype clinically, there is also an opportunity for providers to facilitate the discussion of expectations and risk management with both technology and patient stakeholders. Though admittedly libertarian in tone, anyone considering novel technology in health care has the right to their choice, whatever the risks, but also the responsibility of being accountable for such choices. And though not entirely immune to negative consequences, informed and aligned expectations offer considerable hope in addressing critical care delivery challenges.

Innovation – Norman Borlaug

The origin of dwarf wheat, a high-yield and disease-resistant food source, is a story of defiant innovation during a global crisis that averted widespread starvation and death. The details of Dr. Borlaug's story reveal thoughtful and wide-ranging departures from conventional agronomy that possess several useful parallels to be drawn with telehealth.

Dr. Borlaug accelerated his breeding schedule by taking advantage of two growing seasons in Mexico with the unexpected benefit of more environmentally adaptive strains of wheat. A telehealth model with significant promise is the collaborative care model of specialty telehealth service delivery (e.g., psychiatry) within primary care environments. Beyond the efficiencies of two services collaboratively accelerating care plan formulation; this telehealth medical home model also creates more adaptive service delivery options necessary for telehealth expansion and sustainability.

Rather than simply comingling multiple varieties of wheat with differing disease resistance, Dr. Borlaug cross-bred progeny and parents toward merging several resistances into a single strain. Personal experience in delivering synchronous psychiatric telehealth care to incarcerated juveniles has revealed enormous potential in merging telehealth models to include multiple points of care access. Creating the ability for a telehealth provider to follow an at-risk youth "through the system" (i.e., prison, detention center, group home, parole office, hospital, or school) would stave off a number of ills plaguing our current care model as well as potentially impacting other crises such as recidivism or obesity.

A third achievement that averted global starvation involved dwarfing the now adaptive and resistant wheat varieties. Dwarfed wheat has the virtue of supporting higher yields of grain without collapsing under the weight. With respect to telehealth, providers would benefit greatly from establishing strong ties to the communities and resources around which their patients live. These ties would not only ensure adequate safeguards, but also likely yield improved outcomes.

Environment – Plato's Cave

Perhaps, the archetypal allegory reinvented by the Wachowski brothers in The Matrix trilogy, the emergence from shadow to sun is helpful when considering the largely inhospitable environment telehealth seeks to propagate within. This inhospitality is far from nefarious albeit sometimes a bit shortsighted. As previously suggested, multiple factors result in environment lagging behind innovation. And though this relationship remains certain, the jeopardy lies in not looking beyond the shadows.

Take medical licensure. The cost prohibition of obtaining multiple unrestricted licenses in order to realize the true potential of workforce redistribution is fairly obvious. And while respectful of states' rights and the responsibility of protecting its citizenry, including provider interests, licensure boards offer variations of a state-based restricted telehealth licensure with little reduction in monetary costs and inescapable increases in administrative costs. A national telehealth licensure solution is capable of reducing the burdens of cost and administration, while leveraging digital information toward maintaining an electronic provider registry, already in existence through the NPPES, and allowing for the potential to customize requirements in partnership with each state.

Consider disaster relief. The list of regions impacted by disaster around the world continues to grow with diminishing response capacity after each subsequent crisis. In the Gulf Coast following Hurricanes Katrina and Rita, an overwhelming display of goodwill resulted in numerous providers offering their time and expertise. Having contributed to this relief with telehealth development support, longitudinal engagement with stakeholders across four states revealed a common regional response. The volunteerism was most welcome, but ultimately unhelpful given the short time frame and large bolus of volunteers who were more likely to get in the way that help out. Examination of the expedited volunteer approvals from state governments revealed that the outcome reflected the terms of the regulatory exceptions. If only a fraction of the volunteers were permitted to support the region long term through telehealth and from their hometowns (e.g., 2–4 half days per month, for 1–2 years), there would very likely be a different profile of need across the region.

To be clear, the use of the cave allegory is not intended to pejoratively label anyone as captive to false shadows, but instead, acknowledge the universal difficulty with seeing beyond the walls in front of us.

Digitization – The Tower of Babel

Though particularly relevant to the topic of Electronic Health Records, the digitization of health care through VC and other support technologies will very likely create a Tower of Babel given the current lack of standards with a resulting information cacophony that will persist as more people make this digital transition.

This assertion is far from a criticism as it describes an inevitably challenging developmental stage that presupposes an en masse concerted decision to move from an analog to a digital superstructure. But rather than resulting in the scattering of languages about, a common tongue is sure to emerge driven by some combination of regulatory guidance and commercial market forces. And much like the evolution of radio wave transmission, which progressively differentiated into increasingly more functional and robust solutions, digital information will ultimately adopt a similar though more accelerated evolutionary path.

In terms of synchronous telehealth, anyone may discover an opportunity to participate in the maturation of digital communication, but efforts may best be served in simply maintaining some degree of digital communication facility. It should be stated plainly that the practice of telehealth care is distinct from traditional health care. Moreover, telehealth services are unlikely to replace in person health care, but instead, serve a crucial adjunctive role in resolving access and personnel issues. To that end, telehealth encounter structure and goals may significantly deviate away from traditional training expectations. As such, resources should be directed toward providing structured exposure and consideration of how health care communication will be impacted in the future. More than tutorials on netiquette or how to email with patients, Internet-enabled telehealth environments should eventually occupy equal standing in terms of learning to engage patients whether in the clinic, ward, emergency department, or the Web.

Virtual Reality – Mount Olympus

Having devoted attention thus far to real world representations of self, alternative representations of self also bear mentioning. The gods and goddesses of Olympus are a useful jumping off point as patrons for the best (and worst) parts of our selves. But more than iconic symbols, these ancient myths also tell the story of Olympians commonly adopting alternate forms when engaging others.

This act of adopting alternate selves finds modern roots in the entertainment world with the advent of massive multiplayer online role playing games (MMORPG) in the 1990s. Within fictional fantasy worlds, players would adopt avatars and engage in quests of epic heroism or deceit. The technology driving this billion-dollar industry of virtual avatars has led to some notable extensions into the health care arena.

Second Life[32] represents an immersive virtual world populated by residents who represent actual people interacting with each other through self-created avatars. Unlike MMORPG, residents in Second Life are not given quest parameters, but are instead given the tools to create an avatar and environment to pursue a wide range of activities. A fairly recent examination into these activities revealed five distinct health-related pursuits from individuals, organizations, and agencies around the world.[33] These activities suggest a fascinating reconsideration of self and what it means to engage one another meaningfully. Time and further examination will tell how a Second Life may assist or impact our first one.

The founders of Patients Like Me (PLM)[34] were inspired to create an open social media environment that allows people with debilitating diseases (e.g., ALS) to share experiences and knowledge toward creating community, improving quality of life, and helping to drive comparative effectiveness research through outcome-based patient data. In many ways, the polar opposite of Second Life, PLM offers an asynchronous, largely text-based virtual environment. PLM does offer an avatar feature depicting a two dimensional figure, but the simplicity belies an extraordinarily robust means of leveraging health information in a transparent, patient-driven, and transformative way.

Model Design – The Great Pyramid

The final allegorical insight considers telehealth model design. One might be surprised to learn that one of the most sustaining architectural constructions in history has only three rooms. The Great Pyramid rests upon a Subterranean Chamber that some admittedly fringe experts believe served as an unseen engine room whose purpose approaches the unbelievable. Above this chamber is the misnamed Queen's Chamber where day-to-day high priest operations occurred. These operations served the ultimate purpose of the King's Chamber, where the pharaohs were laid to rest and their spirit awaited transmission to whatever lies beyond the mortal world.

The number and purpose of pyramid chambers match up well with the number and purpose of this suggested telehealth model design. The foundation of the telehealth model is one of Stability and encompasses issues of standardization, security, privacy, and other "unseen," but vital components. Upon this foundation rests the usability of a telehealth model. This incorporates the routine operational protocols, both scheduled and emergent, in the delivery of telehealth care. The crowning level of telehealth design is Exchangeability, the primary purpose of telehealth care. Exchangeability speaks of how individual models connect up to the broader whole for purposes of sustainability as previously mentioned, and also for yet unrealized benefits. These benefits will range from the pragmatic such as identifying orphaned orders thereby avoiding costly redundant activities to extraordinary such as pooling patient data like PLM, but including crime statistics, school performance, and other data sets toward real-time meta-analysis impacting far more than physical health.

Though a long way from dynamic access to massive population-based data sets, the potential transformation of health care delivery and population health begins to resemble science fiction more than science fact. Momentarily tabling the current debate surrounding how to structure, contribute to, and access such a data set; the digitization of health care is believed to eventually benefit society on the magnitude of antibiotics, immunizations, and, of course, dwarf wheat.

Conclusions

The stories, observations, and reflections above are offered up as suggested signposts, which conclude that it's less about the technology and more about the approach and expectations of the digital innovations within health care. The environment will continue to adapt, but not without persistent effort from increasing numbers of people striving to do better. Whatever the reality, virtual or otherwise, there will continue to emerge yet unrealized pathways toward responding to the broad challenges of the day. If still unconvinced about the potential found within the Internet, the recent TED Talk with Jane McGongal is fodder for a different chapter in a different book.[35]

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Managing Clinical Care in a Pervasive Computing Environment

6

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Behavioral healthcare is, for the most part, an information-driven activity. In fact, it is possible to view the health-giving transaction as an exchange of information. This chapter deals with technology issues related to the electronic capture, dissemination, and analysis of clinical information – all now impacted by newly emerging environmental realities. One of the chief realities is the Federal commitment to subsidize the increased use and value of electronic health information technology (HIT). The passage of the American Recovery and Reinvestment Act of 2009 (ARRA) has created billions of dollars of incentives for individual providers and practices to incorporate the *meaningful use* of HIT into their work and hundreds of millions of dollars for states to develop and enhance the health information exchange (HIE) capacity to enable these providers to electronically "talk" to each other.

Another reality is the emergence of a new category of technology device, the smart phone, which is best viewed as a computer-in-the-hand, connected to a ubiquitous network on a wireless basis. In the wings are a wide variety of devices such as tablets that will use the wireless network and more powerful hardware and applications to bring even more mobile functionality to healthcare providers. The determining factor in the importance of these devices is that they represent a medium for robust, intuitive software applications, including healthcare applications, all attached to easily accessed "stores" to purchase or sample this software. While behavioral healthcare has not been a significant market target for large electronic medical records (EMR) vendors, we can anticipate that developers – perhaps behavioral healthcare practitioners themselves – will respond to the opportunity to create inexpensive applications that will be useful for some of the functions mobile behavioral healthcare providers must carry out.

With major technology companies such as Apple and Google now fully committed to making mobile computing easy, productive, and available from anywhere, and with Verizon, AT&T, and other vendors locked into rabid competition to sell these smart phones and their evolutionary follow-up devices while continuing to build out their wireless networks, we are now deeper into the *pervasive computing* environment predicted earlier.

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NIST defines pervasive computing as “Shorthand for the strongly emerging trend toward:

- Numerous, casually accessible, often invisible computing devices
- Frequently mobile or imbedded in the environment
- Connected to an increasingly ubiquitous network structure

There has been a dramatic increase, since 2002, in the development of the *increasingly ubiquitous network* specifically geared to healthcare information. Because there is a growing awareness that the real value of digital healthcare information lies in the ability to share that information with *virtual teams* of healthcare providers, each working with a specific patient and his/her family, more regions and states are working to develop health information exchanges (HIEs). At the same time, the Federal government is creating the standards, policies, and services that will create the *network of networks*, the Nationwide Health Information Network (NHIN). More importantly, the Office of the National Coordinator for Health Information Technology (ONC) has funded HIE projects in all states that eventually will enable healthcare providers to share patient-specific information at the point of care.

The aim is for easier computing, and making it more available, everywhere it’s needed. Because *pervasive computing* so succinctly captures the emerging blending of technologies noted above and the goal of “wherever, whenever, however” computing, it remains a key defining theme for characterizing the environment enveloping behavioral healthcare.

While the technology continues to change in ways that make it more useful and accessible to behavioral healthcare practitioners and while the Federal government is committed to provide incentives for the use of such technology, behavioral health does labor under some limitations. For example, the Federal government, through ONC, has targeted these incentives primarily to primary care outpatient practitioners. Thus, only behavioral healthcare providers who work in blended primary care practices may enjoy the benefits of these incentives. In addition, the *meaningful use* standards for securing these incentives require that healthcare practitioners share information with other providers, thus linking the HIE efforts noted above to these individual incentives.

Other incentives exist through Medicare, Medicaid, and some commercial insurance companies for using e-prescribing (e-Rx). The Physician Quality Reporting Initiative (PQRI) enables behavioral healthcare practitioners to report specially coded Medicare claims data reflecting quality improvement performance indicators. Relevant indicators for behavioral healthcare involve depression; some practitioners who use general medical management codes can also report these.

While these incentive programs have broadened the amount of resources that behavioral healthcare practitioners can receive to “wire” their practices, the inherent limitations in venue of practice or practice activity make it highly unlikely that even the most aggressive behavioral healthcare practice can secure the capital to defray the complete cost of a full-fledged EMR. Thus, most practices and practitioners still find themselves limited by the shrinking resource base for private practitioners and organized providers.

Finally, there remains a lack of a critical mass of appropriate technology spread throughout the behavioral health industry. Even if behavioral health practitioners avidly adopt the mobile technologies noted above and even if the market creates a number of useful, elegant applications for such technology, these applications will, of necessity, only encompass bundles of clinical functionality and not represent robust EMRs. Thus, with all that has changed for the better since 2002, there remain significant technology challenges facing the behavioral healthcare industry. And it is likely that these challenges will exist for the next decade, for reasons discussed below.

Information Flow Dilemma in Contemporary Healthcare

A major duty of the healthcare professional is to assess the information gleaned from the client and others and then use that information to collaborate with the client in some health-enhancing way. Accreditation and/or state licensing requirements, operating on the "if it is not written, it did not happen" principle, require documentation of any client/patient and caregiver information, thus giving rise to the phenomenon known as "paperwork." Paperwork, to a clinician, is time spent interacting with paper instead of clients. Turn this documentation into an electronic process, and clinicians would still consider it "paperwork" since it is *about* clients, not *with* them. Clinicians are drowning in paperwork because of the client documentation requirements demanded by major payers. Major payers require proof of medical necessity, a clinical concept requiring clinical judgment couched in clinical terms, as well as proof of value. Proving value requires some definition of desired outcome that has to be defined in clinical terms, or at least functionally.

This information flow is now more critical than ever. Information is passed from the client through the practitioner to others in the healthcare organization. This is then sent to external parties, primarily the payers of the client's healthcare services, thus directly impacting the practitioner's viability, whether that practitioner is an individual or an organization. In addition to review by the payer, there is an increasing amount of postservice audit for publicly funded programs such as Medicare and Medicaid. The Tax Relief and Health Care Act of 2006 made the Recovery Audit Contractor (RAC) program a permanent part of Medicare and expanded it to all 50 states by 2010. The RACs receive a portion of all overpayments they discover, making them essentially medical *bounty hunters*. When Medicare demands millions of dollars back from hospitals and community mental health centers, primarily because treatment records could not support billings, the need to control that clinical information flow becomes a matter of fiduciary survival, not simply a matter of best practice.

Behavioral Healthcare Issues

Behavioral healthcare has especially been impacted by these information flow trends. Because behavioral healthcare claims increased at rates even greater than general healthcare in the 1980s and because commercial insurers and Medicaid agencies did not have the clinical expertise to review such claims, they contracted with a variety of managed care organizations (MCOs) that usually got a “carve out” dollar amount from the insurer – often on an “at risk” basis – and the mandate to control behavioral healthcare costs.

Thus, behavioral healthcare practitioners often confronted a demand for prior authorization – a sign off by the MCO for a limited amount of care, whether inpatient days or outpatient visits. These limits were not based upon clinical protocols or scientific research, but were actuarial in nature, limits based upon the amount of money the MCO had at risk in its “carve out” contract.

As the MCOs rigorously reviewed inpatient services, given its cost, the behavioral healthcare industry developed a number of less intense services, so that patients could be titrated through a continuum of care, with each step less costly than the preceding, more intensive step. With the creation of each step – residential treatment centers (RTCs), partial hospitalization programs (PHPs), and intensive outpatient programs (IOPs) – behavioral healthcare providers had to provide another layer of information, most of it clinical in nature, related to the medical necessity for the care. In the absence of nationally recognized, standard criteria for medical necessity, providers had to confront multiple criteria, from multiple MCOs.

Reflecting trends in the general healthcare environment that emphasize *value* and *quality*, behavioral healthcare providers must now provide information related to the *outcomes* of their interventions. These outcomes may be reductions in symptoms or increases in function, or both. Again, multiple MCOs/payers require multiple, different documentation for these determinations. Fortunately, as the drive to increase the quality of medical care intensifies, there are national efforts to standardize the performance indicators. As a result, the PQRI program, as one example, uses indicators endorsed or accredited by the National Quality Forum (NQF), with openly published specifications. Many commercial insurers and MCOs with outcomes-oriented programs are beginning to use more standard performance indicators, such as NCQA’s Healthcare Effectiveness Data and Information Set (HEDIS). Unfortunately, HEDIS has only one behavioral healthcare measure.

As a result of all of these factors, however, information flows within the behavioral healthcare industry have changed in quantity and quality over the past decade:

- Payers have migrated transferred more risk to providers or other intermediary organizations.
- Providers must meet a daunting variety of requests for clinical information.
- Value/quality is now the defining criterion for success in the marketplace.

Prior to the impact of the factors noted above, clinicians simply had to report the type of service, the length of treatment, and information regarding the recipient. As a result of these factors, they now have to document a range of information that flows from the client’s eligibility for service. This included problems faced by the client creating a need for service, the lowest level of service required to meet this need, the interventions used as part of the service, and their projected and actual resulting outcomes. This information overload inundated all paper-based systems, rendering them useless. Reflecting this overload, we characterize this era the *tsunami period.* Equally important, this vast volume of information represented data of a completely different type than previously collected. Thus, both volume and type of information are compelling disrupters to providers of clinical care.

As providers took on more financial risk and were required to document every aspect of the patient–provider interaction, they realized that they needed to answer different, more complex questions:

- How can they define the client's problem, so that they simultaneously outline the level of care to be provided?
- How can the activities of multiple practitioners be coordinated to create an optimal intervention episode for the client, so that the least amount of resources are used to meet the need and the client derived the highest level of satisfaction from the episode?
- How can the provider of the services convey the value of the services to the payer, as well as to future and current clients?

Confronted with such questions, the practitioners learned that their practice management systems were unable to satisfy them, since their systems were never created to answer such questions. These particular questions require the integration of clinical information with financial, demographic, and administrative data in order to answer them.

Historically, healthcare providers had adopted information technology primarily to handle their business operations; few clinics or healthcare offices lacked computers on the desks of the administration, receptionist, and back-office billing. Driven by event data – who did what to whom and for what period of time – these back-office systems adequately handled fee-for-service billing. Institutional providers could expect more from their automated practice management systems, such as accounts payable, budget, payroll, and inventory management, but all of these functions are essentially back-office activities. Most private practitioners now have more state-of-the-art practice management, because such applications add scheduling to the back-office systems.

Confronted by the failure of their paper systems, clinicians turned to their computer-based system, expecting it to be their productivity solution. However, as noted earlier, these systems, essentially back office in nature, were never created to meet such expectations. Capturing clinical data electronically is challenging for at least two reasons: (1) clinicians in the past have never had to capture such great volumes of highly complex information, and (2) capturing clinical data requires the integration of a broad range of technologies, many of which are in an emerging state. In the face of the overwhelming need to create and capture information, one would expect a virtual blossoming of the informatics market, with clinicians using technology to capture clinical information faster, cheaper, and better. Unfortunately, disappointments abound. After all, few clinicians, especially in organized settings, have a computer on their desk, and those find that it meets only a limited number of their needs. This void can be explained by a combination of the following factors:

- Emerging, but still immature, hardware technology that captures the mobile nature of much behavioral healthcare practice, with the practitioner functioning over multiple nodes in the continuum of care.
- A shortage of software technology within the behavioral health industry, reflecting the still fragmentary nature of medical necessity criteria and the linkage of such criteria to treatment level and outcomes.

- Continued constraints in resources for private practitioners, especially those not practicing in groups, and organized providers, limiting the capital needed to invest in technology.

This chapter shall expand upon the above factors and deal with technology issues that are related to the electronic capture, dissemination, and analysis of clinical information. Each of these processes represents distinct challenges, with respect to applying information technology. Each of these processes must be technologically harnessed in order for clinicians to answer the questions posed earlier related to the linkage of problem to level of care, the coordination of multiple providers, and the demonstration of value. The development and implementation of a common standard clinical language like what has been done by Bangara and colleagues (HSI) is a promising development.

A Primer on Data Capture

As previously mentioned, clinicians are now required to capture a greater volume of complex information than ever before. To get a sense of the new requirements, it is crucial to remember that the electronic world is a binary one. All information in the electronic world must be *coded*, or translated, from the multivariate world into a binary one. Coding comes in many forms. One such form is *software*, or coding that mediates transactions between the physical and binary worlds. The next level involves coding within the software. At this level, we create categories of information, represented by numbers or letters that are easily input, or entered, into the software. Because of the complexity of the process, we welcome *standards*, or codes that come to mean the same thing to those who regularly deal with the code information.

Before the tsunami period, the information and standard codes used were broadly derived. The back-office, computer-based systems both created and depended on these codes. Because the billing system was of primary importance, standard-coding systems evolved to define provider services, namely the Current Procedure Terminology, CPT, codes. Standard billing forms, such as the UB 92 and HCFA 1,500, evolved to support emerging codes. All other required elements, such as the service providers and their credentials, the service recipient (reduced to a number), and the duration of service, were easily coded. As this coded infrastructure developed over time, the software, which translated these standard codes into the binary reality that hardware could process, also developed in power and sophistication. Information technology could now easily absorb the data, although the process of applying information technology to information processes required congruence between the technology used and the coding of the information. These processes were interdependent; neither was sufficient on its own. As a result, the standard billing forms themselves evolved. The UB-92 became the UB-04, with additional required clinical data; the HCFA 1500 became the CMS 1500, also with additional required data. However evolved, these forms still defined a standard coded environment for a significant amount of healthcare-generated data.

This pre-*tsunami* world was batch-oriented in nature. Entered data did not have to be accessed in real time. Bills could be run at periodic times, dictated only by volume and cash flow needs. Other information, such as budgets, vendor payments, and provider productivity, could also be bundled into reports that were periodically created and used. In short, there was a discontinuity between data capture and data processing. Given the parameters of this period, however, that discontinuity reflected its requirements. Clinical information was electronically irrelevant; it existed in the carbon paper world.

The contrast with the post-*tsunami* world is stunning. Because there was no history of collecting behavioral healthcare clinical information, no group of software applications reflected how clinicians actually worked and integrated clinical with financial and administrative data. Behavioral healthcare clinical practice was subdivided into multiple, often warring, disciplines that had different “schools of practice” within each discipline. These further divisions often created sharper disagreements than those of the parents. Other than the DSM series that codified behavioral health diagnoses, there was no set of universally accepted clinical protocols that flowed from these diagnoses; practitioners did not follow a standard practice. Thus, there was no coding infrastructure available to categorize clinical information. In the absence of any standard content that could be coded into software, there was no broadly accepted software available for clinical processes. The arrival of DSM 5 will not change this situation in any meaningful way.

Niche systems existed at one time and will continue to do so. These software packages generally automated only one aspect of the clinical process, such as treatment planning, or specific assessment instruments. In no case, however, did these software applications integrate into practice management applications. There was no way to provide for the comprehensive data stream required to meet the new demands. By and large, these conditions persist now, since there is no dominant set of EMRs tailored specifically for behavioral health, and commercially available.

Other elements of the clinical information flow reflected the same segmentation. Eligibility for service varied from contract to contract. No universal menu of benefits existed, as risk-managing enterprises used the benefit plan as a marketing differential. The administrative risk manager defined “Medical necessity.” Value was not measured by standard outcomes.

Integration of Multiple, Emerging Technologies

The exchange of clinical information between a clinician and consumer is separate from the information “transaction” that occurs between the clinician and technology. Bridging this gap is what pervasive computing is all about.

In the intervening years since 2002, there has been a significant increase in the number of EMR and practice management solutions available for individual, group, and organizational behavioral healthcare providers. Where there were once only 10 or 20 such applications, there are now over a hundred, with new ones entering the marketplace yearly. A review of these applications reveal a number of key convergences that signal that the market is beginning to address a number of the issues outlined above to bridge the gap:

- Many of these applications now combine the clinical process (EMR) with the business process (practice management or PMS), so that there is a full integration of demographic, administrative, and clinical data available for report generation and clinician review.

- Many of these applications are Web-based, enabling practitioners to access the application from anywhere, on any device that has a browser.
- Many of these applications have been developed by behavioral healthcare practitioners, or in intense collaboration with them. Thus, the workflow more closely adheres to common clinical interventions, bridging the gap noted above.

Before we explore further the conditions required for bridging technology and clinical transactions, we need to explore some of the implications of such a bridging action. The first issue is that this post-*tsunami* world is a “real-time,” as opposed to a “batch-oriented,” world. As clinical and technology transactions occur, entered data will determine what additional information needs to be captured in collaboration with the client and what care might be appropriate. This will happen in real time, as the clinician works with the client.

As part of the intake process, for example, there are usually questions that attempt to assess the risk the client poses to himself or to others. In emerging electronic world, different responses to the question about suicidal thoughts would generate different follow-up questions, as a result of *branching logic* embedded in the software. A “no” would be followed by a question about suicide history. The patient can answer with different levels of “yes,” such as: “yes, but not in the last 3 months” as opposed to “yes, in the last 24 h.” The resulting answer presents different questions for the clinician to act upon, such as: ask and answer, probe for intent, level of plan, and access to means. Equally important, these answers shape the approach to intervention, presenting the clinician with prelisted problem areas to address upon beginning the treatment plan.

In this real-time world, the content of software applications will drive the merging of reporting and intervention practice. Continued research uncovers severity indicators that permit differential interventions, depending upon the data generated in collaboration with the client or from administrative data available to the clinician. We are establishing the technologies and skill base required to develop, maintain, and enhance such content in our efforts at “knowledge management.” We continue to master the art of creating this type of comprehensive, multiuse clinical content. The “art,” in this case, is in creating a rich universe of data points that captures the clinical processes and workflow actually used by clinicians. The more we capture the intervention with data points or structured data, the more downstream leverage we create, since clinicians can use these data points for so many complementary purposes.

Data points can be transformed from real time to narrative reports. In fact, these data points can be converted into a broad range of reports, so that a single effort on the clinician’s part can result in the completion of multiple tasks. For example, upon finishing an electronic intake that embeds carefully developed clinical content, a clinician can:

- Print out a report in a format approved by his/her agency for inclusion in the paper record, if one is still maintained.
- Print out or review, then electronically send a medical necessity report to the MCO behavioral health risk manager.
- Digitally sign and authenticate, then send a copy of the intake report to the client’s electronic medical record.
- Send selected data points to the outcomes or quality improvement data warehouse.

Rich clinical content, however, must consist of more than data points. Narration is needed to qualify, individualize, and create a context for the data points. While narrative statements are difficult to code and analyze, they are critical in capturing the richness of the clinical intervention. Some state licensing personnel, in fact, recoil from automated treatment plans because they view the outcome of such applications as “canned.” Automated treatment plans are seen by some as incapable of making specific and individualizing connections among the intake process, treatment planning, and ongoing service documentation. Properly developed clinical content with spare, but leveraged, narrative text should strike a balance between data input simplicity for clinicians and rich, individualized data reporting.

There are technological implications associated with this reliance upon narrative text. Such text is not structured electronic data and thus is often not available for report generation. If such narrative is isolated to therapy notes that are fully protected by HIPAA and kept in its own “walled garden,” this limitation is significantly mitigated.

Electronic speech-to-text capability would be useful to any technology that brings together reporting and intervention practice. The ability to quickly dictate, as opposed to typing, narrative text will greatly increase not only the clinicians’ accessibility to, but also the acceptance of, informatics – provided this technology is accurate enough that it does not require many passes by the clinician for corrections. Current speech-to-text technology, particularly if the clinician is willing to “train” the application by dictating large amount of text prior to use, produces reasonably accurate output, particularly if the clinician dictates only small amounts of text. It is important to note, however, that speech recognition technology has one other severe limitation: it is best used *after* a face-to-face interaction with the client. Few clinicians would be so rude as to dictate narrative in the client’s presence. Most of today’s clinicians would prefer a paperwork-eliminating system, even if they had to use the precious time after direct client interactions to do the data capture. Unfortunately, the ideal situation from a productivity standpoint is for data capture to occur as the intervention occurs. With the wide range of smart phones and tablets entering the market, however, clinicians increasingly type text of all kinds for multiple applications. Thus, for many clinicians, speech-to-text technology is not necessary, though appreciated.

As our industry creates clinical content and workflow that actually reflects the clinicians’ work, the technology that we use to create and deposit information would have to have other critical abilities. Rigidly constrained workflow and information collection processes become progressively useless since clinical protocols change. The practice of intervention itself would change as the result of systematic outcome analysis, as new evidence-based practice replaced or supplemented the old. Licensing and accreditation systems change, thus spurring reporting changes down to the client–practitioner level; state licensing and reporting requirements change significantly over time. Thus, the technology that embeds clinical content would have to include tools that enable clinicians to change the content as needed. Template building must be intuitive and easily accomplished, perhaps even allowing changes on an ad hoc basis.

Another level of flexibility is also required. As noted earlier, one dimension of informatics is the push for “one pass” productivity: the clinician’s ability to complete multiple tasks with “one pass” of work. The ability to generate multiple reports with the same data points is at the heart of these multiple tasks. However compelling this ability may be, its value is limited if there is no easy way to create and modify report formats. This capability is so important that clinicians may be willing to accept limited variability in the data i*nput* process, as long as they can create significant variability in the data *reporting* process.

With the institution of content established, as well as the need to have tools that can create and modify it, we can now turn to the technologies required to embed this information. The important thing to remember is that a variety of technologies are involved and all must interrelate. In order to concentrate our review of technologies, we need to start with the clinicians. What are their expectations with regard to technology?

The Promise of Technology

One must consider several baseline expectations when developing clinical applications to meet clinicians' needs:

- As noted above, technology must reduce the amount of time spent on "paperwork" by operating on a true "single entry" process. Once entered, the information should be available without having to enter it again elsewhere in the intervention: it is simply provided by "the system."
- "The system" should alert the clinicians if they have done something patently foolish or could increase their own or their employer's risk.
- Technology should be transparent, nonintrusive, and intuitive. One should be able to use it effortlessly.

This last point deserves some additional attention. First, one should appreciate how clinicians work. Clinical activity does not occur in a vacuum – clinicians must take into account a variety of practical considerations. Clients must be scheduled for future interventions, which in turn may trigger additional authorizations for service. Clinicians must report to others how they use their time, especially for billing purposes. The expectation is that these supporting functions will be fully integrated into clinical applications. Quick, one-click access to a scheduling tool saves valuable time and reflects how clinicians want their work to flow. Rapid access to authorized services is invaluable when planning interventions. An option at the end of any reporting or documentation transaction should be the ability to record a clinician's time. This type of organically featured technology, coupled with the appropriate clinical content, begins to close the gap between reporting and intervention practice.

Turning to the "where" of intervention practice, a shrinking proportion of clinicians are desk-bound. In the public sector, the push to serve the most severely disabled has created a spate of services that have a rehabilitative approach and are delivered at scattered sites throughout the community. This is often called a "wrap around" service by clinicians, who borrowed the term from the children's services that describes this approach. Wrap around services are the antithesis of institutionally based services. Rather than place the person in a specialized environment, individualized services are provided, or "wrapped around," in the general environment – home, school, and the workplace. In both the private and public sector, highly skilled and appropriately credentialed staff periodically travel circuits that take them to multiple service locations. These may include: satellite offices within their practices, nursing homes, hospitals, schools, and group homes. Inpatient and residential services require staff to move from room-to-room and floor-to-floor; even practitioners who do not provide wrap around services may work in a facility or campus that requires them to move about. All levels of staff, from physicians to aides, are mobile in such environments.

This high degree of mobility by an increasing number of behavioral healthcare staff means that any technology that seeks to converge reporting and intervention practice must be available anywhere, any time. Since the clinical transactions must be mobile, the reporting must be as well. The mobile staff requires capacity to do more than just report; they must constantly access information in order to do their work. In this real time world, clinical information comes as a constantly changing stream as providers intervene with the client. As we shall see later, the client may contribute to this stream of information independent of the practitioners, as healthcare becomes increasingly self-interventional in nature.

The conjunction of reporting and intervention practice depends upon using a *variety* of tools: the desktop will not be supplanted; it will be supplemented. What are these tools? They range from existing popular smart phones such as the iPhone or Android-powered devices to inexpensive netbooks, and now include technology such as tablets. (At the time of this writing, Apple is just introducing the iPad and likely creating a new category of interactive device.) The point is that we are starting to use a range of increasingly mobile bundles of technology tailored for very specific uses through the application of increasingly powerful software.

Companies as large as Microsoft and Google, by creating robust and elegant mobile operating systems, are enabling the large telecommunications companies to introduce a plethora of appliances into an extremely competitive market. Apple has created integrated software and hardware devices that have largely set the standard for this market. While the pricing for these devices are largely subsidized by the telecommunication network vendors, the data access charges are still significant. Consumers, however, have accepted these bundled prices for the convenience and productivity inherent in these devices. The pricing and wide availability has led to technology that is “casually accessible.” This phrase refers to more than price; it also refers to ease-of-use. Unlike the complex, general-purpose desktop computer, these appliances are designed with simplicity of use in mind, with interfaces that “make sense,” either because, like the phone, we already know how to use them, or because they are designed to access a broad range of applications that are intuitive to use and generally focused to do a narrow range of functions very well. These appliances, in short, have become *cool*. As we all know, *cool* sells, as Apple’s financial performance shows.

Clinicians will easily adapt to these ubiquitous smart phones and tablets, especially as developers create applications that reflect content and workflow useful to clinicians. With their “always on” availability and the capacity to wirelessly sync with the clinician’s desktop, case managers and wrap around staff will soon use these devices as a data review and input device as they make their circuit through client homes and other community locations. Increasingly, clinical content will be artfully designed to require only the clinician to simply “point and tap” entered data. With a wireless connection to the provider’s network and the proper security, data need to be entered only once and it will be accessible to any device connected to that network, including the clinician's desktop system. Programs residing on the desktop or a strategically placed server will use these data points to generate fully formatted paper and electronic medical records, and then send outcome data to the data warehouse. This "strategically placed server" may exist as part of the clinician's organization's infrastructure. It may, however, exist "in the cloud," as part of a large server farm maintained by Google, Microsoft, or an application provider using a "software as a service" (SaaS) model.

With the SaaS model, an individual clinician can access, generate, and store all of his/her needed clinical information, paying only a monthly subscription for this service that is accessible through any device with a web browser. In this context, even a boutique clinician, operating as a lone practitioner, can have access to all of the technology he needs to run a practice and responsibly serve his clients.

A high degree of pervasiveness is implied by such a broad use of appliances, but they represent only the first layer. Any object onto which a silicon chip can be embedded is a potential computing device. A perfect example of this assimilation of technology is an IV pouch that pages a staff once it reaches a defined level of use, alerting the staff to replace it with a new one. In the behavioral healthcare world, there are currently no uses for such technology, but creative practitioners will develop them, only because the capacity exists.

Connected to an Increasingly Ubiquitous Network Structure…

This network, of course, is the Internet and enterprise LANs and WANs built on Internet standards. With secure wireless access to these networks, clinicians now have ubiquitous connectivity. Increasingly, the universal gateway to information is an Internet browser and all appliances are browser-enabled.

The rapid development of the wireless Internet provides the infrastructure for increasing network permeation. Because of the success of smart phones, telecommunication companies have the motivation to rapidly build out and enhance their wireless networks. This broad dependence upon wireless access has led to Federal initiative to develop a broadband plan for the country. The FCC is presently proposing that, by 2020, 100 million homes will have access to download speeds of at least 100 megabits per second. The legislative "sausage making process" will material impact these projections, but the key takeaway is that the FCC believes it to be a critical part of its function to create and disseminate such a plan. The FCC now views high-speed wireless access as a critical national priority. Presently, the unprecedented demand created by the surge in demand for smart phones, with their web accessibility and data interaction, has created sometimes spotty performance, but the telecommunications companies are investing billions of dollars to meet the consumer expectation of "always on" accessibility. New standards and technologies point to dramatic bandwidth increases and system interoperability. With cable companies becoming phone companies and ISPs and fiber optic cable increasingly used as the "last mile" connection, more Americans have access to broadband Web access, much of it wireless.

Thus, it would appear that the future of behavioral healthcare informatics – the convergence of clinical and technology transactions – is to be defined by increasingly sophisticated clinical content embedded within a pervasive computing environment. There are, however, a number of impediments to this envisioned future. Ironically, one of the most significant happens to be technology-based: the security of networked clinical data.

Healthcare, and behavioral healthcare in particular, maintains that the highest value is placed on the *privacy* of individual information, even though the *security* of transmitted data is a major concern for all commercial networked enterprises. Healthcare practitioners and consumers must insist upon privacy, especially at a time when the definition of individual privacy on the public Web and on corporate intra- and extranets is one of the great public debates. The existence of medical privacy as a protected entity remains to be seen. The technology ensuring such privacy is slowly evolving, but it is critical to note that it is yet another set of emerging technologies that must mature before full use of a pervasive computing environment is appropriate for healthcare practitioners. Maturity, in this context, means transparency. Practitioners must trust nonintrusive and invisible technologies to provide the highest level of security and privacy possible.

Security is particularly important, as consumers commonly read about sophisticated intrusions into commercial networks to access and take personal information to generate ill-begotten financial gain. Medical identity theft is becoming an increasing problem, as providers are forced to “red flag” possible weaknesses in their technical infrastructure or possible anomalous data events that might signal fraud.

Security is not the only obstacle faced by behavioral healthcare informatics. “Critical mass” is needed in the field prior to technology making a difference. We can better understand this phenomenon by turning to an exploration of the second crucial clinical process, the dissemination, or sharing of, information.

Sharing Clinical Information: Leveraging Real Time Communication

Clinicians may be motivated to use informatics, since it can reduce the time they spend on paperwork – they can shift from a paper shuffling to a point-and-click accessibility. Once information is digitized, its value is not solely measured in the paper savings and unused physical space; it also lies in the ease of access and sharing. These additional benefits are important for two reasons. First, the value can be measured in the amount of time saved by clinicians not having to root through vast quantities of physical documents. Second, worth can be measured by the increased quality derived from clinicians having important information in real time, when and where they need it.

This second and most profound value, however, comes at a price. All clinicians in an enterprise and among a community of enterprises have to be wired for this value to be obvious; they must *all* have access to the technology. At a minimum, there has to be some critical mass of clinicians using this informatics technology in order for sharing to take place. An analogy is fax machines, a stand-in for any two-node technology. Their use started as a trickle, since the utility of faxing was apparent only if others had fax machines. It was only when these machines became ever-present that the full value of the technology unfolded. To some extent, exactly the same *network effect* dynamic characterizes healthcare informatics.

Studies to determine the value of health information technology have identified these network effects as providing the greatest value in implementing HIT. The rapid and timely sharing of clinical information by all members of a clinical ecosystem increases patient safety and improves the quality of care. For this reason, the Federal government, through ONC, has committed to create HIE capacity in each state. With each practitioner and organization, an active node in such a network, all practitioners become part of a virtual team, with all team members being able to see the clinical information of the others and contribute to the growing pool of clinical information impacting a patient. Some states such as Delaware and Indiana already have robust HIE capacity and the providers are experiencing the reduced costs of eliminating paper lab results and prescriptions and the increased quality that comes from having timely and complete clinical information at the point of care.

It would be a mistake, however, to view the creation of this critical mass of clinicians as a matter solely involving technological resources. We must remember clinical content's critical role in making technology useful for clinicians. A range of services exists along the continuum of service intensity in a typical community-based mental health system. There are outpatient, in addition to inpatient or residential, services. Within such a service ecosystem, various agencies serve multiple populations: children, adults, and the elderly. Agencies may also serve multiple disability populations, such as substance abusers and the developmentally disabled. It is likely that each of these service levels and populations requires specialized clinical content. The development and implementation of such content is not a trivial exercise, especially since each of these content bundles have to be localized and tailored, to some extent, for the specific service provider.

Thus, the full evolution of a pervasive computing environment, with its high degree of simultaneous access by multiple clinicians and the ready sharing of clinical information, depends on a full network infrastructure and implementation of multiple clinical content sets. Remember the fax machines: the full value of healthcare informatics becomes evident only when all nodes are fully networked. Viewed another way, the implementation of healthcare informatics is a long, incremental process, with a delayed value proposition. While individual clinicians will enjoy the benefits of such technology by an increase in their personal productivity, the full benefits to the clinical enterprise will be a trickle-flood phenomenon, with a long trickle cycle.

Another dimension to the development of network infrastructure, independent of clinical content, creates enormous value. One of the most striking aspects of the Internet is its ability to create and foster communities. Communities deal with interactive communication, and the Web is rich with interactive media. Email has been enough reason for people to purchase Web-based technology. The near viral spread of social networking sites such as Twitter and FaceBook reflects a desire for even more intense interfacing, telescoped in time and both exquisitely targeted and broadcast widely – depending upon the user's whim.

Wiring an enterprise or a clinical ecosystem, regardless of size, creates the likelihood that a wide variety of communities will be formed within it. Clinicians will use this neural network to assist them in their duties, even though doing so increases their liability as well as their employer's, since email and IM posts can be revealed to "outsiders." A policy and procedural etiquette will develop over time that limits such liability. It is possible that legal case law will find creative ways to treat such communication, so that some protection is afforded by this informal, open communication channel. If neither occurs, then inventive technologists will provide automatic deletion and “scrubbing” services that maintain this channel and limit liability. It is simply inconceivable that such community-building and communication-sparking capabilities will be killed off by the threat of increased liability.

As the threat of liability is channeled or constrained, by either technological or procedural means, the selfsame technologists will use this neural network to act as a system-wide “to-do list” service, automatically triggering reminders, prompts, and electronic nags of all types. However intrusive such a stream of reminders might be, clinicians clearly wish to shift the responsibility of recording everything on the carbon-based software inside their skulls to virtual memory prosthetics that reside on the network.

A final word about communities: there is no reason that communities must exclude the clients and consumers of behavioral healthcare. A commitment to pervasive computing means that the boundary between the enterprise and its consumers becomes more permeable. If all clinical content is on the network, then clients could conceivably have some level of access to it. They clearly have access to the Web where health searches have become one of the largest types of activity. Clinicians will not be the only ones with “casual accessibility” to network appliances and to clinical content. Clients could facilitate intake and assessments by filling out significant amounts of information prior to arriving at the physical service site. If intake and assessments could be managed, why not a sample treatment plan, guided by the same software used by the clinician? The point is to not replace the clinician, but to make the client–clinician interaction more collaborative. It should channel clinical time into higher value discussions related to client choices. This is not utopian rhetoric. Instead, it is a prediction that both clinicians and clients will arrive independently at such uses of this technology. This also includes those significantly impaired, since diminished capacity does not equate to ignorance. Truly intuitive software should be obvious enough for use by a wide range of clients. For the instances where it is not, creative developers can make the necessary alterations, or case managers can provide the necessary assistance.

The Analysis of Clinical Information: The Rise of Reflective Practice

The melding of clinical and technology transactions will create significant data warehouses, if we assume that there will be pervasive computing development and an increased implementation of healthcare informatics. Initiatives such as PQRI and the ARRA incentives guarantee the development of such quality improvement databases; they are being built at the time of this writing. While these electronic storehouses will enable researchers to “slice and dice” the data in a myriad of ways, the real issue is whether this new ability will make any difference at the intervention practice level.

In the absence of feedback, there is no internal reflection. Intervention practice will be impacted only if the information from these storehouses is looped back to the clinician. With the creation of a whole range of incentive programs – Medicare eRx, PQRI, the ARRA incentives for meaningful use – the Federal government is committed to providing such feedback. In a more sophisticated approach, intervention plans and practice can be filtered through best practice protocols and an ongoing stream of messages can be provided to the clinician, since information is quickly shared in a pervasive computing environment. This clinical "Big Brotherism" can be lessened substantially by making the access to such information optional. Younger, less experienced clinicians could be required or encouraged to use such clinical assistance during a probationary period, while the more seasoned utilize it only when desired.

We have implicitly defined "reporting practice" as how the clinician enters clinical information into a pervasive computing environment. Reporting practice should also encompass how that environment or "the system" automatically presents client-specific information to the clinician. All clinicians could access information about client treatment outcomes specific to their needs. Such information could be located on the clinician's personal clinical information portal, or "dashboard," and present automatically as part of a standard clinical profile on each client. Automatic presentation can come from multiple data sources – the local enterprise system or multiple external systems. For example, the local system can present a listing of risk potentials for the client, as reported in the intake process; the listing of medications currently prescribed and any incidence of adverse reactions to them; lab results, etc. From the external systems, the clinician could view predicted milestones of accomplishment for comparable clients receiving similar interventions, the modal number of visits for clients with similar diagnoses, and so on. Such population-based information enables the clinician to weigh the effects of his/her interventions and trigger an important interior dialogue that could affect the amount and type of future interventions. Thus, the pervasive network is a two-way highway; the comparative data that it presents to the clinician creates the capacity for reflection.

Conclusion

Narrowing the gap between clinical and technology transactions will require the integration of a broad range of technologies. Current pervasive computing technology is becoming robust, cost effective, and widely used. It is not tailored yet to provide optimum value to behavioral healthcare practitioner, because the content and applications that generate such value are only starting to emerge. It is worth noting that the Web has a short and limited history. What is expensive, highly customized, "roll-your-own technology" today will be an off-the-shelf commodity 2 years from now. The dramatic blooming of smart phone use is but one example of this. Both the clinicians and their vendors must assume this progression and begin creating the clinical content necessary to make such technology useful. Clinicians and clients will test the limits of its possibilities only when the technology and content are in place, as they create new communities of interaction.

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Improving Quality and Accountability Through Information Systems

7

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There are several definitions for Quality improvement within healthcare, as there are several purposes for it; however, most agree that its primary purpose is to improve the efficiency of a health care system while improving or holding constant treatment outcomes and the level of health and wellness of the managed population. Any attempt to manage or measure the effectiveness of a quality improvement program or activity within a health system in the absence of outcomes or measures of population wellness represent only half of the system similar to a mathematical equation with terms on only one side of the equal sign. Disregarding outcomes and wellness is to disregard the target or purpose of the QI program. Therefore, health care QI is best measured within the context of patient treatment outcomes, and/or population health and wellness are conceptually linked to patient outcomes. Though outcomes cannot often be directly measured, the goal of quality improvement is to improve patient outcomes in response to treatment. Payers of health insurance are increasingly focused on investment return, seeking maximal improvement in treatment outcomes for minimal premium dollars. Managed care companies are facing increasing scrutiny, and are being mandated to improve patient outcomes while continuing to contain costs. This chapter contains a rationale for measuring patient treatment outcomes within a system and for linking outcomes metrics to the system's QI program.

Improvement in specific patient outcomes often requires enhanced specific care management and administrative processes within managed care companies. Data are needed to guide the process of improvement, as with most service industries. Therefore, the quality of managed care improvements is dependent on the availability of accurate, reliable data. "One cannot improve what cannot be measured." Systematic evaluation of care management and delivery will require sophisticated information systems that can integrate data from multiple sources (clinical treatment records, clinical authorization information, claims payment systems, customer satisfaction and outcomes management systems, pharmacy records, and provider and facility databases). However, one must understand the history

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and application of quality improvement principles to behavioral healthcare before one can truly appreciate the information system requirements of today's delivery systems.

The focus of this chapter is on the real-life experiences and challenges of health care industry organizations, most notably managed care organizations (MCO) and their effort to measure and improve patient outcomes while containing both administrative and clinical care costs, and their response to the informatics community which has placed emphasis on the informatics solutions in an effort to deploy solutions where currently none exist. The chapter begins with a review of quality improvement in healthcare, followed by a brief review of patient treatment outcomes measurement and their role in quality improvement. The chapter then finishes with the important role of informatics in quality improvement for managed behavioral healthcare as well as its challenges and future direction.

History of Quality in Healthcare

The history of quality in healthcare can be traced to the mid-nineteenth century. Florence Nightingale observed the lack of information in hospital records and deduced that to be the reason why some patients responded well to their treatments, while others seemed not to improve or, worse, to deteriorate. Several years passed before her observations could translate into action. In 1913, the American College of Surgeons was formed by a group of American physicians who were interested in understanding the variability of patient outcomes. This group published the first set of "quality standards" for hospitals. These early standards were centered on the development and use of clinical records to assess performance and explain variation. The College developed the Hospital Standardization Program, which measured hospital compliance with its standards, in 1917. This became the first systematic quality assurance process in healthcare, and it relied heavily on retrospective audits of patient charts and hospital policies.

The development and refinement of quality assurance standards continued, and others began to develop theoretical models to explain quality measurement. One of these was a model that described the relationship among structural elements, such as facility characteristics, technology/instrumentation available to the clinician, staff competence (e.g., education level), and process elements like methods of diagnosis and treatment.[6] Donabedian's model suggested that the two elements of structure and process accounted for the variation in outcomes observed across populations.

In the 1950s, the Joint Commission on Accreditation of Hospitals (JCAH) was formed to further the development of quality standards for healthcare delivery. An accreditation program was established whereby hospitals could voluntarily be measured through on-site surveys against established standards. Surveyors evaluated the hospitals' structure and processes through interviews and documentation reviews. These results were then used as proxies for quality of patient care measures; conclusions were drawn about the outcomes of care based on the evaluation of structure and process. Over time, the Joint Commission changed its name to the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) and expanded the standards to include other care settings and methods of treatment management.

The rapid rise of healthcare costs in the 1970s and 1980s led to the development of alternative healthcare delivery models, such as managed care. The management of care was through contracted networks of clinicians and facilities and required different measurement standards from those used in facility-based care. In order to assess and report on the "quality" of these new managed health plans, an independent, not-for-profit organization called the "National Committee for Quality Assurance" (NCQA) was formed. Like JCAHO, the NCQA developed "quality" standards and established an accreditation program. The accreditation program was offered voluntarily to these new managed care organizations as a way of demonstrating to the public that they provided "quality" services. Following in the footsteps of previously established accreditation organizations, the NCQA diversified by developing certification and accreditation programs for related healthcare organizations. In 1995, the NCQA began developing standards for evaluating Managed Behavioral Healthcare Organizations (MBHOs) similar to that for Managed Care Organizations (MCO). These standards, in addition to a related accreditation program, were completed and implemented in 1997. In response to NCQA's quality improvement standards, the MCO and MBHOs developed quality assurance departments that focused on measuring and modifying programs to ensure compliance with the NCQA's standards.

Continuous Quality Improvement

American industry embraced a "new" quality philosophy during the 1980s and 1990s: Total Quality Management (TQM) or Continuous Quality Improvement (CQI). The theories behind TQM are based on the works of Walter Shewhart, W. Edwards Deming, Joseph M. Juran, and Philip Crosby. Walter Shewhart, while working as a physicist at Bell Laboratories in the 1920s, developed both statistical techniques to help measure process variability and a method to reduce variation to acceptable levels.[16] This method has come to be known as the "Plan, Do, Check, Act" method of quality improvement:

Plan – identify opportunity for improvement
Do – implement interventions
Check – measure affect of interventions
Act – adjust interventions/change interventions

Deming used Shewhart's techniques – along with an understanding of organizational culture – to launch the "Japanese Quality Revolution" in the 1950s.[4] He taught the Japanese to utilize Shewhart's model as a continuous cycle of P-D-C-A-P-D-C-A, etc., until the product variation remained within an acceptable range. Juran began lecturing in Japan during the mid-1950s on management theory, strategic planning, and quality management. He built on the statistical and cultural foundation established by Deming to focus on the elimination of waste and rework.[7]

Philip Crosby presented a well-defined quality management program for creating awareness and changing attitudes within an organization, especially toward establishing and maintaining quality products and services. This program was based on the idea that quality is the responsibility of every worker and that it reflects the attitudes of management. As a result, leadership in quality improvement must be provided by top management.[2] While this philosophy began in the manufacturing industry, it was not long before other employers began incorporating these theories into their own work settings.

Healthcare Quality Assurance Evolves into Quality Improvement

By the mid-1980s, visionaries in healthcare quality began to explore the application of TQM principles to healthcare. Donald Berwick, MD used the analogy of "identifying and eliminating bad apples" to explain the *quality assurance* model of inspection and outliers removal that was, at that time, typical in most healthcare settings. He proposed a *systems-based* model, which was based on statistically analyzing the results of patient care and supporting administrative functions in order to determine the cause of patient variation.[1] Variation in patient outcomes was analyzed, and then the root causes were systematically addressed and, when possible, eliminated. Berwick's model clearly shared many of the principles of CQI, and *quality improvement* within healthcare was born.

The accreditation organizations followed Berwick's lead. JCAHO modified their standards to reflect measures of an organization's leadership, cultural foundation, planning, and use of continuous quality improvement methods in what they called, "the Agenda for change." Likewise, NCQA also underwent standard revisions. They reassessed how to evaluate managed care organizations on their ability to identify opportunities for improvement, analyze data to determine the leading barriers to improvement, implement appropriate interventions, and measure results. NCQA established this process as a set of standards for quality improvement and called them *Quality Improvement Activities* (QIAs). QIAs became, and remain, the preferred method of managed care organizations for demonstrating successful CQI implementation of improved quality of care and service. A chapter by Dewan reviewed the performance measurement and quality improvement efforts in behavioral healthcare.[5]

Quality Improvement in Managed Healthcare

The evolution of quality improvement in behavioral healthcare has trailed behind general healthcare. In the past, behavioral healthcare organizations attempted to apply the established quality assurance standards for medical care to their own treatment and delivery models. Greater attention has been recently focused on the incorporation of quality improvement principles into the management and delivery of behavioral healthcare. Beginning in 2001, NCQA's MBHO standards mirror those of medical managed care standards. Quality improvement activities have been part of the MBHO standards since their 1997 inception.

One approach to managing quality improvement within MCO and MBHOs is to take the historical perspectives and blend them into four broad concepts that are used to support CQI. What follows is a brief description of the four concepts, followed by a description of an effective CQI model.

Customer Driven. MCO and MBHOs, typically acknowledge their multiple "customers," including members, family, payers, providers, facilities, regulatory agencies, and accreditation bodies. Each of these customers has specific expectations with regards to its relationship to the MCO/MBHO, and these expectations are translated into measurable performance standards. Most MCO's MBHO's concept of quality is achieved through meeting customer expectations, then continuing to improve in order to reach the goal of excellence.

Focused on Systemic Issues Rather than Individuals. Managed care recognizes the fact that all performed activities within the organization are "processes." Each process is a sequence of steps, that when combined, result in some measurable outcome. Processes within each functional area are linked together and ultimately result in the products or services that are delivered to the customers. No process is perfect; flaws in this instance are called, "barriers to excellence." Barriers are parts of a process that prohibit the system from reaching its potential or highest possible performance level. They are often integral to how employees complete job tasks, including the way they communicate with others and record central events (e.g., clinical information during an intake call). Barriers are not people; they are not under performing staff, nor are they patients who are noncompliant with treatment regimens. As a result, quality improvement efforts can be focused on removing barriers within its many processes, rather than on individual outliers.

For example, barriers within the Care Management system that impact telephone performance (such as the average answering speed) can include staff schedules (adequacy during peak times), types of incoming calls (care management calls, complaints, claims calls), and talk time. In order to identify barriers, outcomes and process data are needed. Systems that track cases through the authorization for care process, that quickly rout high priority calls to licensed clinicians, and that effectively capture and report clinician competence all need further development to better support the QI process.

Employee Involvement and Empowerment. MCO/MBHOs embrace a culture of line-level staff involvement and empowerment. This is consistent with their belief that line staff are the ones most familiar with customer expectations and the processes they follow each day. Integration of quality improvement within operations is possible by involving and empowering employees throughout all steps of the QI process. This integration allows each employee equal responsibility for the quality of services delivered to customers.

*Outcomes-Based Decision Making***.** MCO/MBHOs use data for a number of processes, including evaluating barriers to determine appropriate interventions and the outcomes of key processes, determining whether or not interventions are effective in improving member care and service, and measuring the extent to which it meets or exceeds customer expectations. Data are preferred over anecdotal statements, since they provide objective facts about operational performance and minimize subjectivity. Furthermore, data can be measured more specifically over time, thus providing a mechanism for tracking improvement. The sources of these data are sophisticated information systems that collect knowledge needed to support quality improvement.

Quality Improvement Activities: An Application of CQI

MCO/MBHO's model for implementing its CQI philosophy is the quality improvement activity (QIA). QIAs are ideal for documenting operational improvements in care and services, and are mechanisms that help structure the task of improving complex processes.

The most successful QIAs combine CQI tools: research methods, sound, outcomes-based decision support, and expert knowledge in the content area being improved. When CQI principles and methodology are implemented well, and evidence is collected as part of everyday operations, the QIA report compilation is a description of the process and evidence of improvement.

CQI Cycle. An effective CQI model that is closely aligned with NCQA's QIA relies on the identification and elimination of barriers to excellence; this process consequently fosters improvement in performance. Performing CQI on a process, such as care or network management, is a complex endeavor. Therefore, QIA development presents the improvement process as a series of small steps:

- Identification of opportunities for improvement
- Analysis of barriers
- Development of interventions
- Implementation of interventions
- Tracking performance improvement

These steps are part of an ongoing improvement cycle (Fig. 7.1). The cycle begins with systematic performance measurement and opportunity for improvement identification (performance areas that could be improved). Once opportunities for improvement are identified, they are prioritized based on criteria such as relevance to member well-being and feasibility of change. Once the highest priority opportunities have been chosen, barriers to improvement are identified and interventions are developed and implemented to remove their effect on performance. Improvements in member care and services are monitored through remeasurement of performance and comparison of remeasurement to baseline performance. If greater improvement is desired after one cycle, the QIA cycle may be repeated. Otherwise, improvement resources may be refocused on other highly prioritized opportunities for improvement.

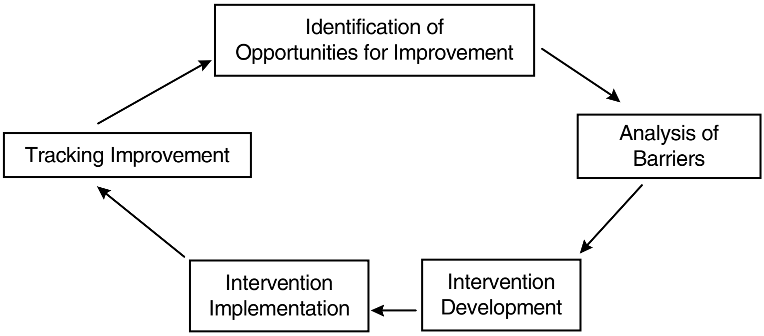

Fig. 7.1 QIA cycle

Improvement in Existing Programs

CQI, by definition, provides structure in order to help improve existing processes. The CQI process is applied to bring about programmatic changes, including:

1. Enhancing aftercare coordination
2. Enhancing management of high risk or fragile patients
3. Increased compliance with preventive health screening through methods such as reminders and incentives
4. Improving the thoroughness of screening for comorbid substance abuse among depressed patients
5. Improving access to treatment

Improvement realization of the many possible programs and processes by using CQI methods helps staff identify the highest priority QIAs.

Outcomes and Systemic Health Management Issues

Managed care is a system that was developed to manage a population's health benefits. The system is a confluence of policies, procedures, practices, information, and various information technologies that are used together to support care management decisions. The current section will focus on the use of outcomes of information in the ongoing design of managed care models. This means that outcomes can be used to identify opportunities to improve policies, procedures, practices, and technology that are used to care for the behavioral health of any population. A brief overview of the decision support model within CQI will be followed by discussions of two ongoing efforts at a large MBHO.

A population's behavioral health is difficult to measure. Household surveys, census information, and other large survey and polling efforts provide some information, but are costly and often not focused enough to identify specific problems in care management systems. For example, many household surveys capture information such as the incidence and initiation of substance abuse among teens; however, they do not typically collect information about the effect of new managed care programs on substance abuse (teen outreach, drug awareness and prevention). In contrast, highly detailed and in-depth information is available from individuals who access care through a managed care system. These individuals can also be the most informative group identifying effectiveness of current managed care models and potential for improvements. What follows is a brief discussion of how informatics impacts these issues and makes resolution feasible where it was not possible even 10 years ago.

Maximizing Patient Treatment Outcomes. Several MBHO processes affecting patient treatment outcomes have been identified as opportunities for improvement within the industry. Based on research findings, it is assumed that improvement in process will result in improvements in the general well-being of the membership population. Included in the MBHO processes targeted by accreditation agencies are:

- Access to providers –When a member needs to speak with a licensed clinician, it is essential that there be no long waiting period.

- Provider competence.
- Care manager competence.

What follows is a brief description of a single opportunity for improvement from each of these domains as well as ideas about how informatics can aid in process enhancement and deconstruct barriers that exist in the effective use of information when immediate solutions are not obvious.

Aftercare Coordination. In 1992, nearly 40 million people in the United States experienced some type of mental disorder.[10] Lifetime estimates of mental illness prevalence are even higher,[8] thus making it comparable to that of many physical illnesses.[9] Although suicide remains one of the most serious consequences of mental illness, other social and economic consequences underscore the need for aggressive prevention and treatment efforts.[10]

It is important to continue treatment after discharging members who had previously been treated in an inpatient facility. Without continuity of services, many patients relapse into symptomatic behavior; discontinue medications; and/or fall into depression, violence, mania, or psychosis.[3] Ongoing services in a less restrictive environment prevent the occurrence of many adverse effects and help to assure that gains made during hospitalization are not lost. Outpatient visits within 30 days of discharge allow behavioral healthcare practitioners to detect early post-hospitalization reactions and medication problems. Furthermore, follow-up services reduce the rate of readmission to hospital programs.[9,15]

How to exactly increase the number of patients who attend and continue to attend aftercare following discharge from acute care is less clear than the potential impact of aftercare attendance on member well-being. Many questions that remain unanswered are:

- How does outreach affect attendance?
- Are some patients more ready to engage in aftercare than others[11,12]?
- What are the differential effects of various approaches to aftercare coordination?
- Is there value in matching patients with different approaches to aftercare based on patient characteristics such as social support, motivation, diagnosis, previous treatment history, or medical comorbidity?

Focused studies that address specific changes to the process of aftercare coordination, as well as their effect on aftercare attendance and subsequent re-hospitalization needs, will shed some light on these issues. Performance indicators, such as the percentage of recent discharges that attend at least one aftercare appointment within 7 days, and percent of discharges that are readmitted to acute inpatient care within 30 days, are quite helpful. However, in order to see measurable improvements in the well-being of the MBHO's membership, greater detail is needed in the form of more data from three sources: patients, providers, and care management staff.

Patient information within managed care administrative data systems typically includes basic information such as age, gender, and race. Though the enrollment process requests other demographic information from members, it is usually optional and left blank, thus resulting in data that are not representative of the population. In order to better understand the population, many managed care companies are conducting membership surveys – particularly of the treated population. Random samples from these surveys answer questions about members' social support system, medical problems, substance abuse problems, and other patient descriptors that help MBHOs understand how to improve existing programs. The resulting data can then be used to help improve existing programs and plan new programs. In the example that addresses aftercare coordination, patient information may be used to determine whether diagnosis, severity of illness, or treatment history are related to a patient's attendance at aftercare with only simple reminders, or whether patients with longer treatment histories require ongoing reminders and coordination after attending the first session in order to ensure continuation with a treatment regimen.

Provider and care manager profile data are typically more easily acquired than are the same for members. Provider information is essential to the credentialing process. The desire to be accepted into an MBHO's provider network motivates providers to make specific information available to MBHO staff. Information such as the provider's training, degree, background, and specialty are part of the credentialing process. Likewise, care managers are often hired, in part, based on their training, degree, experience, and specialty. Added to this information are their supervisor's observations of specific skills and reviews of their patient charts. These data provide a rich platform of information from which may be developed care management decision support systems.

However, changes in programs must go beyond focused studies, and findings must be incorporated into operations. These applications require information technology that delivers the patient profile, provider profile, and recommendations for aftercare coordination procedures to thousands of care managers who speak with patients and providers on a daily basis about their aftercare plans and compliance. These systems must be easy to navigate and capable of providing information from several disparate databases, simultaneously. Additionally, they must provide information in real time, instantaneously.

Provider Competence. Equally important to coordinating care is maintaining a highly effective provider network. Traditionally, provider competence has been monitored through audits of hospitals and provider offices (e.g., CARF, JCAHO). In addition to site visits, a number of patient charts typically are reviewed for adherence to clinical standards and expected levels of documentation. Within the past 5 years, JCAHO and other accreditation agencies have begun to focus on patient treatment outcomes (e.g., CARF, ORYX). The rationale is that patient treatment outcomes are the single best indicator of quality of patient care. All else held constant, higher quality providers are those whose patients get better faster, stay better longer, and have fewer complaints and adverse incidents. Currently, medical outcomes measurement is in many ways better established than its behavioral health counterpart. Therefore, behavioral health still relies heavily on measuring provider process, documentation standards, and compliance with clinical practice guidelines as proxies for outcomes and provider competence.

Provider audits typically generate tremendous amounts of paper. Checklists, patient chart excerpts, and utilization statistics need to be available for auditors to complete a thorough audit. Web-based applications are beginning to be developed, and audits of both MBHO and provider offices can be completed in their entirety using these applications. They have the advantage of being interactive with the user, who is entering information into the web database as well as being prompted to locate and record specific information. In addition, these applications make available to the auditors information from provider and member databases within the MBHO. For example, auditors at a provider office may look up the provider's average number of sessions, readmission rate, patient treatment outcomes (when they are available), satisfaction, and complaints – all while conducting the audit. As with any centralized system, web-based applications make training and changes in protocol easier. The application needs to be updated only once and the protocol is updated for all auditors. Further, the quality of the auditor's work can be monitored for compliance with protocols. Patterns of audit findings can be analyzed to reveal auditors who tend to focus on certain weaknesses while failing to address others. Opportunities for auditor training can be identified easily, and training materials can be developed to address specific needs. Continued monitoring of auditors' results will reveal the level of success of the training, as well as other opportunities for improvement.

Access to Services. Several barriers to access exist within managed care. Provider density compared to membership density and need for services, access within time standards, and delay time awaiting authorization for reimbursement are all barriers that slow the patient's access to needed care. Assessing the competence of providers and maintaining a high quality network was briefly addressed in the previous section. The current section focuses on barriers within the authorization process.

Within most managed care systems over the past 10 years, when a patient requires services, either the patient/advocate or the provider contacts the MCO and requests authorization for service (reimbursement). The MCO representative then verifies the patient's eligibility for benefits and the need for services. The result is either an authorization, which means that the provider can render services with a guarantee of reimbursement from the MCO, or a non-authorization, which means that services cannot be reimbursed. Any delay in the authorization decision process has the potential to delay the beginning of treatment. Possible points of delay include provider availability to contact the MBHO and telephone hold time.

Web-based applications have been developed to increase the efficiency of provider inquiries regarding member enrollment information. For example, within some benefit structures, authorization of outpatient care is not necessary for reimbursement. However, providers still must confirm member eligibility and guard against members misrepresenting their insurance status or level of benefit exhaustion. Currently, providers can log onto the web sites of some MBHOs, and – through a series of passwords and other security systems – access member eligibility information. These systems are interactive in that once eligibility is verified, the provider can log a request for reimbursement after the session is completed and a claim submitted. This application saves the provider time in that she/he no longer needs to contact the MBHO via telephone to verify eligibility and seek authorization for reimbursement for routine care.

Behavioral Health Informatics for Quality Improvement

Consistent with this environment, behavioral health care informatics initially focused on the fundamental necessities of doing business: authorization and claims processing. These initial systems were generally written in PIC or COBOL programming languages, were relatively inflexible with regard to configuration and extensibility, and required expensive programming resources for generating canned reports. These systems were commonly implementations of existing managed health care applications, and were configured to support only those procedure codes and diagnostic categories associated with the delivery of behavioral health specialty services. These systems operated as single tier information systems, with users connecting either via dial-up or direct connection via dumb terminals (or terminal emulators running on desktop PCs).

As the quality movement in healthcare grew in strength and universally accepted standards were established, national accreditation organizations began to emerge (e.g., the National Council for Quality Assurance). During the early 1990s, the information requirements to support quality management and accreditation requirements rapidly outgrew the capabilities of existing behavioral health information system infrastructures (this problem was not distinct to the behavioral health care sector; it has, and continues to be a significant challenge for the health care industry as a whole). At the same time, the demand for reliable data regarding quality of healthcare care and services far outpaced the availability of affordable mechanisms to replace or supplement existing data sources.

Consequently, a grass roots effort began in many managed behavioral health organizations, which harnessed the skills of employees who had a basic understanding of database structure and expertise in inexpensive database management tools. Realizing the opportunity represented by having an electronic record of customer contacts with automated data collection integrated seamlessly into the work-flow of general operations, industry leaders began to take notice of these “home grown” information systems and evaluate them for implementation on a more global scale.

Using some of the more sophisticated grass roots projects as a springboard, several managed behavioral health organizations hired programmers and established project teams to develop scalable applications to support the growing business requirement for elaborate data acquisition, reporting and analysis. These visionary companies realized that the ability to demonstrate an active program for improving quality and health care outcomes would become a competitive advantage in the short term, and a “ticket for entry” in the long term for continued success as a health care company. The early adopters could become market leaders and set the minimum standard for new entrants to the market place.

The first generation of applications to support business operations and data requirements were typically two-tier client-server architecture, with the front end application containing the business logic and the second tier comprised of a scalable enterprise database management system (DBMS). The applications were generally written in very flexible, third generation (3 GL) object-oriented programming languages. This generation of applications was commonly developed as a stand-alone system, distinct from the legacy authorization and claims systems. This first generation of applications established several advantages to the organization, including:

- An intuitive, user-friendly graphical user interface (GUI)
- Reduced paper documentation
- Increased contemporaneous availability of data/documentation across distinct users
- Significant improvement in work-flow efficiency and
- A reduction in manual data collection mechanisms and improved reliability of data.

Data Source Challenges

The benefit of sophisticated information systems to support quality and outcomes initiatives is dependent on the usefulness of the data elements captured in those systems. Unfortunately, in behavioral care, many data source challenges exist that can inhibit the effective use of this information.

One of the most significant challenges is confidentiality. Individuals by nature are reluctant to provide accurate information about their demographics or health status if it can be traced back to their identities. Legitimate fears regarding the release of such information have prompted federal and state regulations limiting the ability to collect and use information that is vital to demonstrate the effectiveness of treatment or the efficiency of administrative services. Consider a simple study to determine the cost/benefit of three treatment options for major depression: (1) individual therapy alone; (2) individual therapy combined with drug therapy; and (3) drug therapy alone. In today's complicated health care system, such a study might require data from multiple sources, including a behavioral healthcare vendor, a general medical Health Maintenance Organization (HMO), a third-party claims administrator, a pharmacy benefits manager, and others. Each of these entities can be prevented from sharing the data required to conduct such a study by their own confidentiality policies, expectations by customers, state or federal regulations, and/or accreditation standards.

Lack of Data Standards and Definitions. In addition to the confidentiality issues entailed in collecting and combining data, the physical ability of organizations to link data from varying sources can be a challenge. For example, a customer complaint database may track complaints from providers by provider number, while the Claims Department tracks payment to providers by Tax ID number. If there is not a common data element, it would be difficult – if not impossible – to pinpoint provider-related potential causes for complaints about timely claims payments. Further, the plethora of mergers and acquisitions of the 1980s and 1990s left many behavioral healthcare companies with multiple information systems. These information systems superficially appear to collect the same data. However, analysis of detailed data definitions often reveals that these systems are collecting vastly different information. In one system, a confirmed appointment is identified only after a follow-up call is made to a provider's office; in another system, that confirmed appointment is recorded when a patient indicates that she/he intends to follow through. Combining this information for quality purposes could have deleterious effects on the quality improvement initiative.

Mining Databases. Health plans collect health care transaction data as part of their care management operations. For instance, any time a member visits their primary care physician, has a prescription filled at their local pharmacy, or is admitted to the hospital, a unique record is generated and stored in a database. Within their operations, plans use these data to generate service utilization reimbursements, support care management decisions with patient (and provider) transaction history, and create a documentation trail for regulatory inquiries. As these data document utilization of all reimbursable services by health plan members, it is a rich source of data for summarizing health care service utilization, cost of care, provider performance, diagnostic information, patient treatment outcomes, and other concepts that are important to health care researchers and essential to the development of effective and accurate health care policy. The academic literature reflects much activity by researchers analyzing health plan claims data. Results are published in most medical and behavioral health journals, but appear most frequently in health economic, pharmacoeconomic, public health, psychiatric, and addiction journals.

Claims Data Format. Health plan data are generated each time a member of a given health plan utilizes a covered healthcare service or requests authorization for service(s). Member data may be organized in several different tables, but is usually divided up into laboratory data (e.g., blood work), pharmacy data (e.g., prescription fills and costs), and medical data (hospital and doctor visits). Some health plans have separate behavioral health (e.g., hospital or outpatient psychiatric or behavioral health counseling) tables while others incorporate these records into their medical data tables.

Technological Advances. Technological advances in personal computing during the last decade have made the management and analysis of large datasets possible. Statistical analysis of small data sets (e.g., 1,000 cases, 300 8-bit fields) is achievable on desktop personal computers, and has been for over 20 years. However, prior to 5 years ago, analysis of large datasets (millions of cases, several 8-bit fields) was not feasible using commercial software on desktop computers; it was more commonly performed on mini mainframe computers and large capacity workstations. Recent advances in computer hardware include production computers equipped with terabyte hard drives, multiple core processors, and motherboards capable of supporting sixteen or more gigabytes of RAM. Even the most mainstream operating systems (Windows 7 64 bit version) now disperse large data processing and writing tasks across all available computing resources breaking down the old barriers (e.g., 4 GB of usable RAM). Equally important, advances in data management and statistical analysis software for PCs (e.g., SPSS, SAS, STATA) maximize use of available resources within the Windows 7 64 bit environment, allowing production level personal computers to be able to open, manage, manipulate, and analyze databases of enormous magnitudes (e.g., 20+ GB data files). Now that these tools are at the disposal of most academic and commercial organizations, analysis of claims data and the results are likely to proliferate and be used to resolve issues outside of academic inquiry and health care public policy. What follows is a detailed description of the data sources, barriers, and opportunities within informatics.

Purpose The analysis of claims data can be useful for a variety of reasons, both to the plan and the public. Typically, when analyzing claims datasets, a particular disease state or patient population is isolated within the database. For example, let's take opioid dependence. Opioid dependence is defined as compulsive, prolonged self-administration of opioid substances (e.g., heroin, methadone, oxycontin, etc.) for no legitimate medical purposes, where the discontinuation of such use results in withdrawal symptoms (Diagnostic and Statistical Manual of Mental Disorders IV- Text Revised). The number and rate of people who abuse and become dependent upon opioids is increasing among all demographic populations within the United States.[13,14] As a drug problem, opioid dependence (OD) is second only to alcohol abuse.[17] Currently, there are a number of treatments available for this condition, and may include various medications or abstinence-based therapy approaches.

Research Options. Researchers interested in studying the effectiveness of various treatments for opioid dependence have a number of options. Among the least expensive compared to random controlled trials or outcomes surveys would be to analyze health plan claims data of patients diagnosed with opioid dependence. As mentioned above, health plan claims data will provide data on all services utilized by health plan members for each year of membership representing a contained population. Services for these patients include the number of doctor visits, ER visits, and laboratory data for a given year or years, all of which could be used as a proxy for treatment success.

Continuing with the opioid dependence example, let's say that a given plan revealed that among their opioid dependent patients, 50% are treated with drug X and 50% drug Y. If those treated with drug Y have significantly fewer ER visits, hospital visits, and higher levels of high-density lipoproteins, it may be concluded that drug Y is be a superior treatment option. Again, these analyses are no substitute for a RCT, but may be the first step or impetus for future, more controlled studies.

Why PE of Claims. The most important aspect of health plan claims data is that it provides not a sample, but the entire population of the health plan or line of business. There is no need to infer results from the sample analysis to the population (i.e., health plan or line of business) as the population is the sample. Summaries of cost and service utilization from the analysis of the sample accurately represent the cost and service utilization experience of the plan or line of business. No generalization from the sample to the plan is needed. However, if the results are extended to other years or other populations, then inferential techniques are needed, as is caution, as violations to assumptions can affect the validity of the generalized results. For example, results from an analysis of services and cost summarized from claims of services and cost accrued during the year 2005 from the HMO membership of the United Health Group (UHG) adequately represent services and cost accrued during that year for UHG. However, caution must be exercised when generalizing these results to another calendar year or to another health plan. Also, health plan samples are not randomly assigned to different treatments; patients and providers make clinically, personal, and economic choices between treatment options. Furthermore, within specific disease states, there will be individuals with pre-existing conditions or additional comorbidities that may affect treatment service utilization and cost variables. Some of these factors may be handled statistically; for example, by controlling for overall health with a recognized measure, (such as the Charlson Comorbidity Index), or by trimming outliers from the dataset.

In addition to the population level analysis, analyzing claims data can be a relatively quick and valuable way of studying a disease state, population, treatment approach, level of care, public health care spending policy, or other research question. Health plan claims data may be especially useful for analysis of less common disease states and treatments, and for the economic impact of treatments. Again, using the opioid dependence example, instead of comparing lab and medical service claims between drug X and drug Y patients, cost variables may be used instead, and the economics underlying the available treatment modalities may be compared.

Although potentially very useful, claims data analyses have some shortcomings. For one, claims datasets are notoriously large in size, some in excess of 20 gigabytes for a given year. Though "too much data," is a nice problem to have, it may be overwhelming for some analysts who do not have the resources to adequately address these data. Also, these data are proprietary to the health plan that owns them. Some plans have programs to de-identify the data (remove all personal identifying information), after which, they may sell the data to researchers. Other plans are glad to have external researchers reviewing and analyzing their data or may wish to participate in a study and make contributions and appear as authors on any publication.

Cleaning and Coding. Furthermore, unlike datasets used in the traditional social sciences, claims datasets require considerable cleaning and re-coding. As mentioned above, a record is created for each individual claim, not each individual member. So it is not uncommon for a single patient to have hundreds of records for each year of membership. Often, a hospitalization will be represented with multiple claims. A single emergency department visit can be represented with multiple records of claims. For instance, one claim may contain all information concerning utilization of hospital-based services, devices, and facilities (exam room or curtain), while another claim may represent all physician-related costs. Therefore, prior to analyzing the data statically, typically, multiple records are concatenated into a single record for each member, for each year. This conversion, from claim level to patient level data, often requires database level programming and often requires more staff time and effort than the statistical analysis and interpretation of results.

Conclusions Despite these limitations, overall, analyzing health plan claims data can be a useful method for studying the patterns, treatments, and costs of many disease states. Plans and patients alike may benefit from the information obtained from these analyses. The possible adoption of electronic medical records in the near future by the healthcare system may simplify this process even greater, making it an even more attractive method of study.

These advances are key to the recent increase in health care analytics and development of care management policy as described within this chapter. It is now common for analysts equipped with a production level personal computer and a Windows environment to perform the highest level of statistical modeling on the largest of datasets available within health care. Some of the most powerful policy defending or refuting tools are now in the hands of anyone who can afford a personal computer and software license. The bar for entry into the world of PE analysis of health plan data has been dropped to include most professionals who are inclined to participate. Gone are the days of needing to hire one of a few staff nationwide to analyze data sets that take months to prepare and longer to analyze and interpret. It may soon be feasible to incorporate a health plan administrative data mining platform into real-time care management decisions.

Communication. Another significant challenge is communication between the quality improvement staff and the information system programmers. This vital communication link can be akin to attempted communication between two individuals who speak different languages. A common scenario begins with a request by the QI staff for programming or report generation to support a specific improvement opportunity. The information systems professional listens intently to the request, but often does not understand its purpose. Nonetheless, the information systems professional writes the program codes necessary to accomplish the task and sends these codes back to the QI staff for approval prior to initiating the work. The QI staff reviews the document, which, because of the programming language, looks similar to the hieroglyphics from his or her Anthropology Class, and approves the document because, "they are IS professionals and they must know what they are doing." After hours of programming and report generation, the final product does not result in the information required by the QI staff. This lack of effective communication often inhibits the effective and efficient quality improvement outcome initiative.

While data source challenges such as these can have a serious impact on quality and outcomes initiatives, mechanisms exist to reduce their effect. Organizations must embrace a common practice around confidentiality. More effective communication with patients around the value of specific shared data can be combined with appropriate release of information forms that allow for the sharing of data between caregivers and payers; this will reduce the liability associated with these system quality improvement and outcomes projects. These forms can be supported by interdisciplinary, inter-organizational review boards whose responsibilities include the review of methodologies to ensure appropriate confidentiality of information. Likewise, solid planning around data definitions and elements prior to building new information systems will ensure their connectivity to existing systems. The construction of data warehouses to assimilate data from different sources with different definitions can also be helpful to organizations faced with multiple systems. These data warehouses can be constructed to include transformations, where possible, to align the definitions of disparate data sources.

Finally, training and using Business Analysts to interface between IS programmers and quality improvement staff can alleviate communication issues. Business Analysts are highly trained individuals who are knowledgeable about the data elements and definitions within the Information System and have a solid understanding of the behavioral healthcare industry. These individuals often write the initial specifications for programming needs based on discussion with the QI staff and approve the programming documents through discussion with the information systems programmer. In conclusion, data source challenges can be minimized by understanding their impact and developing proactive solutions to address them.

Data Interface. Despite these gains, the lack of interface between the clinical/service/quality management information system and the legacy authorization and claims systems left significant opportunities for improving work flow efficiency and data integrity in the next generation of applications (users were still required to use the clinical/service/quality management information system in parallel with the authorization and claims systems).

In response to these challenges, applications were developed specifically to integrate user-friendly interfaces with legacy systems (most notably authorization and claims systems) and continued feature evolution to support a rapidly changing business environment. During this phase of evolution, programmers created asynchronous, bidirectional data conversion procedures between the clinical/service/quality management information system and the authorization and claims systems. Additionally, these data conversion interfaces were used to expand the capabilities of the clinical/service/quality management information system to incorporate updates from member eligibility and provider databases. Now, the care manager or customer service representative of the managed behavioral health organization would have the majority of information required to perform their primary job duties (member eligibility, documentation of previous contacts, provider network participation) from a single user interface. Additionally, authorizations could be issued in the clinical/service/quality management information system, eliminating the necessity to work in parallel systems.

Current trends accreditory and regulatory requirements are creating an impetus toward a level of health data integration never before seen in the industry. Managed health care organizations, are now required to demonstrate a high degree of coordination between general medical care (primary care) and other health care specialties (including behavioral health). These pressures, combined with regulatory requirements for administrative simplification and security of individually identifiable health information, is setting the stage for the industry shaping new paradigms for health information systems. The primary limitation of the existing information infrastructure for the health care industry as a whole is the focus on enterprise-specific solutions with little to no portability of data from one vendor to the next. Technologies such as object-oriented programming and object-oriented database management systems (which easily scale for thousands of users and are capable of storing terabytes of data), extensible markup language (XML), distributed object technologies (such as COM+, DCOM and CORBA), wireless and handheld technologies, highly secure virtual private networks (VPN's), and affordable high speed internet connectivity are becoming the foundation of a new era in health care. While many companies are capitalizing on these new technologies, those with longevity will provide health care informatics and services with the following features:

- Repository-based storage of health care data. These data will be "owned" by the consumer and portable via standard formats from one vendor to the next.
- Metadata regarding quality indicators will be abstracted from data across all payers, providers, and consumers.
- Consumers will have access to standardized empirical quality indicators, which will be used to select the health care vendors that can create the most value, given their specific needs.
- Anywhere, anytime access to medical information. Patient data will be accessible from any authorized source via secure connections whether via direct connection, dial-up or wirelessly, and on a variety of media including handheld devices.
- The use of intelligent systems will grow, and routine decisions regarding medical necessity currently made by care managers at the managed care organization will be automated.

Future Directions: Information for Client-Centered Approach to Care Management

Information, when mined, analyzed, and interpreted correctly can be an empowering element within managed care. Front-line staff who speak with patients, providers, and family members on a daily basis need information to adequately recommend and support treatment plans. Obviously, more information is not always more empowering. However, uninformed care decisions may not result in the best or most efficient possible treatment plan and patient outcomes. The middle ground between inadequate information and information overload is the focus of research on informatics within MCO/MBHOs. Effective informatics provide needed information in a timely fashion and in a format that is flexible enough to allow the end user to mine more detailed information when needed. What follows is an example of such a system that is currently evolving from a simple care management and authorizations system into an effective care coordination system.

Informatics and Aftercare Coordination. Clinical information systems (CIS) are routinely used to query data that are essential to authorizing care (e.g., member eligibility, provider availability, treatment history) for managed care members. At the time of the first writing of this chapter, one large MBHO used a client server system with a user-friendly GUI interface. End users have at their disposal member eligibility and benefit structure information; service utilization history and remaining benefits; and provider information including location, contact information, specialty, and availability. Searches can be initiated by member ID, provider name or ID, dates of service, or authorization number. This information is presented as a result of pre-developed queries that are launched by the Care Coordinator (end user) who then evaluates it in real time, usually during a request for services. The design and technology are not new, and most of these functions have been widely available on a variety of legacy mainframe systems. However, the architecture takes advantage of multiple tiered system development and integrates both old and new technologies as well as old and new data platforms. For example, member information is loaded into the system from eligibility tapes just as this had been done on legacy systems for more than a decade. However, provider information, treatment history, and scheduled care management activities are either part of the CIS data files or are ported in from other external files either in real-time or scheduled replication.

Clinical information systems are more robust than most systems in that they provide user prompts for scheduled actions. For example, when a member is admitted to acute hospitalization, the CIS automatically prompts the Care Manager in charge of the case to initiate discussion with the hospital staff concerning discharge plans. As part of discharge planning, hospital staff identifies an aftercare provider and schedule an appointment that is captured in the CIS. On the day after the scheduled aftercare appointment, the same Care Manager is prompted to contact the aftercare provider to confirm that the member attended the appointment. In the case of a missed appointment, the CIS will provide the member's contact information to the Care Manager, who then attempts to contact the member, identify barriers to attendance at aftercare, arrange for help to overcome the barriers, and schedule another appointment. All of these activities are automated within a single user interface.

Clinical Information Systems and UM Decision Agreement. Medical necessity criteria (MNC) are policies that state when and under what conditions member care will be reimbursed. Licensed clinicians conduct most of the assessments and determine the need for treatment based on the medical necessity criteria. The criteria are based on accepted standards of practice and guidelines for care. It is the agreement between the care manager's assessment of member need for treatment and the MNC that determines the level of care that will be authorized for reimbursement. The MNC are reviewed annually against industry and professional standards and updated in the CIS. A simple series of questions answered by a member or clinician are entered into a screen, and an algorithm then identifies what level of the MNC are satisfied. The result is a message indicating the level of reimbursement that is authorized.

Both of the examples described in this section are driven by information that is "pushed out" to the care managers who are the end users. The section that follows outlines the next generation of systems that will be based on assumptions concerning the health needs of a population. These systems will use outcomes, provider profile, audit, and utilization information to develop care management models for maintaining the highest level of behavioral health and population well-being.

Smart and Self-correcting Systems. An example would be real time knowledge of population treatment needs and patient treatment outcomes, which is crucial to care management in health care and its subspecialties including managed behavioral health. One of the major challenges that face MCO and MBHOs and providers is balancing the need to provide effective care while keeping costs low. To manage cost and quality of care effectively, fiscal and quality processes must be combined, in real time, by those staff who are making care need decisions. However, care managers typically have not had the information technologies that combine these two data streams. QI staff and care managers have traditionally monitored treatment quality in solely clinical terms. Only recently are they beginning to understand how to use fiscal and outcomes data in combination with MNC information to efficiently manage the well-being of a covered population.

To address these needs, several companies have developed systems for collecting and managing patient treatment outcomes data for provider groups, lines of business within an MCO, as well as for the entire managed population of an MCO or MBHO. Such systems include automated data capture and reporting. Case level reports include admission indication for treatment, historical diagnosis and treatment information, and progress in treatment. Aggregate reports include facility as well as level of admission severity and outcomes data. Some systems make case level reports available in near real time (less than an hour). However, few combine outcomes, epidemiological data (e.g., regional population need for treatment), utilization management, and fiscal data for care management decision support.

Most managed care systems still rely on research study designs for patient treatment outcomes, indicators of efficiency, and quality improvement activity effectiveness metrics. In these models, investigators develop a research question that includes operational definitions of the concept being measured. Examples of operationally defined quality improvement concepts include:

- Is a new care management policy more efficient than an old one?
- Do competing interventions (e.g., medications, treatment approaches) result in different rates of clinical improvement at same or different cost?
- Does a new less expensive intervention result in same or improved patient treatment outcomes?

Next, the investigator captures data (e.g., health plan claims data, provider profile data, and patients and provider surveys) that are relevant to the research question and analyzes the data. The results are interpreted in an attempt to address the research question, which is also the target for quality improvement, and provide guidance on how the health plan might improve the quality of the care that it manages.

Conducting quality improvement activities, or studies based on patient treatment outcomes as described within is a labor intensive process that as yet is typically not performed in real time. It is not a method typically used to evaluate a treatment plan for a single or small group of cases. As an experimental process the results of which may influence how cases are managed in the future, it is not included in care management informatics systems. Though, imagine if it were. Such an intelligent CIS would be able to calculate the probability of clinical success (positive patient treatment outcomes) and cost for each case that requests services for a disease. The process would proceed as follows when a managed care member requests services for a disease, such a hypothetical system would:

1. Pool all similar cases based on patient disease, comorbidities, and patient characteristics.
2. The treatment and outcomes history of this pool of cases would be collated.
3. Available treatment approaches would also be collated.
4. The probability of treatment success for the presenting case could be calculated for each treatment approach, based on historical evidence of all available cases that used any one or more of several interventions.

Such a system would allow at least two critical care management components:

1. Logic for comparing utilization of services to patient treatment outcomes. The goal of such logic would be to maximize the cost-benefit of service utilization.
2. Logic that uses the outcomes to utilization relationship to enhance inform those who enhance medical necessity criteria.

Currently, both of these tasks are largely regulated to special projects' departments of most MBHOs and there has been little standardization of methods or benchmarking of outcomes.

Conclusions and Recommendations

With treatment costs largely under control, the role of MCO and MBHOs is to increase the quality of member care and services within the current cost of care structures. Minimally, this means that managed care will increase the number and rate of positive patient treatment outcomes and/or increase the amount of improvement while keeping costs flat; or will decrease costs more while retaining the current number, rate, and amount of clinical improvement constant. Several government agencies and independent healthcare policy institutes have called for managed care systems to focus on improvement of clinical outcomes as evidence of success in increasing quality of care. Increasing quality of care requires parallel increases in the effectiveness of care management process. Effectiveness of care management is dependent upon the specificity, validity and timeliness of treatment, and disease history of individual cases and comparable populations. Though these data are available as part of special projects, they are typically not available within the time constraints used for making care management decisions. These data must be available and presented in understandable bits to care management staff within minutes of request for care. Otherwise, members are left waiting for an informed care management decision or care management decisions are made on inadequate information.

Information systems that quickly identify needed information, across platforms, calculate and present information to end users within specific templates exist. However, the rate at which care management models are evolving requires a great deal of flexibility in addition to speed and accuracy. Such a system would need both the database query power of mainframe technology as well as customizability and flexibility of web or local database technology. Further, the system would have to be both read and write from the local client to the local database and centralized data repository. Multiple data entry formats (e.g., IVR, web, scannable forms, keyboard) would all be needed as large MCO/MBHOs often service several regional offices and providers, both with varying IT capabilities. Larger MCO/MBHOs have the resources to build such systems themselves while smaller companies will no doubt rely on external vendors and consultants. In either case, several technologies will be linked together, the information will be passed between them quickly, and the care of millions of people will depend upon the accuracy, timeliness, and validity of the information that appears on a care manager and/or provider's computer screen. There is little time for error trapping and little tolerance for error.

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Part III

Patient and Client Centric Technologies Section

Social Networking, Health 2.0, and Beyond

8

John S. Luo and Brian N. Smith

Introduction

The past several years has brought with it an apparent surge in social technologies. Web-based tools such as blogs, wikis, personalized search engines, instant messenger clients, video sharing sites, and social networking services are providing people with countless ways to connect, share experiences and insight, and engage with others. Sites like Facebook,[1] Twitter,[2] LinkedIn,[3] and PatientsLikeMe[4] are providing people in all walks of life with the means to connect like never before. The term "Web 2.0" is commonly associated with such web-based applications that facilitate community and interactive information sharing. These tools are making it easier than ever before to find information, resources, and contacts, and to interact with others around these sources in meaningful ways. In the context of health and health care, the term "Health 2.0" is used to describe the application of these participation-enhancing tools – such as health care blogs and podcasts, personalized medical search engines, and social networking services – by all actors in health care. From the scientists seeking innovative therapies, to physicians and nurses providing treatment, to the patients receiving care, we are all participants in health care. In this chapter we aim to not only review these participation-enabling technologies and discuss their implications for behavioral health providers, but to also provide useful guidelines for when, why, and how to get the most out of these innovative tools. We will also provide cautionary warning for situations in which use of some technologies may be ill advised. Upon reading this chapter we hope you will agree that while there are certainly some risks and temptations with respect to these technologies that are best avoided, the benefits of these innovative tools – to the extent that they empower patients and health professionals,

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foster information sharing and community, and facilitate engagement across the spectrum of health care – can be quite powerful.

Background

Web 2.0: Fostering Interactivity, Engagement, and Community

The term Web 2.0, often credited to and associated with Tim O'Reilly, saw substantial momentum in 2004 and 2005, right around the time of O'Reilly's first Web 2.0 Conference, which was held in October of 2004.[5] Initially, the term was defined by example, where O'Reilly and colleagues compared Web 1.0 (e.g., Britannica Online) and Web 2.0 (e.g., Wikipedia) technologies. The platforms that were and are still often associated with Web 2.0 are those that are built upon an architecture of participation, where tools make it easy for end users to provide value to their peers as well as the overall community. Perhaps the most central byproduct of this underlying structure is the ability to harness the power of collective intelligence, and to provide this ability right back to the community. And while it has been argued that "Web 2.0" does not refer to technological advancements in the World Wide Web per se, there is a shared approach and attitude of facilitating collaboration, harnessing network effects, and providing the resulting collective intelligence back to the end user and community as a whole.

Consider the differences between using the Encyclopedia Britannica Online[6] and Wikipedia[7] – the former, while it can provide a great deal of information on a given topic, does not harness and allow users to benefit from the collective intelligence and insights of the "community," a quality that is at the core of Wikipedia. One can readily anticipate the flipside of the argument as well, as willingness to contribute to Wikipedia's ever-growing encyclopedia does necessarily imply "expert" status – anyone with access to a computer and the gumption to submit entries or edits to Wikipedia can have their information posted. This is where trusting the collective process comes into play. Literally millions of people have made contributions to Wikipedia's ever-expanding project, and not only does the community work to continuously build upon the database, they also efficiently update incomplete, incorrect, or biased information. As a result, Wikipedia, as a resource, becomes more robust over time, a process that will continue as long as people are motivated to contribute their expertise via the platform. Indeed, Wikipedia is but one example of a platform that benefits from, if not depends on, a positive network effect – the phenomenon in which the value of a service or product increases as more people use it.

Among the social technologies that have seen the most attention, and another exemplar category for services that depend on network effects, perhaps the most powerful and ubiquitous are those that offer some form of networking. It is difficult to argue against the pervasiveness of social networking sites, which, at their core, provide tools for connecting people to other people. As is often the case with technology, social applications are often first adopted by younger audiences, and for predominately casual uses. The first social networking site to attract a significant following was Friendster,[8] which was conceptualized and launched in the spring of 2002 by computer programmers as a tool to help people find friends through their friends. Fast-forward 8 years later, and we see that millions upon millions of people are using social networking platforms to connect. Consider these statistics for the current largest social networking platform we know of, Facebook, as reported on their statistics page in March of 2010[9]:

> More than 400 million active users (50% log on to Facebook on any given day)
> More than five billion pieces of content (e.g., web links, news stories, blog posts) shared each week
> More than 1.5 million local businesses have active Pages on Facebook

Not only is the number of users staggering, the average amount of time that an account holder spends on Facebook – close to 1 h/day – is astounding. What other single web sites attract that much time and attention from their community of users? That Facebook is able to command such loyal attention on a scale that is in the hundreds of millions is a testament to the power and potential inherent in many social technologies.

Health Care-Based Internet Tools Go Health 2.0

It probably does not come as a surprise that these tools (i.e., wikis, social networks, and other Web 2.0 technologies) have found their way into the world of healthcare. Over the last few years as we have seen new web-based technologies enable information search, collaboration, and community, the Web 2.0 revolution is being applied to empower patients and facilitate information sharing. Patients who used to use the Internet to connect primarily through email discussion lists have been utilizing these newer, more robust tools to build communities around their health interests. And patients are not the only ones building community, as health professionals are using these technologies to connect and collaborate as well. Web-based search has become much more powerful, thanks to sites like Helia[10] and Medstory,[11] which enable patients to synthesize personalized searches across a variety of relevant databases and domains. Wikis, which are websites that are designed to allow users to collaborate on content, have been built for a multitude of health and health care domains (e.g., helping communities prepare for public health emergencies). Fluwikie,[12] for example, fosters information sharing and dissemination around public health concerns such as avian influence, swine flu, and other viruses. In addition to enhancing search and building community, these technologies and the companies behind them are promoting engagement, information sharing, and patient empowerment. The Pew Internet and American Life Project conducted a survey in June 2009 which demonstrated that the use of the Internet for access to health information by US adults jumped from 25% in 2000 to 61% in 2009. Of those adults, 41% were searching for health information from an online group, web site, or blog.[13]

Health 2.0

Social Networking

Social networking sites are based on a very simple concept – they are designed to allow users to connect and communicate with those friends and peers that they already have, and to also find new contacts, peers, romantic relationships, collaborators and so on through those they already know. This concept is now a ubiquitous phenomenon on the Internet. Facebook started out as a social networking site based primarily on university campuses to network students and eventually faculty; however, it reached its fame by opening up its system to anyone, and to allow people to connect around personal, professional, and commercial interests. With its easy to navigate applications for sharing pictures, videos, comments, and blog entries, Facebook's popularity took off when the platform's programming interface (API) was opened up to third party developers in 2007. These programmers have created games and other socially based applications such as quizzes to develop an online sense of connection to one's friends and family. In addition, numerous groups have been created to also foster a sense of belonging. One can connect, for example, with others who appreciate news outlets like National Public Radio, television shows such as the Travel Channel's Man v. Food, or thousands upon thousands of other entities – movies, sports teams, restaurants, vacation destinations, artists, political affiliations, support groups, the list goes on and on. If you can think of it, there may already be a Facebook group or page dedicated to it. The site also allows users to sift through existing connections to find new ones based on profile characteristics, common connections (i.e., friends), and similar interests, thereby facilitating new contacts.

Other current top rated social networking sites include MySpace[14] and Twitter. MySpace is currently the second largest social network, having been passed by Facebook as the most popular. Twitter, a relatively recent phenomenon, is a very simple microblogging platform that allows users to send and receive *tweets,* which are text-based messages of no more than 140 characters that can be sent via twitter.com, a cell phone, or any number of other Twitter applications. Each user decides which other users they wish to follow, which enables the user to control the information that they see in their twitter stream, which is the continuous feed of all of the tweets from those that one has elected to follow.

Although Facebook and MySpace are social networking sites primarily for personal and more entertainment-based professionals, there are a plethora of professional social networking sites as well. The most well-established site is LinkedIn, with almost 60 million professionals. This site was initially adopted by the technology-based working sector, but has now grown to encompass practically all professional industries such as healthcare, architecture, and waste management. The primary use of this site has been to connect to colleagues but to then leverage the degrees of separation to establish new connections in the context of finding jobs, collaborators, and references. There are all too many professional social network sites, many of which have attempted to focus on a particular industrial sector and/or purpose. Rather than attempting to create a profile on a multitude of professional social networks, one advisable strategy is to create a profile on LinkedIn (as it is the most popular and will therefore provide the most bang for your buck), and perhaps one to two other specific social network sites such as MedicalMingle[15] or Therapy Networking.[16]

While there can be advantages in having a professional social network account on various sites (e.g., one's professional profiles on these social networking sites could be used in lieu of a professional website), this strategy is not recommended. Many professional social network sites have certain elements, such as previous jobs and experiences that are not ideal as the "front door" for prospective patients. The primary advantage of having a professional social network profile is that these pages are often indexed and searched by the various Internet search engines. By having a link on the profile to your professional website, you will have more traffic without much marketing effort. These professional connections are ideal for referrals and new business ventures. Many recruiters often search through these sites to find candidates for their job openings. Therefore, it helps mental health professionals to provide a complete profile with details on leadership, administration, and experience that will enable the recruiter to contact you with a more likely job of interest.

Just as Facebook's popularity has grown, so has the comfort that both patients and physicians have developed using social networking-based websites. Indeed, the social networking phenomenon is enabling patients, health providers, and other stakeholders to efficiently share information and experiences in every health context imaginable – from health and disease to treatment and recovery, patients, scientists, and health providers are utilizing these tools to connect, mobilize communities, and filter information. There are now even a few reports of healthcare providers in other fields who have chosen to "friend" or connect to their patients.[17, 18] In those instances, the providers were not in the field of psychiatry, and the reasons why patients wanted to connect with their doctors seem innocuous enough. One patient was thinking about going to medical school, and had contacted her former medical student, now a resident, on that simple issue. Patients also found that being connected to their doctor on Facebook was convenient in asking for medication refills or scheduling an appointment, which bypasses the hit or miss of whether the doctor was available since on Facebook your friends currently online are made known to you. Patients even commented that seeing personal matters such as the doctor's videos of his children dancing made them feel more connected to their provider. However, in the field of mental health, such personal information and privacy are much different matters.

In mental health, privacy is a critical parameter, as many patients would not enter into treatment or disclose the very issues that torment them without that sense of privacy. Scott G. McNealy, chief executive officer of Sun Microsystems, Inc. has been quoted in 1999, stating that on the Internet "You already have zero privacy. Get over it".[19] Indeed, the plethora of search engines and specific individual information mining sites such as 123people.com,[20] zabasearch.com,[21] and pipl.com[22] search for information on numerous sites including public records, Amazon.com, MySpace.com, and many others. It is rather illuminating and perhaps even frightening to see what private information is available on the Internet such as birthdays, wish lists, pictures, and comments posted on a web site many years ago. However, just because absolute privacy is perhaps a lingering memory it does not imply that the principles of privacy no longer apply to mental health care on the Internet.

Privacy of personal information is critical to the therapeutic relationship in behavioral healthcare. Patients in psychotherapy who know all too much about their therapist may have difficulty with transference, and discover that they struggle more with their issues. Providers who search for more information about their patients may uncover lies or other unrelated matter that will change the perspective and focus of the therapy goals. As therapists begin and continue to explore the connectivity inherent with Health 2.0 applications, they are advised to remain cognizant of just how public the Internet is, and to strive to maintain clear distinctions between their professional and personal lives online. While it can be advantageous to provide professional information to current and prospective patients online (e.g., your medical specialties, hospital affiliations, whether or not you are taking new patients, as well as highlight online resources that you believe to be useful), it would not be advisable to share content that is of a personal nature. This includes, for example, photos of yourself or family, lists of "friends," and specific updates as to where you might be spending your weekend. This is not to say that behavioral therapists are forbidden to join sites like Facebook or Twitter, but rather that those in mental health professions should consider the importance of boundaries. You could, for example, limit Facebook connections to just family and close friends, and set up the privacy controls on the platform to ensure that your information is only accessible by those to whom you are directly connected. When patients make a "friend request" to a therapist on any social networking site, privacy and boundaries are the primary reasons to consider declining the request. It is far too difficult on these social networking sites to create settings that prevent patients, for example, from accessing specific pictures or reading certain comments made with regards to blog postings, and many users have no idea that these adjustments were possible, and allowed default settings of general access to remain. Facebook even readjusted the default privacy settings for all of its users secondary to this issue in December 2009, and simplified the options, which were often confusing and, therefore, not utilized. In general, it is recommended that discussing the privacy matters in person with the patient while politely declining the request is important to avoid the perception of abandoning or ignoring the patient.

Similarly, if a therapist is comfortable – perhaps even excited – about the utility of microblogging tools like Twitter for information sharing, he or she could choose to limit posts to those that are professional in nature. Many health professionals have adopted this strategy, choosing not to share personal information via Twitter (e.g., such as where they might be having dinner that night) and instead using it to share and receive professional content, such as news of exciting research findings, or tips for managing stress. In fact, a number of therapists have incorporated their Twitter posts directly into their professional websites, which is a clever and relatively simple way to keep the content on a website dynamic and fresh.

Just as mental health professionals are advised to maintain boundaries when it comes to their own personal information and accessibility, it is similarly important to respect the privacy of patients. Consider the following question: do you think that "Googling" a patient would be a positive or a negative strategy vis-à-vis the therapeutic process? One possibility is that the therapist could glean some information that might help the treatment, such as evidence of specific rumination or paranoia, or the discovery of improved functioning (i.e., behaviors) in some domain following a set of targeted therapy sessions. On the other hand, looking for information not explicitly disclosed by the patient can also be seen as a violation of trust. As such, it has been suggested that, before searching for information online regarding a patient, therapists first consider the reason for doing so. That is, is information being sought in an effort to help the patient in some way, or is the therapist merely "researching" to satisfy his or her own curiosity? If the answer is the former, the therapist could address the boundary issue by being upfront with the individual prior to searching for information online, and ask how they would feel about online information being sought in an effort to inform the therapeutic process. If the patient agrees, the therapist could consider reviewing any pertinent findings obtained with the patient. The American Psychiatric Association Ethics Committee considers providers who have searched for information on their patient to satisfy their curiosity to have committed an ethical violation.[23] The key element that makes searching for information an ethical violation is that finding such information does not contribute to patient care and serves another purpose. In some instances, searching for information about a patient does make clinical sense. For example, when the patient makes a grandiose statement and there are no other sources of collateral information, it may be necessary to determine if that information is true by checking information on the Internet.

Provider Ratings

Nowadays, the wealth of health information on the Internet now includes opinions by patients and others regarding their professionals. In the past, word of mouth or lists of providers from the insurance panel were the traditional method for finding behavioral healthcare providers. For many patients, the starting point may be their primary care physician, who will then refer the patient on to someone they know. One of the challenges is that for many primary care physicians, their network primarily consists of specialty colleagues to whom they frequently refer patients such as cardiology, rheumatology, and gastroenterology. Oftentimes, this network was established via contacts made through graduate school, postgraduate training, local healthcare provider society, or just because they are in the same health professional building. In these circumstances, it is often the case where a primary care provider would ask colleagues for recommendations regarding mental health providers. To remedy this situation, a virtual network via social networking sites such as LinkedIn as well as continued efforts to expand a referral network in person make sense for the mental health practitioner.

Today, patients can search physician and therapist rating sites to see what others had to say about their experience. These sites include RateMDs.com,[24] DrScore.com,[25] Vitals.com,[26] HealthGrades.com,[27] ConsumerHealthRatings.com,[28] and TherapistRatings.com,[29] where patients post comments both in free form as well as give ratings on scales regarding aspects such as professionalism, punctuality, helpfulness, knowledge, and quality. None of these ratings have been studied to produce validity, although HealthGrades does search through malpractice databases, public state medical board disciplinary action records, and board certification agencies to create a "background check," which they then rebrand as a "physician quality report." These reports cost $12.95 per physician, and provide information readily and freely available on state medical licensing board and other agency web sites as well; however, the convenience of obtaining such information appears to be the basis of the report fee.

One of the problems for providers is that there is little recourse for negative reviews. This stance is typical of most ratings sites, which state that they serve as a forum not an arbiter of opinions. Some sites will remove comments or ratings determined to be unconstructive or merely lambasting the provider, and only a few sites such as RemarkableDocs[30] have policies accepting only positive reviews. A significant fact to consider by both behavioral health providers as well as potential patients is that many of these reviews are done anonymously. Few patients actually give their real name or other identifying information in order to maintain privacy. The adage “caveat emptor” comes to mind in determining whether anonymously provided information has much merit. In addition, the majority of patients who do rate their healthcare providers are typically extremely dissatisfied or hopefully quite happy with their provider.

Another downside to provider ratings sites is that there are too many of these sites out there, and patients often do not know where to turn to find accurate or helpful information. Even the most liked physician or provider has about 30 ratings on a particular review site, with many sites averaging only two or three per provider. Although an online reputation is important to maintain, a broader perspective, such as the attitude that one negative review out of many positive ones is likely to not drive future patients away, may preserve sanity and decrease anxiety and paranoia. In addition, another strategy is to decrease the ranking of the rating site as many patients today just enter the provider’s name into the search field versus checking a specific rating site. This downgrade of the search ranking can be accomplished by having many other sites linked to your primary professional site as well as creating additional content for the Internet, such as postings on other health related sites. It also may be helpful to know what sites containing information about you are being viewed. As such, we suggest that health professionals periodically check the online landscape to see what kinds of information on them might be out in the public domain, and hence easily accessible by others. One way to accomplish this task is to set up a search alert in popular search engines such as Google[31] and Yahoo,[32] which will then notify you via e-mail on what terms and what pages were viewed.

Health Tools

Searching for health and medical information online has been commonplace for a number of years, as more and more people turn to online resources for insight. Recent research indicates that the use of the Internet for access to health information in this country reached 61% in 2009, up from 25% in 2000.[13] One of the problems facing patients today is that there is too much information, both good and erroneous, contradictory and confusing, as well as misleading available on the Internet. To address this issue, specific health search engines, such as Medstory, Healia,[33] and Healthline[34] search specific medical databases, healthcare websites, and use a specialized health-related taxonomy to improve the relevancy of the search findings. Google and Microsoft’s Bing[35] are still search engine portals that help patients find information; however, more patients are finding better results via health search engines. Many patients are reading about other patients’ accounts with medications and types of therapies, which inform their decision making about compliance or follow-through on recommendations by behavioral health providers. Although traditional sources of health information on the Internet such as the National Institutes of Health,[36] Medscape,[37] PsychCentral,[38] and now Wikipedia are still utilized, it behooves the behavioral healthcare practitioner to check out what patients are viewing that may potentially shape their actions.

In addition to general information, specific tools are now available on the Internet to help and perhaps stimulate the consumer to consider behavioral health services. The Depression and Bipolar Support Alliance offers confidential screening tools for mania, depression, and anxiety.[39] MoodGym is an online-based cognitive therapy program to help prevent and cope with depression.[40] Patients are using the web site DoubleCheckMD[41] as well as the popular medication program ePocrates[42] to determine if there are drug interactions among their medications to be concerned about. One source of confusing information is the result of various drug interaction programs available online. For example, in checking the interaction between paroxetine and risperidone, DoublecheckMD will highlight the need to monitor blood sugar, platelet counts, and white blood cell counts, as well as checking EKG for abnormal heartbeats, but it does not comment on how paroxetine with its 2D6 cytochrome P450 enzyme inhibition may slow down the metabolism of risperidone. The drug interaction program of Epocrates has identified this potential increase in risperidone levels, and Epocrates then reminds providers about the increased risk of the adverse effects as well as neuroleptic malignant syndrome. Although it is nearly impossible for patients and providers to check all of the various mental health tools available on the Internet, it makes sense to ask patients what health information and health tools on various web sites they have been visiting in order to determine the relevancy of the information they are considering. By engaging the patient in a discussion of the information they have found online in a confident, non-accusatory, and open manner, behavioral healthcare providers are providing patient centered care and establishing that they are open to learning about the concerns of their patients. This process helps engender trust that the provider has the expertise to help patients determine whether the information they have discovered in the Health 2.0 era is relevant to their health needs.

Peer Support

Of all of the Health 2.0 applications that we have seen to date, among the most powerful have been those that bring support to those who need it most. When faced with uncertainty, we turn to peers for support. And in the context of health, where the stakes can be quite high, people are particularly motivated to seek out others like them – people that have faced or are facing the same types of illnesses and health situations that they are themselves facing. Fortunately, thanks to the Web 2.0 movement, patients have at their disposal an ever-growing arsenal of online tools and networks to provide what can be otherwise elusive insight. Sites like MedHelp,[43] PatientsLikeMe, DailyStrength,[44] LIVESTRONG,[45] and OrganizedWisdom[46] are providing powerful tools and dynamic communities to empower patients and foster a sense of belonging and community among those facing illness. Armed with a basic understanding of the sites and tools that are available, mental health providers will be better able to understand the experience of their patients who turn to these communities for help, as well as be able to facilitate patients reaching those resources that may offer the most benefits.

Mental health professionals, as well as any health care provider, understand and appreciate the value of social support, and the importance of not feeling isolated or alone. Given that patients (and we are all patients at some point) are turning to these platforms, it is suggested that those providing therapy at least have a basic understanding of the online communities that are available to patients seeking further support and insight. While this section will certainly not cover all or even most of the online peer communities available for patients, several dynamic communities will be highlighted.

PatientsLikeMe, founded in 2004 by three MIT engineers, is considered by many to be one of the fastest growing companies in the patient support domain. Their tools are designed to help those diagnosed with "life-changing diseases" by allowing patients to share and discover the outcome based on a number of disease categories. As an example, patients who have been diagnosed with major depression may be interested in going to their Mood Conditions community to see data on the kinds of treatments being used by thousands of other patients who have been fighting depression. Here they would be able to see information regarding efficacy and side effects for a multitude of treatments, as well as learn about how behavioral changes like quitting smoking and getting physical exercise may impact their symptoms. And not only is this information readily available for patients, the anonymized data that is generated via the PatientsLikeMe community helps researchers learn how these diseases act in the real world, thereby facilitating the potential discovery of novel treatments. As a testament to their approach and potential, PatientsLikeMe was recognized by Fast Company as being among the top 50 most innovative companies in the world in 2010, as well as the second most innovative company in healthcare.[47]

Of the many entities that are offering health-related peer support, among those with the longest staying power to date has been MedHelp, which has been a reliable destination for medical information and support for patients since 1994 – well before there was talk of "Web 2.0" technologies. One of the significant advantages of MedHelp is the active presence of medical experts who moderate many of the forums and wikis on the site. As such, their dynamic community consists of patients and physicians working together. And MedHelp has taken this collaborative approach even further by establishing partnerships with some of the most reputable health care institutions in the world, such as the Cleveland Clinic, Johns Hopkins, and The Mount Sinai Medical Center, among others. As a result of these partnerships, not only can patients post questions to the community of members, they can also utilize any number of "Ask an Expert" forums, where they are able to ask questions of medical specialists from MedHelp's partnering institutions.

Two other Health 2.0 sites that allow patients to get information from experts are DailyStrength and OrganizedWisdom. DailyStrength has created hundreds of support groups for people facing a number different disease conditions. And like MedHelp, DailyStrength has combined efforts with other reputable healthcare institutions, such as the Centers for Disease Control. Not only can patients find support from peers within the DailyStrength community facing the same illnesses that they have faced, medical professionals are also available for advice and consultation. OrganizedWisdom provides yet another way for patients to benefit from the expertise of healthcare professionals by providing a platform that allows medical experts to share their knowledge and training by creating "wisdom cards," which provide patients with vetted health information on thousands of medically relevant search terms. WebMd,[48] a pioneer in the world of online health and medical information, also provides tools that allow patients to interact around medical content and interests, along with their expert-vetted medical information.

In addition to these and many other Health 2.0 sites that offer peer support for patients, Ning[49] is one network service provider that has taken a different approach. Through the Ning platform, anyone can essentially roll their own network, and create a community for whatever interest they may wish to connect around. Literally millions of networks have been created on Ning, many of which are privately branded. While Ning is not a Health 2.0 company per se, countless communities have been created around medical conditions, diseases, and other health-related interests. Private and public groups have been formed around topics such as addictions, anxiety disorders, Asperger syndrome, cancer support, autism, obsessive compulsive disorder and on it goes.

Patients are not the only players in the healthcare industry benefiting from Web 2.0 tools and technologies. Just as PatientsLikeMe and many other community-based platforms offer resources and communities to patients, companies like Sermo,[50] Medscape Physician Connect,[51] Ozmosis,[52] and Within3[53] provide technologies to help facilitate networking and information sharing among medical professionals. Sermo, which is often cited as the largest physician-only network in the United States, provides an online environment where licensed physicians can exchange ideas and clinical observations in real time. Medscape Physician Connect enables physicians to utilize a large community of peers to discuss clinical and nonclinical topics, as well as search through thousands of archived discussion posts. Another physician-only site, Ozmosis, provides tools to allow members to connect with peers, share medical content (e.g., clinical cases or bookmarked web content), and submit questions to their network. Within3, which was started by three social psychologists in 2004, designs and implements secure online communities to foster connectivity and collaboration amongst physician and researcher groups in the health sciences. In addition to these social network-based communities, there are a number of others focused on specific specialties, geographies, and other professional interests. While there are certainly more sites specifically geared toward patients, it is clear there are also a number of platforms designed to foster connectivity within and beyond professional networks within healthcare. Given the multitude of connections that exist between colleagues within health systems, alumni groups, academic centers, and medical societies, it is not surprising that more and more tools are being developed to allow medical professionals to more efficiently utilize these valuable networks.

In sum, it is clear that there are a multitude of web-based resources available to provide peer support. The tools for connecting to others with common interests are continuously becoming more robust, and they seem to be on a ubiquity-approaching trend. Of course, the value and potential positive impact of support from others cannot be understated; a point that may not be understood by all medical providers, but is not likely lost on most behavioral health professionals. Knowing what we know about social support, we can help others navigate toward networks and communities that are likely to provide social resources for those who could most benefit from.

Conclusion

The Web 2.0 approach is facilitating interactivity and community development among all actors in the healthcare system. These trends of connecting, sharing information, and participating are only going to become more common and robust as additional innovations are developed. And it is clear that the innovative technologies that we are seeing now are not just for the young crowds. According to a recent analysis by Media Metrix, more than fifty percent of Facebook's users are 35 and older.[54] Another signal of the staying power of some of the most heavily used Web 2.0 platforms can be seen with the abundance of businesses, government offices, professional societies, nonprofits, and academic centers that are using them to facilitate their mission. It has become common for professional organizations to establish a presence on Facebook or Twitter, and to use these technologies to disseminate information and engage audiences. Health professionals are encouraged to at least become familiar with these participation-enhancing tools as well, and we hope that this chapter will serve that purpose for many. If you are an expert in some area, why not find out what is being said on the topic on some of the widely used wikis, social networks, and interactive forums, and perhaps even contribute to the collective discussion? While there are certainly risks that should be avoided and protective strategies that should be taken – particularly with respect to privacy – psychiatrists and other behavioral health professionals can do themselves a great service by becoming aware of these powerful tools, and, when applicable, helping to make patients and colleagues aware of them.

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Computerized Psychotherapy

9

Brent Coyle and Naakesh A. Dewan

One of the first duties of the physician is to educate the masses not to take medicine

William Osler
Canadian Physician, 1849–1919

Introduction

Psychotherapy can bring insight, modify behaviors and thoughts, and provide support and guidance to individuals. It can help groups in distress due to life events, medical conditions, or neuropsychiatric illness. Can this deeply caring and intimate enterprise be replaced or supported by automated, computerized, or self-directed therapy? This chapter will provide an overview of the past, present, and future of computerized psychotherapy. The reader will have to answer this ultimate question as he or she challenges their thinking and imagination in this unprecedented juncture in the history of medicine and healing itself.

Therapy

"I wouldn't trust therapy done by a computer. I don't believe anyone would benefit from it." The process of psychotherapy is an interpersonal one. There cannot be therapy without a therapeutic alliance and that can only happen between two people, in

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effective relationship." These utterances come from friends, family and colleagues in the mental health field who find automated care insulting and an infringement on their practice.

Decades of understanding of the therapeutic process must first, at least, be considered. Out of extensive clinical experience, a therapeutic relationship or "alliance" has been found to be a necessary substrate for personal change. This is a true and hallowed foundational ground for any therapist. Transference, similarly, is foundational and assumed at least in psychoanalytic circles. For true change, individuals in psychodynamic therapy need to come to relate to and resolve the distortions of the therapeutic relationship in order to benefit from treatment. For decades, the most fundamental concepts of "empathy, warmth and genuineness" have prevailed in the therapeutic environment.[1–6]

These concepts repeatedly have been proven and seem to reflect the sentiments of the individuals working within the therapeutic "sacred space" where the importance of a *relationship with a therapist* who practices with integrity and authenticity was/is paramount to establishing the trust necessary for vulnerability, receptivity, and ultimately insight and behavior change. Therapy was, is and presumably, always will be … a fundamentally *interpersonal* process.

The processes, however, of therapy and therapeutic growth have never been exclusively in the relationship or the training of the therapist. There is now convincing literature that would claim similar therapeutic effectiveness of a social worker, Ph.D. psychologist or, a physician psychiatrist. Additionally, many people get their "life change" advice and guidance from clergy, mentors, coaches, motivational speakers and books. Peer support has even proven to be helpful.[5, 7] We also now know that people were more likely to be honest in writing than in interpersonal contact.[8] So the notion that "well-trained psychotherapists" are necessary to reduce suffering and improve quality of life in those who suffer from mild distress or mild impairment of psychiatric disorders must be questioned.

Lastly, we still have our human reactions and judgments. We may tend to see ourselves (and on a particularly good day, our patients/clients may also see us) as fairly "non-judgmental," "accepting," and helpful, but we have our limits. Despite how much we might think that we effectively cover up our responses, as a comprehensive review said recently, "Computers don't have eyebrows".[9] Furthermore, computers don't commit sexual boundary violations with patients and we all get tired and forget things after a long day. Sometimes we are sick and barely able to attend to others. Sometimes we are in the midst of tremendous personal loss or hardship it becomes difficult to get outside of our own needs.

Furthermore, even if one were to embrace the fundamental necessity of psychotherapists, the availability and access would never be achieved for all those in need due to geography, workforce, and/or economic barriers. Is technology the answer? Or are well-designed, empirically validated computerized therapy protocols supervised by clinicians the answer? Should psychotherapy be conducted asynchronously with direct patient contact? Will computerized psychotherapy result in greater adherence? These are the types of questions now being considered by researchers around the world.

Drugs

Now let's shift our attention to the medical profession's current area of greatest hope and confidence – Drugs work. The FDA proves that. Physicians and the public love the power of medication. They are powerful little capsules (and other potential administration forms) that instantly (we hope) create whatever effect we desire. Invariably there is some sophisticated and astute biophysiologic explanation for the mechanism of the drug, placebo controlled trial(s), and effectiveness charts to further convince us of the drug's outstanding therapeutic benefit.

But before getting too excited about the "drug cure," let's first reflect carefully on even the likelihood of benefit from medications for psychiatric issues. For many conditions in psychiatry at least, the potential for treating a given condition with drugs alone might well be questioned. For example, think of the myriad of reasons *why* a given individual might be depressed, anxious, addicted, etc. Is it intuitively obvious that a medication would be helpful, say nothing of curative, in these conditions?

Consider trauma in this context. Most of the psychological literature would suggest that the curative elements of trauma treatment have to do with "mastery and desensitization" of the traumatic event. A therapist may explain to patients that it is much like watching a horror movie so many times that it seems boring or uninteresting. This is a cognitive, verbal, and, quite likely, a painful emotional process. It means slowing the trauma down enough to process the anger, loss, fear, etc. at a pace that allows for the "processing" of the event(s). That intuitively makes sense and various psychological treatments have focused on the variants of that reality.

But how could a medication help this process? Providers who work with those suffering from addiction and traumatic life experiences do not use benzodiazepines because of the fact that these medications are pharmacologically much like "alcohol in pill form." As such, they, like alcohol, are likely to *impair* one's ability to process the trauma and/or otherwise *assist* in *running from* the trauma rather than gain mastery over it . So psychotherapy takes time, requires effort, and is not helpful for some groups of patients in behavioral healthcare.

Obsessive–compulsive disorder is another excellent example in that the psychological mainstay of treatment has long been "exposure and response prevention." This process is a variant of the "mastery and desensitization" process just discussed, but again, the process of exposure then mastery of the anxiety associated with obsessions and compulsions is a time consuming psychological and educational process.

Drugs Versus Therapy

After a comprehensive clinical evaluation, a competent summarization and treatment planning explanation is likely to include an explanation that a combination of medication and therapy carries the most effective outcome. The mechanism of biologic change in psychotherapy is likely more predominantly "top-down" and enduring, whereas that of medication is more “bottom-up” and immediate. Ideally, the two methods then most effectively and synergistically “meet in the middle.”

In the tertiary field of psychiatry, is it not uncommon to meet patients who have been repeatedly treated with various medication trials and combinations and never exposed to psychotherapy? Even when challenged to “try something different,” patients still, frequently, want desperately to cling to a “biological determinism model” and the unique “power of the pill.”

Medication versus Psychotherapeutic Effectiveness

How does psychotherapy compare to medication effectiveness? The pharmaceutical industry is carefully monitored, regulated, and controlled. Clinical trials of medication in comparison to placebo are a standard required component of FDA approval. When one has the opportunity to look at this data carefully, however, it is extremely shocking to become aware of the relatively small effect size for most psychotropics in comparison to placebo.[14]

Medication management outside of this crucial psychological work, however, has far from optimal efficacy. Yet we keep prescribing medications without the psychological component due to time constraints with relative carefree abandon.[10–13] In OCD trials, the effect size for computer-based psychotherapy versus medications can reach 2.5–3-fold.[10–13] Drug companies have been known to help fund and develop computer-based treatments as an add-on service, but ultimately give away the product because it worked embarrassingly better than the drug.

Face-to-Face Therapy versus Computer Therapy

Finally, how do computer-based treatments compare with face-to-face interventions? Well, that depends on several factors as you might imagine, but the short answer is that they have the potential to rival the effectiveness or even exceed it.

The two treatment modalities are ultimately and simply “different.” Some people will like and/or do better with one modality than the other (just as some people prefer “pay at the pump” to fill their cars with gasoline while others prefer “full service”). We must remember, however, that many people don’t have the option for psychotherapy for a myriad of reasons and that computer-based treatments are most likely better than nothing at all.[15]

Treatment Fundamentals

So, we are left with the reality that a combination of medication and psychotherapy is usually better than either one alone. The benefits of therapy are probably more enduring but the benefits of medication are probably more immediate. Psychotherapy, as well as medication can be curative on its own, and computer-based treatments can be nearly, or as effective as face-to-face therapy and certainly far better than nothing at all or as compared to therapy done by incompetent individuals.

Why this treatment overview? Because it is in this clinical and economic context that we best explore our subject. Computerized therapy promises to extend the availability of clinically validated, "best practices" care for a diverse collection of disorders and individuals, yet this promise remains unfilled, despite advantages to patients and clinicians in terms of cost, availability, convenience, and a myriad of other ways.

Perspective of Technology Pioneers

The lead author had the privileged opportunity to speak with John Griest, M.D., Warner Slack, M.D., and Isaac Mark, M.D. during the preparation of this chapter. These individuals, among others were foundational for this development and one of the most interesting things was the consistency of these individuals being OUTSTANDING physicians in their own right but their early and sustained desire was to make all of us BETTER through technology.

Griest recalls, "I was chief resident and I quickly realized that if I was among the best we had, we were all in terrible, terrible trouble cause I couldn't remember all the stuff I was supposed to do and I tried very hard." I said to myself, "What could I do to be better?"

At the time when Douglas Engelbart at Stanford Research Institute developed the computer mouse in 1964, and Joseph Weizenbuam was in the process of developing ELIZA, the first natural language simulation of a Rogerian psychotherapist, Warner Slack was already developing computerized assessments.[16]

A short time later, John Griest and Warner Slack published *Computers and Doctors: Use and Consequences* in the journal Computers and Biomedical Research.[17] Remember, the floppy disk was yet to be invented in 1971 by IBM, say nothing of the 3½ in. floppy disk being produced by Sony in 1981. The founding of Apple computers did not take place until 1976 and the first ARAPNET had just been established between UCLA and the Stanford Research Institute in November 1969. The foresight and burgeoning efforts of individuals like these has been phenomenal.

Medicine: A Profession in Need of Every Available Resource for Teaching

A "teacher" is, ideally- skilled, careful, eloquent, measured, precise, calculating, sociable, and a careful listener so as to build upon firm foundations of understanding reaching for new and creative heights. Few professionals now remember that the Latin root for "Doctor" is that of "Teacher," but how many "Doctors" of any specialty now remain primarily focused on being better "teachers"?

The literature on leading causes of death informs our profession and our society that the actual causes of death are obviously *behavioral* in nature.[18] Tobacco (i.e., nicotine addiction) still leads the list; however, poor diet and physical inactivity are quickly rising to take its place. These two clear leaders are followed by: alcohol consumption, microbial agents, toxic agents, motor vehicle accidents, firearms, sexual behavior, and illicit drug use.

Perhaps we realize that being a physician still means educating and motivating people toward healthy behavior, but now with new tools and technical solutions. Without question, computers and the technical society have transformed the way in which we are exposed to and absorb information. Therefore, why would this not be true in medicine, in mental health, and in psychotherapy?

Computers have been the centerpieces for all subsequent development in a technical field; however, the Internet and now "mobile devices" have put tremendous additional potential in the palm of our hand. It is also fascinating to consider the colossal power of the social networking community. Despite the "noise" of the community, the potential for pointing individuals toward wise and fruitful endeavors is no less than astounding.

Today's Emerging State of the Art

A number of applications are available around the world. Some are still undergoing testing, updating, and are not available for commercial dissemination. The economics of the marketplace as well as their acceptance, usability, and efficacy in the eyes of patients and clinicians will drive access and utilization. If we are to continue our corollary with the automobile industry, we are still in the "horse and buggy days" with some "model T's" on the road.

Most available systems across disorders are based on a cognitive behavioral approach. Common components of these systems include:

1. Symptom monitoring
2. Documentation of automatic cognitions
3. Homework assignments
4. Event scheduling
5. Relaxation suggestions
6. Disease and treatment education

These are the same components one might find in therapy manuals. Just as a computer system designed to teach chess to a user can be superior to reading a book, so too a computerized adaptation of cognitive behavioral practice can be superior to a workbook. Technology fundamentally transforms the work of psychotherapy in ways never imagined.

A recent seminal work reviewed 175 published and unpublished randomized controlled trials using 97 computerized therapy systems, and while many were encouraging, when one seriously desires to access or buy the systems and/or recommend them to patients/clients, it becomes almost impossible to do so.[9] Most have been academic efforts that, while they may hold future potential, are not yet available for consumer use. Others have been approved for and recommended for use only within the public health systems of limited numbers of countries.

Several excellent reviews have complimented Mark's work.[19–22] The authors have wished to remain practical, so after careful review, they have chosen to highlight only systems that are readily available. Interested parties are also highly encouraged to review Mark and the other writers for much greater detail.

Panic/Phobic Disorders

Mark reviewed 18 systems globally, and informs us that the greatest number of tools in various stages of development and availability are for these disorders. Unfortunately Canada's Panic Program (www.paniccenter.net) is the only one available to the general public (Known to authors). Mark also noted that this program had an extremely high attrition rate. England's FearFighter (www.fearfighter.com) is the most widely known, and is now approved and recommended by NICE (National Institute for Clinical Excellence of England and Wales) however, even as an authors and physicians desiring to review it for this publication, we were denied access. Sweden's netCBT seemed to be purchasable at https://www.livanda.se/ but was not available in the English language. Australia's net Panic Online was fairly well known and studied but the authors found it inaccessible from Monash University. (More information might be found at http://www.infotech.monash.edu.au/research/centres/cosi/projects/panic/)

Existent programs and those in development rely on education and practice of mastery and desensitization of anxiety and panic provoking stimulus in keeping with established and empirically based interventions.

Obsessive–Compulsive Disorder (OCD) and Post-Traumatic Stress Disorder (PTSD)

The most encouraging practical access emerged from a conversation with Revere Griest, son of John Griest, responsible for the business aspects of CTSteps, who provided authors with a professional access portal at www.professionals.ctsteps.com CTSteps is similar to BTSteps used in England and each was a collaborative effort of Griest and Mark. Again, although a portal exists for global users with Griest, UK residents will soon have access to BTSteps through the public health system. OCFighter (http://www.ccbt.co.uk/) is similarly only available in England's public system.

For PTSD, The Netherland's "Interapy" was reviewed but, again to the author's knowledge, it is only available in Dutch, http://www.interapy.nl/.[23]

Depression and Anxiety

Using informal "criteria" for both accessibility and researched computerized systems, Dr. Jesse Wright's "Better Days Ahead" (available for purchase at http://www.mindstreet.com/

for $99.95 and England's "Blues Begone" (available for purchase at http://www.bluesbegone.co.uk/ for £110.00 best fulfilled what might be practical solutions. Australia's MoodGym/Bluepages http://moodgym.anu.edu.au/welcome has been present for some time, but data on attrition has been extremely discouraging. Its relatively unengaging format may at least partially, explain why. Most prominent in Mark's review were England's Beating the Blues (http://ultrasis.com/) and COPE, which may be available in the UK. Adaptation to the web is reportedly underway (http://www.ccbt.co.uk/cope.html). Reportedly, Dr. Griest's group is in the process of developing a depression-based module which is likely to be entitled "Thrive" and is expected out soon. While several systems were reviewed for anxiety, as of yet, none of the widely divergent systems have achieved any degree of notoriety or accessibility.

Available systems almost exclusively use cognitive behavioral approaches to system management and while CBT is clearly a leader in empirically based treatments, other systems using Interpersonal Therapy and other approaches will be well received following development and testing.

Eating Problems

In the light of the market for diet and exercise, and exploding choices becoming available in especially handheld devices like the iPhone and others, this field is changing so fast that it defies any reasonable publication rate. Interested readers are encouraged to review applications in Apple's iTunes application "store" and other PDA and Mobile device "stores." Marks reviewed especially the handheld CADET program (Computer-Assisted Diet and Exercise Training); however, getting more information proved to be difficult. The founder, kburnett@miami.edu, may be a useful source of information. Similarly, the Mandometer PDA device, Student Bodies software, at Stanford University, and many others may have practical potential.

Addictions

Again, other than a limited number of iTunes applications for the iPod, etc. and other hand-held devices none of the seven systems for smoking cessation, seven to lower alcohol intake, and three for other drug addictions reviewed by Marks seemed to be directly accessible or purchasable at present. A prominent application in the reviews was "Go NoSmoke." A web-based "application" is available on the American Lung Association website and the telephone based "Quit Now" might also be construed as "automated."

The authors became aware of an interesting social networking community (www.onerecovery.com) that has been developed to enhance sobriety. Despite its promise, it too is not accessible directly by the public, rather, only as a follow on resource from a highly limited number of treatment facilities.

The lead author completed review of Automated Addictions treatments that might be accessed at: http://www.mytherapysession.com/PDFs/AutomatedAddictions3.pdf

Today's Fears

In no particular order, a myriad of fears and anxieties, become manifest when we seriously consider making a computer or technical system responsible for even part of our emotional health care assessment and/or delivery.

What If People Don't Want to Use It After It's Been Built?

New technical resources are produced only in the context of tremendous financial costs and usually personal sacrifice of professional's time. Anyone who has been in this development field can readily provide unlimited stories of technical frustration that have taxed the most ardent of followers. From missing spaces in computer code, to power outages that destroyed massive amounts of previous work, to the development of new technology that instantly antiquated years of former effort, etc., the frustrations of development of these tools is monumental. Individuals have continued to push on to accomplish this development in the light of the tremendous hope, but is it any wonder that anxieties might rage with regard to adoption?

We have already discussed how enamored we are with medication. Despite how intuitive it might seem that emotional and mental health problems might ideally be repaired via psychological, verbal, and interpersonal growth, psychotherapy, clearly requires effort so will be a reluctant and difficult "sale" to make. Therefore, anxiety also exists on the part of the developers about making their interventions "fun" enough to capture and maintain the attention in the context of, perhaps an ever-dwindling capacity in the population.

Attrition

Anxieties soared when an exceedingly high rate of attrition occurred using these tools. People, it seems just couldn't maintain their commitment/attention to the innovations. Many reasons have been postulated and encouraging pieces of realization also quickly emerged.[24] Researchers began to find that even small amounts of human contact and facilitation greatly enhanced commitment to and ultimate benefit from technically facilitated treatments; some nearly matching those of their fully "humanly" delivered alternatives.[25–29]

Even though one might easily envision these resources being used at least in a step-wise fashion, it seems we are an increasingly lazy society in the context of numerous entertainment options. Can they be produced in such way that makes them attractive and/or with the ability to maintain interest and change?

What If It Doesn't Do What It Was Intended to Do?

Another anxiety of developers lies in uncertainty of the actual outcome of the interventions. While intervention is likely to be astutely built on fundamental psychological concepts, their application to this new delivery "world" could very well alter the ultimate outcome. Unintended consequences may appear out of these interventions.[6]

Will We Be Able to Charge for It?

We seem to be at an impasse with regard to the free availability for these tools. Since many have evolved out of academia, many have been available to their users without charge. A subtle but important message is conveyed by making automated psychotherapeutic and psychoeducational interventions available at no cost. Patients have been found to improve more when drugs, and even placebos, cost more. For example, in the treatment of addictions, a drink or drug has a monetary "value." When interventions are offered for free, there is a powerful subliminal message that the treatment is not nearly as "valuable" as the drug/addiction other illness itself.[30–32]

How Will Therapists Be Impacted?

Psychology continues to be one of the most frequently chosen fields of undergraduate study likely because we are so fascinated by thoughts, feelings, and behaviors and their complex interactions within our society and personal decision making.

Now, as we seriously consider the development of machines/applications that will serve even a small substitute capacity in this regard, tremendous anxiety mounts. Clearly, the human system of care delivery is imperfect. Ethical and legal problems within the system are sobering. Most notably, sexual boundary improprieties and violations among other egregious examples and technology certainly offer solutions to many of these problems. But what does it mean to actually substitute a machine or a computer chip for a person in, arguably the most intimate of all social interactions? Is it ethically "right" for an individual to find help through technical means?.[33]

We have already mentioned the potential outcry that may stem from the pharmaceutical industry in reaction to these technical developments, but the therapeutic community would undoubtedly dwarf that cry. Again, not only are personal livelihoods at stake but our core sense of meaning and purpose as well. Is it any surprise then that many helping professionals would resist and be reluctant in supporting these developments?

How Will Certification Emerge?

Just as we needed the development of the FDA to assure drug safety and efficacy, certification of automated measures is inevitable. We are engaged in a fundamentally shifting environment ideologically. Now we are faced with an explosion of tools and techniques equally "potent" in their therapeutic effects without any mechanism for "approval" of them as such. The instant potential for global adoption similarly pushes our conceptualization of certification beyond current physical and ideological boundaries.

Many compare the development of these tools to "self-help" which is a powerful force of its own in health care. Until interventions of this kind are "certified," there will be no way for them to be any other than "self-help" and as such, providers may be unlikely to, at least routinely, refer to them.[34–36]

Will It Be Adequate Adequately Secure?

This is actually one of the first questions that come to mind when people seriously began considering the utility of technical means for healthcare delivery. Within emotional health in particular, there are legitimate confidentiality concerns. The confines of the fiduciary individual therapy contract has been a hallowed ground for professional organizations, not only because it has been demanded by their clientele, but because it is the deeply right and ethical thing to do. Any trust, therefore, given to the technical system must be built on the most secure of systems.

Implementation Challenges

Conflicting agendas are likely at play when one considers the tremendous intellectual energy going into this development, yet how little is available practically.[37, 38]

First, as has already been alluded to, pharmaceutical companies are about as likely to promote these systems, as they are to promote a competitor's drug that works better than theirs. It will never happen. The costs associated with bringing a drug to market are just too high to risk it. Probably one of the reasons why CTSteps has not taken off faster is because of the combined pharmaceutical marketing structure.

Therapists similarly, are unlikely to promote it for fear of devaluation of their services. Yes, it probably depends on the setting. Therapists in private practice in contrast to beleaguered systems might be vastly different in levels of interest and adoption.

So who will? First, public health systems have already been slowly convinced to recommend a limited number of interventions in England. This administrative recommendation is important, at least as a trendsetter. Often public systems such as these are slow to act however, and may fail to recognize innovative new systems. Even in the United States, we have many public service options that may embrace these potentials, at least as a part of a tiered approach to care.

We, in America and other places globally have also typically been more interested in a capitalistic approach. We tend to use what is "popular," however that comes to be. It might be as trite as a celebrity putting out "tweets" in recommendation. It might be the most ingenious marketing campaign or it might be the best "value." Unfortunately, we, as a culture have also come to expect health care for free. As amazing and unsustainable as it sounds, we become "entitled" to care for no cost, or at least for only a small "co-pay." While the developmental costs for computerized treatments pale in comparison to pharmaceuticals, they are not insignificant or trivial.

Alternatively, insurance companies could recommend or, potentially, mandate these services as less expensive/portals for coverage.

Prior to providers more routinely recommending these services as compliments to care, what could develop might be networks of health care "consultants" that might, for a (hopefully deductible or flex account eligible) fee make referrals to these systems as "stepped" approaches to care. Alternatively a friend or relative wishing to help might purchase intervention.

What is concerning here is a total lack of precedent within the legal and malpractice realms. Just as most self-help books offer a legal disclaimer, most certainly, such clinics would need rock solid assurance of limited liability should an individual choose a low cost intervention but ultimately suffer an unfortunate outcome.

Another potential option lies in the technology itself. If the assessment automatically connects individual to needed education or "therapy" then no "buy-in" from a physician or therapist might be needed.

So, we are left with some excellent systems that are getting better and better all the time, but it seems that the "consumer" has to (currently) find them on their own. That way, the individual using the system, the medical and therapeutic communities, and everyone else is sure that it is "Self-Help" only for fear of getting sued or otherwise threatened.

Conclusion

Therapy done or assisted by a computer is likely to be inevitable. Yes, it presently needs significant human coaching. Perhaps it always will. No doubt these therapeutic interventions will become increasingly entertaining and self-sustaining but it seems unlikely that the human element to psychotherapy will ever completely die, nor should it. Our world, profession, and especially our society need effective tools to help us become healthier. Technology will undoubtedly play a central role.

Where we are headed is entirely too difficult to predict. As forward thinking as Warner Slack was in the mid-1960s, he was, by his own report most surprised by the development of the Internet and would never have dreamed of a calculator being given away when, in 1965, a four function calculator cost $2,500 weighed 50 lb, thus any of us might be caught off guard by the most fundamental, yet incredibly revolutionary developments in this fast-paced world. Let's hope we can find a way to enjoy the ride!

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Part IV

Organizational Issues

Leading Change in Implementing Technology

10

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If one does not know to which port one is sailing, no wind is favorable.

Seneca

Executive Leadership

> *We can never really be prepared for that which is wholly new. We have to adjust ourselves, and every radical adjustment is a crisis in self-esteem; we undergo a test, we have to prove ourselves. It needs subordinate self-confidence to face drastic change with inner trembling.*
>
> *Eric Hoffer*[1]

What is true, unmitigated leadership? What is leadership in health care informatics? Who is leading, the system of the technologist or the executive officers, or both? Since the beginning of mankind we know that human beings learn better from failed attempts rather than from glorious successes. This fact is certainly applicable in today's world of advanced technology. Ray Delany, a management consultant for Health Informatics New Zealand (HINZ), describes the essential necessity of the human factor of leadership being the key tool in "obtaining good results in technology areas" as it "is increasingly a matter of mastering what the technology people call 'people skills' or 'soft skills'."[2] It is no longer, and not just, putting a technology system in place in an organization and passing out a user manual with an accompanying "quick tips card." With increasing knowledge of the importance of human capital, the workplace has instituted professional development teams to train staff in the effort of retaining those same staff as corporate assets. This is true across the workforce, which includes public companies, the private sector, nonprofits, and the niche of behavioral health care organizations.

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Since the original work of Lorenzi et al., *Behavioral Healthcare Informatics* (2002), the wave of new informatics offerings and subsequent implementations have grown exponentially and have forced organizations to participate in the twenty-first century as we currently understand it. Large and small organizations, in the industry of health care, are focusing on technology to provide the information needed to improve the quality of care and efficiency in their organizations. Whether replacing an existing information system that is beyond practical use, or implementing new information systems architecture, the fundamental need of strong, visionary leadership remains a necessary prerequisite. Technology alone offers no guarantees to improve the quality of care or business accountability in highly competitive health services markets. While “technology is the glue” that holds clinical quality together, it is “nothing but a servant.” [3]

Regardless of the size of the organization, or when the migration of information technology is “rolled out,” the roles of the chief executive officer (CEO), and the chief information officer (CIO), become key proponents for successful change management and technology implementation. The alignment of the strategic vision to the day-to-day usage of informatics and its impact on performance outcomes, is crucial, and primarily depends on these two individuals having a thorough knowledge of the clinical and administrative aspects of the organization, as well as a detailed understanding of the functionality of the information technology. An even greater service to the organization would be that these two individuals become the key architects of the informatics design and construction, working together for optimum implementation and a realized performance management system of the changed organization.

Each person has a different set of organizational roles, but their respective roles must be complementary and easily understood by all in the organization. This chapter provides an in-depth perspective on the roles of the CEO and CIO in a behavioral healthcare organization and issues related to successful implementation. For some organizations, the CEO and the CIO will be the same person; for others a CEO and CQO (Chief Quality Officer) will act in concert; for others a database programmer/developer or VP of Information Services will serve as the de facto CIO. In behavioral healthcare organizations, the CEO is often called the “executive director,” especially in nonprofit human service organizations. Whatever the case scenario may be, it is vital to formalize and systematize the roles, responsibilities, and activities of these positions in the ever evolving behavioral health care organization of the new millennium.

Information technology has advanced at a staggering speed, and it has become an inevitable reality, that people must embrace and adapt to technology in order to survive, particularly in the world of the clinician as the global economic forces limited staffing with increasing patient rosters.

Technology systems have advanced to combine administrative patient data systems with computer systems to support clinical processes, which have provided functionality for both management and clinical levels. Benefits to management include support for planning, allocation of resources, clinical audit, and outcome measurement. At the clinical level, information systems can support the coordination of services, patient assessment, treatment plans, reviews, and provide a basis for continuity of care, as well as a vantage point from which to enhance quality assurance. Despite the early introduction of such systems and potential benefits, the diffusion of information technology in the area of behavioral health care has been slow and only started to increase in the 1990s.

Delany (2004), goes on to emphasize the importance of leadership as being the fundamental “process of moving people and organizations from one place or state to another. This requires the ability to challenge the current thinking on any given issue, a characteristic Kouzes and Posner call ‘Challenging the process’, one of (5) exemplary leadership ‘practices.’ Leadership practices are traits invariably exhibited by people who are regarded as good leaders by their followers and/or by the community in general. Kouzes & Posner’s five practices are:”

Challenging the process: not accepting the status quo as immutable. Good leaders venture out and don’t wait for things to happen; they pick up the good ideas of others and transform them into action. They learn as they lead, from both successes and failures.

Inspiring a shared vision: engaging other people in the idea that the future can be different. This not only involves dialogue and genuine consultation with others, but also an “infectious enthusiasm,” enrolling others in the vision by the clarity and elegance of the way in which it is articulated.

Enabling others to act: creating the environment where positive changes can occur. This is based on the assumption that “no-one does good work when feeling weak, incompetent or alienated” and avoiding that situation wherever possible through teamwork, trust, and empowerment.

Modeling the way: leading by example while being prepared to be accountable for one’s own core beliefs and principles.

Encouraging the heart: looking after the people that are being led, through genuine acts of caring as opposed to noisy pretences and exhortations. This is based on the knowledge that people can become exhausted and disenchanted and need to be encouraged to continue.[2]

Chief Executive Officer

Today’s CEO must absolutely possess the talents of financial acumen, strategic thinking, communication abilities, personal insight, boundless energy, understanding, cross-industry experience, and diverse interpersonal skills. The overall responsibility of the CEO is to focus on the big picture, the broader perspective, the formulation and implementation of policies, controls, limits, and to contain risks of derivative activities, and the manner in which they are conducted, in accordance with the authorization of the board of directors. All of this applies as well, to leading an increasingly diversified work force and the protection of the organization as a whole.

The primary job of a CEO is nurturing the long-term viability of the organization’s business as well as its various resources. However, visionary leadership is no longer achieved only by communicating the vision that leads to an organizationally shared purpose. Equally, if not more importantly, the leadership of a CEO “is much more than setting a visionary strategy and bidding for funding to implement it. As well as the visionary strategy, leaders must have what Collins calls a ‘ferocious resolve’ and ‘an almost stoic determination to do whatever needs to be done’ to implement the vision. Further, leaders must exhibit traits that encourage their followers during tough times, while removing any obstacles to action. Above all, leaders must have humility and integrity and must lead by example. These characteristics are consistent with the generic principle of ethics and good behavior in society, and are transferable across many areas of human endeavor."[2] Gone are the days when a CEO can compromise the health, wealth, and well-being of the organization in exchange for personal gain.

CEOs are strategic visionaries and they must have the ability to (1) perceive the big picture, (2) persuade their leadership team, as well as managers and workers, to share the organizational vision, to trust, and to follow, (3) insistently communicate the organizational vision both internally and externally, and (4) foster an environment of accountability through shared ownership of organizational performance.

Yukl and Lepsinger (2006), describe it as "Envisioning Change" by "painting a vivid, appealing picture of what your organization wants to accomplish or become," which helps "to communicate the desired outcomes of a change initiative in a way that is understandable, meaningful, and inspiring. Envisioning change is about putting opportunities and threats in context and clarifying how the organization needs to respond. A variety of elements may be included in the vision, such as strategic objectives, key values for the company, general approaches for attaining the vision, slogans and symbols, and a description of what the vision will mean to people when it is attained. In times of great change, people look to their leaders for direction and signs that the organization has selected the right course of action. Therefore, it is essential to communicate personal confidence that the vision can be achieved and that the benefits will be worth the short-term sacrifices. Leaders can convey a message of confidence and optimism through the type of language they use and by consistent actions that demonstrate their conviction and support of the vision."[4]

For many CEOs, the ability to lead is instinctive. CEOs look to their boards for advice and input in the evaluation of ideas, financial situations, and action plans. CEOs also confer with company management for viability and feedback. CEOs research the impact – financial, social, psychological – of the strategic vision, listening carefully to responses from employees, customers, board members, and the community.

The success of an organization and the true test of a CEOs abilities to execute his or her strategic vision both in times of calm and in times of crisis rest heavily upon how this individual leads in times of crisis. Karen Day (2006), another consultant for HINZ, says that a "crisis arises after commitment to the project and at a time when the impact of the project goals is perceived to make a difference to an individual's daily working activities."[5] CEOs must be well informed, optimistic, well spoken, charismatic, nurturing, a stabilizing force via motivation and reassurance, and must clearly know their roles and responsibilities as they pertain to a major change implementation. CEOs must be consistent and shining examples of the culture they espouse, providing a proactive, focused, and visionary leadership now and into the future.

The CEO is also responsible for business strategy and planning, developing new business, and building the company's market share, communication with the stakeholders and boards, sharing of the company's vision, facilitation of organizational interaction, management of growth, and public relations It is usually in this realm of business strategy that the information systems and informatics issues arise.

As a primary responsibility of today's CEOs, strategic thinking is a central theme in their day-to-day operations. Strategic thinking is the basis for the company's mission and business plan. But even more so, the execution of the mission and the "shelf life" of the business plan are highly reliant on the performance outcomes of the organization as a whole. Without succinct performance outcomes, decision making can become disastrous. Therefore, the CEO will require abounding energy, increased foresight, excellent communication, and people skills to command control of the strategic vision and mission of the organization. By doing so the CEO is constantly reinforcing and monitoring, strategic plans, performance leadership, and using data and measurement as cornerstones of improvement, in order to ripen the environment for the skills and energy required to implement change strategies with information systems.

As the CEO's visionary, strategic, and leadership role continues its evolution into the twenty-first century, the CEO will face numerous challenges. CEOs will have to expand their skills to increase their role in the global marketplace and will steadily withdraw from less strategic aspects of business operations, which has forced today's CEO to relinquish the role of autocrat for that of strategic liaison. Interpersonal skills will continue to emerge as the CEO becomes the visionary link or conduit between the organization and the individual, or group of individuals, with whom the CEO interacts, both internally and within the community, providing a continual and convincing sense of purpose, style, and vision. The CEOs precision in performing these multiple roles is inherently critical to the organization's work-force satisfaction and, consequently, the company's performance.

The continual improvement of information technology systems will present new opportunities for expanding the organization. The evolving CEO, will maximize these opportunities, in order to continue to create innovative business strategies to keep the organization at the cutting edge. CEOs need to ensure that their organizations are not only technology friendly, but also leaders in the use of technology in every dimension of their business.

However, as aptly stated by Yukl (2006), "the complex task of persuading people to support major change in an organization is too big a job for a single leader".[4] Therefore, it is absolutely necessary for the CEO to lead that effort in conjunction with the Chief Information Officer. The CEO with board support creates the conditions that are favorable for a broadly based acceptance of organizational changes couching it as a betterment of people and organization.[6]

Chief Information Officer and Chief Quality Officer

> *The winds and waves are always on the side of the ablest navigators.*
>
> *Edward Gibbon*

In any large informatics implementation, a key executive who understands IT basics, the structural components of the system, the resource requirements, and the time and energy to create and sustain an action plan to completion, are the ingredients for an exceptional CIO. In some instances, this can be the CEO but someone has to have the acumen to focus on informatics and ensure that they support the direction of the systems needed to support the organization.[7]

The operative role of the CIO as related to informatics in a behavioral healthcare setting is to improve the business process and thereby allow the clinical processes to take precedence. A CIO has seven main areas of responsibility: (1) business process analysis and improvement, (2) information resources management/systems development (purchase or build), (3) capital information technology (IT) investment control, (4) performance measurement, (5) IT training/education/communication, (6) strategic and capital planning, and (7) administration.

In larger organizations it is not uncommon for the CIO to report to a Chief Quality Officer (CQO) or some other chief executive, who would/could execute these five practices with the balanced combination of sincerity and timeliness. The CEO is the "visionary link" between the board of directors and his executive direct reports, who in turn will communicate the strategic vision to the rest of the organization.

Business Process Analysis and Improvement

A successful business process analysis will result in studying the business processes and crosswalking those processes with a technology system that will increase the overall efficiency of the day-to-day operations, thereby increasing performance of each individual tasked with a part of that process, and the organizational performance outcomes.

McKibben and Pacatte discuss the necessity of aligning business processes with a technology system that supports the business processes or where the business processes can be easily adjusted to work with the technology system. They also illustrate two different methodologies for a successful business process analysis. One is the Top-Down methodology and the other the Bottom-Up methodology. We will examine one of these methodologies.

"There is a growing awareness that the desired increases in efficiency can only be achieved by aligning the business processes with the technology. The business processes and activities must be designed to effectively use the new technology. In addition, the new technology must provide the information in a usable and understandable manner to allow the users to make the needed decisions and to complete the tasks. To achieve the desired increases in efficiency, the business processes must be aligned with the capabilities of the new technology and the skills of the staff."[8]

Bottom-Up Methodology

"The Bottom-up Methodology, presented in Fig. 10.1, usually starts with the identification, by the business staff with approval of the management, of opportunities for improving business processes by reviewing the existing business processes. The initiation of the Bottom-up Methodology may also be started by the implementation of new information technologies or new regulations or requirements, which may require modifications of the existing business processes. The Bottom-up Methodology must include developing support of senior management for implementing the new business processes. Obtaining senior

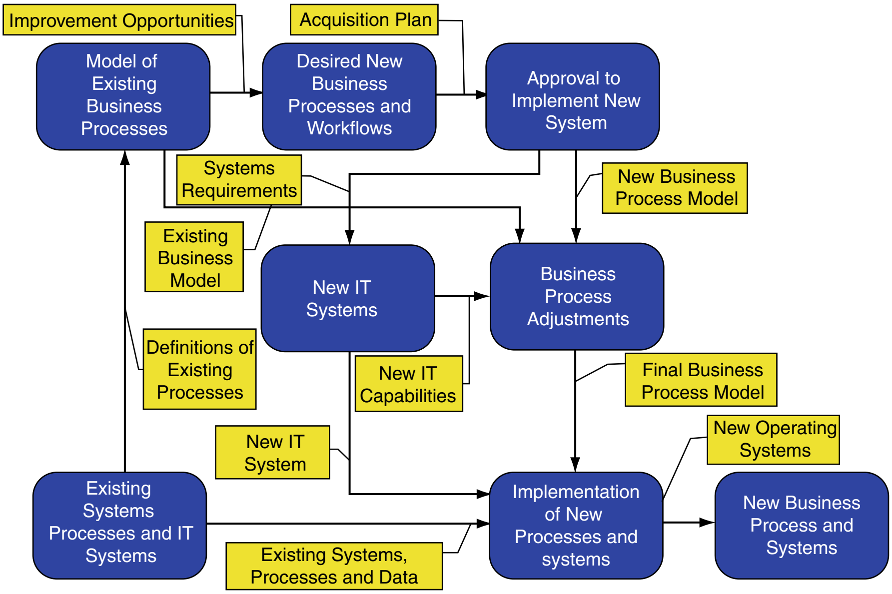

Fig. 10.1 Bottom-up business process methodology

management support is often a difficult task and will usually require the staff to develop the information and business cases for justifying the implementation new business processes. The Bottom-up Methodology usually includes the development of two business process models. The first model is a definition of the existing business processes and the identification of opportunities for improving the processes. A second business model is developed to define the new desired business processes and workflows."[8]

Methodology Selection

"The selection of the business analysis/modeling approach and methodology is dependent on the goal of the business reorganization and the level of organizational support. The preferred approach for major changes in business process is clearly the Top-down Methodology due to the built-in support of senior management and the opportunity to institute major business process improvements. The identification of new business processes required for the implementation of new information technology or responding to new regulations may best be accomplished by use of the Bottom-up Methodology."[8]

Additionally, the support and authorization of the Board of Directors, the CEO and all senior executive leadership, are concomitant with the level of adoption, success or failure of these first phases of change and all subsequent phases toward the implementation of change. Beyond this, there must be a "rock solid" IT leader in the organization who can work proactively through every phase. Depending on the size of the organization and the sophistication of the implementation, someone must take complete ownership and command to drive the process to completion. Dewan et al. (2002), describe the huge impact technology implementation can have on a wide range of people from leadership of the health care system, to management, staff, and even vendors. They point out that "those spearheading the project must be skilled at dealing with both, the 'people' and individual level, as well as the organizational or group level." In order to have high probability of success, the unambiguous, committed support of ALL senior leadership is critical.

The CIO must take active and detailed part of all business redesign processes in which informatics is a strategic factor in the improvement of direct patient care. Even more critical is the effective communication of the business redesign process upward to executive leadership as it relates to the strategic and business plan, outwards to the redesign team or cross-functional team as it relates to the implementation plan, and eventually to all organizational stakeholders as it relates to the ownership of their investment and performance. The business redesign process is especially important in behavioral health care as e-commerce, e-therapy, and e-managed care become more prevalent.

Information Resources Management/Systems Development (Purchase or Build)/ IT Architecture

Clinicians must be involved in the vision of what needs to happen with technology. These clinicians will be directly affecting the organizational outcomes through their applied behavioral health treatments, and will need to understand how informatics will increase not only their success factor but also their individual performance. However, it is the CIO who will analyze the organization's information technology architecture and determine if what is needed can be purchased or if it must be built to meet the specific needs of all functions and levels of the organization. The CIO establishes IT policies and standards that promote a secure architecture to support the scientific, engineering, and administrative data and information technology requirements. Having a strong core group of leaders is critical to the success of the systems development and the later implementation. There is an enormous amount of advanced planning, staff evaluation and vendor work that must be accomplished prior to forming a cross-functional team where clinicians will take an active role in the development and implementation process.

Capital IT Investment Control

The capital investment for informatics efforts and information technology must follow the above-mentioned efforts in the section of "Information resources management/systems development (purchase or build)/IT architecture."

The organization must decide whether to have an application service provider (ASP) model, have a complete internally run and operated local area network, or have a combination of both. From an informatics perspective, the ASP model allows someone else to manage all mission-critical financial, clinical, and office management functions including internal e-mail, word processing, and calendar management. This complete outsourcing of all IT activities is only beginning to be used by businesses outside of health care and may find a home in behavioral healthcare organizations, which are sometimes less capable of raising capital for technology expenses and may be served best with outsourcing everything. For this reason, as you progress through any technology implementation project, keep in mind that more than just your current technology environment changes. The Information Technology organizational unit, how it works with, interacts with and supports other business units, will also have to change and adapt in order to completely and successfully leverage the new technology. Part of the Information Technology change consists of assessing current IT staff/team member skills versus needed skills to implement and maintain the technology solution. Internal team relationships must be managed to support the change needed to provide better support, collaboration across units/departments/programs/teams, assessment, adoption and utilization of the implemented solution. In the behavioral healthcare organizational setting, as in any organization, the purchase of new personal computers, networking equipment, and technology peripherals will need to happen every 2–3 years, as well as propriety and non-proprietary software upgrades every 1–2 years. This requirement to keep up with hardware, networking, and software refinements will exact a financial drain on the organization if long-term planning is not conducted.

Performance Management

Performance measurement processes must be created to measure not only the IT infrastructure itself in terms of performance standards, but also the contribution of the IT infrastructure and systems to overall mission performance. One role of the CIO is to use key metrics to measure the performance and effectiveness of the IT infrastructure and its contribution to meeting the agency's vision and mission performance. The metrics are intended to quickly convey information that can be acted upon by the CIO. It should be noted that while some IT activities may be program driven, the CIO should introduce and inculcate the key metrics into the program. Key metrics include the following:

- IT business value – identification of value drivers (internal perspective), customer satisfaction surveys, and interview programs that actively seek out users to determine the level of satisfaction with the products and services provided by the organization.
- Process improvement rate – implementation and application of structured processes, and information system asset base, including the current size in dollars, location, and number of installed components, their remaining useful life, the cost of replacement or substitution, and how IT is changing in size from year to year.

IT Training/Education/Communication

Educating the CEO as well as others in the organization is another responsibility of the CIO. The executive management and staff must be educated on the potential contributions, limitations, and subsequent actual measured performance of IT in accomplishing the critical organizational mission. The CIO must convince the organization's executive management that IT is an essential agent of transformation, help to create a shared vision for this transformation, identify core IT competencies to support the new vision, achieve approval for an overall strategy to achieve these competencies, keep the organization informed of relevant technology trends and the best practices in applying these technologies, and clearly communicate how IT strategies and architecture will be aligned with the new business vision.

Adequate and appropriate training is an important consideration when implementing a new system. Robins and Rigby discuss the utilization of key persons to train staff in using new computer systems. Formal training is one aspect of learning a new system, but staff members also need to be given time to learn how to use the system. The limitations of the training process underscores the importance of effective communications to staff about events such as installation and training and more general communication about the project. Such communication is likely to encourage the feeling of involvement of the staff and to facilitate the adoption and ownership of the new technology.

User acceptance and user satisfaction have been strongly linked to the level of user participation in system development. Lack of involvement is likely to lower user acceptance and decrease user satisfaction. On the other hand, users are also more likely to accept a system that they perceive to be useful.

User resistance is common in the medical sphere, and physicians have generally been slow to adopt computerized systems in the healthcare sector. This resistance has been attributed to direct data entry taking too much time, apprehension about changing work patterns, and perceived threats to professional values. The literature in the mental health field refers to these issues as well as concerns about security and confidentiality, being monitored (accountable), and "the dehumanization of the traditional patient/therapist relationship." Recognizing direct benefits is one way of overcoming this resistance.

Strategic and Capital Planning

Budget and strategic planning go hand in hand. This aspect of the CIO's job is vital if information is to become a strategic resource for the organization. Moreover, external environmental assessment of available technologies and applications, combined with an assessment of the individuals of the organization, is the first step. Also, the vision and business goals of the organization must be defined. Only then can a true IT strategy be developed. The budgetary impact, as mentioned before, can be significant. The CIO must be very careful not to overstate or understate the value of information technology.

Organizational Aspects of Implementing Informatics Change

"Sentimentality will always be man's first revolt against development. [How-ever] the times have made this reaction obsolete…. Things are happening so rapidly now that at any moment the present we're living in will be the 'good old days'."

Change is a reality in both our society and our private lives. Our society, professions, and daily work lives are constantly changing at an accelerating rate. Children take for granted the powerful personal computers that we could not even imagine at their age.

The behavioral health professions are undergoing rapid changes, and behavioral health informatics – as part of health informatics in general – is one of the driving forces in that change process. It is impossible to introduce a behavioral health informatics system into an organization without its members feeling its impact. Informatics is all about change – the modification of data into information with eventual evolution into knowledge. Data becomes information only after the data is processed, that is, altered in ways that make the data useful for decision making. These enhanced decision-making capabilities are inevitably going to affect the organization. The organization and its people influence, shape, and alter the nature and use of the informatics systems, which, in turn, influence, shape, and alter the nature, operation, and culture of the organization, and so on.

You must address and manage employee fears associated with change, as their initial fear is that they will no longer be the "experts." One of the biggest challenges we faced with our legacy leadership was and is their fear of reliance on technology instead of human decision-making process or "legacy solutions." You must demonstrate and prove that this change will produce better results than the existing process, and that it will do so more efficiently. You must ensure that the solution is not implemented to simply address or "band-aid" an existing flaw in the system, but instead it must provide for significant process improvement and benefits across all levels of the organization.

If we do not manage our change processes, they will manage us – an undesirable outcome. The less control we feel during the change process, the lower our resiliency, that is, our ability to bounce back from the stress of change and our preparation for the inevitable next alteration in today's environment.

Change and Informatics – An Example

At a 1993 conference on the topics of informatics and change, healthcare consultant Bernard Horak presented an example of a professional conflict between nurses and physicians caused by the introduction of a new information technology. In this scenario, adapted by Lorenzi and Riley, the perceived role of nurses as the integrators of patient data/information was challenged when the physicians performed direct order entry into a computer for medications, diagnostics, vital sign monitoring, and so on.

Types of Change

Changes within an organization can often be identified as one of four types, which may overlap:

- *Operational* – changes in the way that business is conducted, such as the automation of a particular area

- *Strategic* – change in the business direction, for example, moving from an inpatient to a continuum of care focus
- *Cultural* – changes in the basic organizational philosophies by which the business is conducted, for example, implementing a continuous quality improvement (CQI) system
- *Political* – changes in staffing occurring for various reasons such as top patronage job levels in government agencies.

These four types of change typically have impact at different levels of the organization. For example, operational changes tend to have their greatest repercussion at the lower levels of the organization, at the front line.

Culture shift is a huge challenge and requires constant effort and focus to ensure not only a successful implementation, but also complete adoption of the solution. What you want to profoundly avoid is a "solution" that becomes an additional obstacle. Communication is absolutely and fundamentally critical to success of any change process. The change management process must support two-way communications between the "team" and the customer/client/staff. When staff feels uninformed → leads to uncertainty → leads to negative impact on the organizations natural energy and drive to succeed.

Those at the upper levels may never notice changes that cause significant stress and turmoil to those attempting to implement the changes. Conversely, the impact of political change is typically felt at the higher organizational levels, where changes are typically not made for result-oriented reasons but for reasons such as partisan politics or internal power struggles. When these changes occur in a bureaucratic organization, the employees at the bottom rarely notice the changes at the top. Patients are seen and the floors are cleaned just as before. The key point is that performance was not the basis of the change; therefore, the performers are not affected.

Magnitudes of Change

Change, like beauty, is in the eye of the beholder. A proposed change that upsets one person may be a welcome alleviation of boredom to another. The types and magnitudes of reaction are often difficult for an outsider to predict. When working with change and management, it often helps to have a simple way of classifying the types and sizes of change.

Microchanges and Megachanges

A practical model that we frequently use divides changes into microchanges (differences in degree) and megachanges (differences in kind). Using an information system as an example, modifications, enhancements, improvements, and upgrades would typically be microchanges, while a new system or a major revision of an existing one would be megachange. This scheme works well in communicating within organizations if we remember that one person's microchange is another person's megachange. Later in this chapter we present a more rigorous analysis of the magnitude of change that can be used if necessary.

Classic Change Theories

The rate of change in most organizations is escalating, and healthcare organizations - after a slow start – are no exception. The phrase change management has become fairly common in the literature on management. What is change management? How does it help people feel less threatened? How did it evolve? Why are people fixated on it today? What is a "change agent" or a change management person?

Change management is the process by which an organization achieves its vision. While traditional planning processes delineate the steps on the journey, change management attempts to facilitate that journey. Therefore, creating change starts with creating a vision for change and then empowering individuals to act as change agents to attain that vision. The empowered change management agents need plans that are (1) a total systems approach, (2) realistic, and (3) future oriented. Change management encompasses the effective strategies and programs to enable the champions to achieve the new vision. Today's change management strategies and techniques derive from the theoretical work of several pioneers in the change area.

a. *Early group theories*

In 1974, Watzlawick et al published their now classic book, *Change: Principles of Problem Formation and Problem Resolution*. Theories about change had long existed. However, Watzlawick et al found that most of the theories of change were philosophical and derived from the areas of mathematics and physics. They selected two theories from the field of mathematical logic – the theory of groups and the theory of logical types – upon which to base their beliefs about change. Their goal of reviewing the theories of change was to explain the accelerated phenomenon of change that they were witnessing. Let us briefly look at the two theories that Watzlawich et al reviewed to develop their change theory.

The more sophisticated implications of the theory of groups can be appreciated only by mathematicians or physicists. Its basic postulates concern the relationships between parts and wholes. According to the theory, a group has several priorities, including members that are alike in one common characteristic. These members can be members, objects, concepts, events, or whatever else one wants to draw together in such a group, as long as they have at least one common denominator. Another property of a group is the ability to combine the members of the group in a number of varying sequences and have the same combinations. The theory of group gives a model for the types of change that transcend a given system.

The theory of logical types beings with the concept of collections of "things" that are united by a specific characteristic common to all of them. For example, mankind comprises all individuals but is not a specific individual. Any attempt to change one in terms of the other does not work and leads to nonsense and confusion. For example, the economic behavior of the population of a large city cannot be understood in terms of the behavior of one person multiplied by four million. A population of four million people is both quantitatively and qualitatively different from an individual. Similarly, while the individual members of a species are usually endowed with very specific survival mechanisms, the entire species may race headlong toward extinction – and the human species is probably no exception.

The theory of groups gave Watzlawick et al. the framework for thinking about the kind of change that can occur within a system that stays invariant. The theory of logical types is not concerned with what goes on inside a class, but gave the authors a framework for considering the relationship between member and class and the peculiar metamorphosis that is in the nature of shifts from one logical level to the next higher. From this, they concluded that there are two different types of changes: one that occurs within a given system that itself remains unchanged and one whose occurrence changes the system itself. For example, a person having a nightmare can do many things in his dream – hide, fight, scram, jump off a cliff, etc. However, no change from any one of these behaviors to another would terminate the nightmare. Watzlawick et al concluded that this is a first order change. The one way out of a dream involves a change from dreaming to waking. Waking is no longer a part of the dream, but a change to an altogether different state. This is their second-order change as mentioned earlier.

First-order change is a variation in the way processes and procedures have been done within a given system, leaving the system itself relatively unchanged. Some examples are creating new reports, creating new ways to collect the same data, and refining existing processes and procedures.

Second-order change occurs when the system itself is changed. This type of change usually occurs as the result of a strategic change or a major crisis such as a threat to system survival. Second-order change involves a redefinition or reconceptualization of the business of the organization and the way it is to be conducted. In the medical area, fully changing from a paper medical record to an electronic medical record would represent a second-order change, just as automated teller machines redefined the way that banking functions are conducted.

These two orders of change represent extremes. First order involves doing better what we now do, while second order radically changes the core ways we conduct business or even the basic business itself.

A middle level seems to be missing from these two extremes. Golembiewski et al added another level of change. They defined middle-order change as lying somewhere between the extremes of the first- and second-order change. Middle-order change “represents a compromise; the magnitude of change is greater than first-order change, yet it neither affects the critical success factors nor is strategic in nature.” An example of a middle-order change might be the introduction of an electronic mail system into an organization. There is an organization-wide impact, but there is no reconceptualization of the basic business. E-mail is more of a tool for operational and communications efficiency.

Some personality types welcome changes that they perceive will make their jobs easier while other personality types use their day-to-day work rituals to build their comfort zones. In the late 1960s, one unit in a medical center started to code all of their continuing medical education courses with International Classification of

Diseases (ICD-9) codes. Even though these codes were never used and took a great deal of time to complete, the organization did not want to change the process as time passed because "we have always done it this way." The old process lasted through two directors. When a new director tried to change the process, there was resistance. The most important question to an individual involved in any change process, regardless of the level or degree of change or the person's organizational position, is, "How will this affect me?" The most traumatic changes are of the second-order change type, but one person might perceive changes in the first or middle order as more traumatic than another person might perceive a second-order change. One of the challenges for the change manager is successfully managing these perceptions. How the change manager implements the process of change can have a decisive effect on the resistance factors.

When the Watzlawick et al. book was published, many people were unfamiliar with the applications of theories of change into contemporary society; thus, the book was a major contribution to alternative ways of looking at the changes that occur daily. While Watzlawick et al. comprehensively presented the theories of change and offered their model of levels of change, they did not offer practical day-to-day strategies. We are interested in the effective strategies for managing change and have reviewed many social science theories to determine the psychology behind the change management concepts and strategies that are used widely today. We believe that today's successful change management strategies emanate from several theories in the areas of psychology and sociology. Small group theories and field theories provide the antecedents of today's successful change management practices.

b. *Small group theories*

The primary group is one of the classical concepts of sociology, and many sociological theories focus on small-group analysis and the interaction process analysis. These theories outline and delineate small-group behavior. Small-group theories help us to understand not only how to make things more successful, but also how to analyze when things go wrong. For example, a practical application of small-group research was presented by Bales, who applied small group principle to running a meeting and made the following suggestions:

- If possible, restrict committees to seven members
- Place all members so they can readily communicate with every other member
- Avoid committees as small as two or three if a perceived power problem between members is likely to be critical
- Select committee members who are likely to participate in varying amounts. A group with all highly active participants or all minimally active participants will be difficult to manage

An example of small-group behavior at work is a job candidate being interviewed by a number of people. Information is then collected from the interviewers and is shared with a search committee. The search committee selects their top candidate, and that person is hired. If the person hired does not work out, a member of the search committee may very well say, "I knew that Mary would not work out, but I didn't say anything because everyone seemed to like her."

Many of the changes that new technology brings are discussed, reviewed, and debated by people in a small-group framework. If negative sentiments about a product or service are stated by a member of the group who is an opinion leader, the less vocal people will often not challenge the dominant opinion. For example, a medium-sized organization was selecting a local area network (LAN) system. While the senior leader wanted one system, some of the other people had not only suggestions but documentation about the qualities of another system. During the meeting to decide which system to purchase, the senior leader stated his views first and quite strongly. A couple of the lower-level staff members started to confront the senior person; however, when there was no support from any of the other people present, they did not express their strong preferences for their system of choice. When the system finally arrived, the senior leader's initial enthusiasm had dwindled. He then confronted the technology people as to why they not made him aware of the shortcomings of the system selected.

These examples illustrate a key change management requirement: to effectively manage change, it is imperative for change agents to understand how people behave in groups and especially small groups.

c. *Field theory*

Kurt Lewin and his students are credited with combining theories from psychology and sociology into the field theory in social psychology. Lewin focused his attention on motivation and the motivational concepts that underlie an individual's behavior. Lewin believed that there is tension within a person whenever a psychological need or an intention exists, and the tension is released only when the need or intention is fulfilled. The tension may be positive or negative. These positive and negative tension concepts were translated into a more refined understanding of conflict situations and, in turn, what Lewin called "force field." Lewin indicated that there are three fundamental types of conflict:

1. The individual stands midway between two positive goals of approximately equal strength. A classic metaphor is the donkey starving between two stacks of hay because of the inability to choose. In information technology, if there are two good systems to purchase or options to pursue, then we must be willing to choose.
2. The individuals find themselves between two approximately equal negative goals. This certainly has been a conflict within many organizations wishing to purchase or build a health informatics system. A combination of the economics, the available technologies, and the organizational issue may well mean that the organization's informatics needs cannot be satisfied with any of the available products – whether purchased or developed in-house. Thus, the decision makers must make a choice of an information system that they know will not completely meet their needs. Their choice will probably be the lesser of two evils.
3. The individual is exposed to opposing positive and negative forces. This conflict is very common in healthcare organizations today, especially regarding health informatics. This conflict usually occurs between the systems users and the information technology people or the financial people.

People can easily be overwhelmed by change, especially within large organizations where they may perceive they have little or no voice in, or control over, the changes they perceive are descending upon them. The typical response is fight or flight, not cooperation. Managers often interpret such human resistance to change as stubbornness or not being "on the team." This reaction solves nothing in terms of reducing resistance to change or gaining acceptance of it. Many managers do not accept that others regard them as imposing "life-threatening" changes and establishing "no-win" adversarial relationships between management and those below in the organization.

Small-group theory is highly applicable in behavioral health informatics because of the way that medical environments are organized. The care of the patient or the education of students entails many small groups. These groups converse and share information and feelings, and strong opinion leaders can sway others to their way of thinking relatively easily.

Lewin's field theory diagrams the types of conflict situations commonly found in health care. In this way, the typical approach-avoidance forces can be visualized. For example, "If I accept this new system, what will it mean to my job and me? Will I have a job? How will it change my role? Will this new system lessen my role? Why do we need a new solution or a solution at all? Is there a clear reason for making this change?" These anxieties are very clear and very real to the people within the system. Remember: one person's microchanges are often another person's megachanges. So, as the system designers think they are making a minor change to enhance the total system, an individual end user may see the change as a megachange and resist it vehemently. When designing the total people strategy for any system, it is important to involve the people from the very beginning and to clearly understand how groups function within the organization.

All of these social science theories assist the change management leader in understanding some of the underlying behavior issues as they bring health informatics technology into today's complex health systems.

Practical Change Management Strategies

Change management is the process of assisting individuals and organizations in moving from an old way of doing things to a new way. Therefore, a change process should both begin and end with a visible acknowledgment or celebration of the impending or just completed change. Nancy Lorenzi et al. (2009), discuss the management of change in their published paper from BMC Medical Informatics and Decision-making:

> Each practice is unique in terms of its dynamics. Understanding the environment facilitates change management. Champion leaders need to identify key issues as they arise and address them as rapidly as possible. A change management strategy generally includes mechanisms for soliciting feedback at all stages of the change process. The alternative of not identifying problems and not providing feedback about problem resolution leads to misinformation within the office practice. Feedback obtained must be addressed promptly. Every issue cannot be resolved to everyone's satisfaction, but sharing information about which issues can be addressed (or not) and in what time frame is important.[9]

Based on our research, there is no single change management strategy that is effective in every situation. It is essential for the change management leader to take the time to know the desired state (vision-goal) and the particular organization, and then to develop the appropriate strategies and plans to help facilitate the desired state.

Over the years we have evolved a core model for the major process of change management. There are many options within this model, but we believe that it is helpful for change leaders to have an overview map in mind as they begin to implement new information technology systems. The five-stage model that has proven effective for reducing barriers to technology change begins with an assessment and information-gathering phase.

a. *Assessment*
   This is a two-part process that first informs all potentially affected people, in writing of the impending change. The second part encourages the use of surveys and face-to-face assessment tools that are administered to "randomly selected" individuals to evaluate their perspectives of the proposed changes and to ask for ideas on ways to reduce concerns. These interviews should help in ascertaining what each person envisions the future will be, both with and without the new system; what each interviewee could contribute to making that vision a reality; and how the interviewee could contribute to the future success of the new system. These interviews provide critical insights that should be integrated in the actual implementation plan. Often those people interviewed become advocates or champions of the new system, not only easing the change process considerably but accelerating the adoption of the implemented technology.
   The option for the use of focus groups should be considered in larger organizations where multiple groups are represented. The focus groups allow anywhere from five to seven people from across the organization to share their feelings and ideas about the current system and new system and can later serve as conduits for shared expertise across the organization, once the change technology is fully implemented.
b. *Feedback and options*
   The information collected in the assessment phase is then collected and evaluated. The outcomes are used to share with the "top management and to those directly responsible for the technical implementation." This is where both positive and negative issues are addressed. This information, if integrated early in the process will aid in the development of the project team in tandem with creative program design. Equally important, the feedback and options submitted by the staff, or end users of the technology, should be carefully interpreted so that the eventual outcome of the program design is performance enhancement by the end user of the technology.
c. *Strategy development*
   This phase utilizes "collected information" to create "effective change strategies" to help support rapid adoption from an "organizational perspective." At this juncture, the natural progression is the actualization of a schematic or a "road map" with milestone goals for the technology change. The overall strategies are shared via newsletters, focus groups, and training to "bring on board" affected people within the organization.
d. *Implementation*
   This refers to the change management strategies needed for the organization, not the implementation of the new technology system. This is described as a systematic process and progression toward the desired behavioral changes and future goals important to each individual's acceptance of the new system. "This is an effective mechanism for tying together the new technology implementation action plan with

the behavioral strategies." This is a pivotal phase on which the success of the entire technology change can depend. Implementation planning is concomitant with communication and shared expertise, and if these are not tantamount or superior to the initial assessments, feedback, and strategies, then the collective organizational adoption of the technology will be mediocre at best.

e. *Reassessment*

A 6-month re-evaluation of the implementation process is recommended. This is similar to the assessment phase and provides a basis for "fine tuning" the implementation and encourages the end users to continue to provide feedback and address concerns. The technology can be "tweaked" and customized for specific purpose and usage, paving the way for performance management, accountability, and excellence throughout the organization.[10]

Resistance to Organizational Change

Many clinicians and leaders of Health Care organizations are thrust into the role of change agent and are often unprepared for the anxiety and the unhappiness that the organizational unreadiness creates via the uncertainties of incumbent technology challenges and issues. This unreadiness most often leads to resistance, according to the chapter discussion of Riley, Lorenzi, and Dewan on "Introducing Informatics Systems into Organizations."[11] They identified four categories of resistance that should be analyzed prior to implementation.

1. *Resistance to environmental changes* – changes in the organization's general environment that will have impact on the way that organization functions and possibly on its very survival.
2. *Resistance to general organization or systems changes* – changes in the way the organization is structured or the broad systems that it uses to pursue its mission. These changes might result from either external or internal forces.
3. *Resistance to the changers* – it matters little what the change is. "If 'they' are for it, I am against it!"
4. *Resistance to specific changes* – changes such as a new or updated computer system, which is resisted based on its own merit or the process by which it is implemented.[11]

Resistance Against What?

There can be countless reasons for resistance to change in a given situation, thus the term resistance to change is often used very broadly. One of the first aspects that must be analyzed is the difference between

- Resistance to a particular change and
- Resistance to the perceived changer(s).

In the first case, the resistance is directed against the changes in the system. In the second case, the resistance occurs because of negative feelings toward specific units, specific managers, or the organization in general; any change would be resisted just because of who or what is behind it. Both types of resistance have to be dealt with, but it is critical that we correctly identify the resistance category. When a new behavioral health informatics system is introduced, three questions are very important to ask:

- What is the general organizational climate – positive or negative, cooperative or adversarial, etc.?
- What has been the nature of the process used to implement previous informatics systems?
- What has been the technical quality of the informatics systems previously implemented?

Whether or not we are new to an organization, we inevitably inherit the organizational climate and history. This negative "baggage" can be a frustrating burden that adds significantly to the challenge of successfully implementing a new system. On the other hand, the ability to meet this type of challenge is a differentiating quality of skilled implementers.

Joia and Magalhães (2009), describe additional systemic issues of resistance:

"People or groups resist systems due to the interaction between characteristics related to the system and characteristics related to the organization context". Examples might include:

- Systems that centralize the control of data encounter resistance in organizations with decentralized authority structures
- Systems that balance the distribution of power in organizations will be resisted by those who wield power.[12]

Intensity of Resistance

"Most of the 50 to 70% of information system implementations that fail are not the victims of flawed technology, but rather of organizational and people-related issues. In fact, much of the knowledge base for helping behavioral healthcare with information technology changes comes from work in disciplines such as management science and sociology, as well as medical informatics."[13]

Resistance can vary in many ways, and perceptions regarding resistance can vary widely from one observer to another. One might perceive an end user who asks many questions as being very interested and actively seeking knowledge. Another might see the same person as a troublemaker who should just "shut up and listen!" Therefore, it is extremely important to discern the varying needs and curiosities of the end user from those who are dogmatic in their resistance and a well-crafted implementation plan should contain all that is necessary to address individual needs and general curiosities. Perceptions must take a "back seat."

We studied Garrison Wynn's Eight (8) Common Reasons & Beliefs that People Resist Change and found that these perceptions are a common denominator held by the non-adoptive individuals when major change implementation has begun. These reasons and beliefs amplify the intensity of resistance:

1. *There is no real need for change* – As described earlier; there was a certain predisposition among tenured staff and even some leadership that what was good enough in the past was good enough for the future. We of course believed that what was good enough to get us here was not good enough to keep us here, or move us forward.
2. *Change is going to make it harder* for them to meet their needs; change will affect them negatively (more work, more time spent on something other than what they believe they should be focused on) – This is where the real education comes in. We heard this "resistance speech" repeatedly. Even senior operations directors repeatedly complained that there "was just not enough time in the day." Educating staff on the benefits of the change to the organization and the importance of their individual contribution is critical.
3. *Risks seem to outweigh the benefits* – The risk for them was the perceived loss of expertise in the silo environment in which they functioned. However, this "risk" was in all actuality a realization that the organization was going to focus on performance leadership and management through data sets, using technological innovation. Ironically, this "risk" was going to enable them to become even more expert at their jobs. Still this was a direct threat to many, as a culture of innovation technology had never been a priority or deemed necessary for the future success of the organization.
4. *They do not think they have the ability to make the change* – There was a certain amount of fear from many regarding the use of technology and having to adapt to/learn a new skill set and that they "just didn't get it."
5. *They believe the change will fail* – Previous attempts had essentially failed. Why should anyone expect anything differently? They believed that the new leadership was just attempting the same change process from a different viewpoint to previous leadership, and that this new attempt at real change would result in another failed outcome.
6. *The change process is handled improperly/mismanaged by upper management* – There had been a period of senior leadership turnover and we did address this by over communicating throughout the process. They felt that a system that would be implemented now could possibly become obsolete if there was another turnover in executive leadership.
7. *The change is inconsistent with their values* – We faced this challenge, as our organizational culture was such that, "we don't need technology to take care of our customers."
8. *They believe those responsible for the change cannot be trusted* – no faith in the leadership implementing the change process.[14]

We can safely assume that every significant health informatics implementation is going to encounter some resistance; however, the intensity of resistance can vary widely. In an organization with a history of managing changes reasonably well and of decent morale, a significant number of people may be neutral toward a particular proposed systems change. However, there will still be a negative component, and at the very least this negative component must be managed and prevented from growing. In every situation, the proportions of positive, negative, and neutral may vary widely.

Lorenzi and Riley define change management as "the process by which an organization achieves its vision". They continue to describe people's inherent resistance to change, as "people are most comfortable with the status quo unless it is inflicting discomfort." Even then, people will often resist change; "devil you know is better than the devil you don't know. It is a shock, for inexperienced managers the first time they see subordinates resist even a change that they requested."[15] We think properly and frequently communicating the organization's strategic plan and vision is a requirement for any adoption of change and will neutralize much resistance. Resistance, wholly evaluated and properly managed can curtail, or even prevent, the vexing crises that many small and large organizations experience when implementing new Informatics Systems. The de-escalation of these "crises" is ultimately reliant on the confidence level and capabilities of leadership, and can dramatically increase positive outcomes, long-term adoption and move people, for instance, from the "obstructionist" role to the "champion" role during the change process.[16]

The Cast of Characters

Lorenzi et al. (2001) stipulate a broad range of role playing with specific characteristics while organizational informatics change is taking place. The individual perception of change that these role players have will determine where they fit in the "cast of characters" throughout the change process. These role players sometime will have more than one role and the roles that they occupy will largely depend on the amount of buy-in they have toward the success of the implementation change. "Unless we clearly identify both the players and their roles in any change situation, we risk making decisions and taking action based on generalizations that are not true for some of the key players." Below is a list of the roles that have been identified as "key players" in organizational change:

- The *initiator* or instigator perceives the problem situation or opportunity and conceptualizes the change to be made in response.
- The *approver* or funder is the power figure who okays and financially supports the proposed change.
- The *champion* or cheerleader is the visible, enthusiastic advocate for the change. The champion constantly tries to rally support for the change and maintain that support during difficult periods.
- The *facilitator* attempts to assist in smoothing the organizational change process. The facilitator is sometimes involved from the beginning, and sometimes is called in only for assistance once the change process has gone awry.
- The *developer* or builder is responsible for the technical aspects of the change, for example, developing the new informatics system. These aspects can range from the broad technical conceptualization to the narrowest of technical details.
- The *installer* is responsible for implementing the change, including the necessary training and support activities.

- The *doer* is the "changee," the person who has to work in the changed environment.
- The *obstructionist* is a guardian of the status quo and typically conducts guerilla warfare against the change. If the obstructionist is also a doer, the reason may arise from a personal fear of the change. However, the desire to obstruct may also arise from forces such political infighting, for example, which gets the credit, or institutional conflicts, for example, union resistance to a labor-saving system.
- The *customer* is the end beneficiary or victim of the change in terms of altered levels of service, cost, etc.
- The *observer* does not perceive being immediately affected by the change, but instead observes with interest. These observations often affect strongly how the observer will react if placed in the doer role in the future.
- The *ignorer* perceived that this change has no personal implications and is indifferent to it. In the broadest sense, this category also includes all those who are unaware of the change.[16]

An overview term often applied to all these roles is stakeholders. With the exception of the ignorers, all the categories have some stake or interest in the quality of the change and the change implementation process. The roles are subject to change, especially during a change process that extends over time. For example, an initial ignorer might hear rumblings of discontent within the system and change to an observer, at least until the feelings of angst subside. For those implementing change, the following steps are critical:

1. Identify what roles stakeholders are occupying in the process;
2. Identify what roles the others involved in the process are playing, being careful to recognize multiple roles;
3. Identify which role is speaking whenever communicating with those playing multiple roles; and
4. Monitor throughout the process, and whether any roles are changing.

Administration

Overseeing management of IT, including implementing IT acquisition and project management processes, can be the most tiresome of all of the CIO's responsibilities. Very often problems with word processors, replacing the toner cartridge in printers, and other mundane jobs stand in the way of implementing IT systems. IT professionals also tend to be in demand, and employee turnover can be a huge problem. Thus, it is critical to have very rigorous documentation protocols and standard operation procedures in the organization. In the event an employee leaves, one does not have to start over or take months to retrain others. The responsibilities of the CEO and CIO are intense. In behavioral health care these responsibilities can be assumed by the same person. At times the chief clinical officer or the quality officer assumes the informatics role. Often consultants are required to facilitate IT planning and strategy.

Administration oversight as it pertains to the specific implementation project is also key. Stakeholders can become unreasonable and unrealistic in expectations and timelines, often forgetting the process or "operating procedures" that were developed, and agreed upon when the decision to implement the change was made. If this is not managed properly, it can become another avenue that leads to a failed implementation or adoption. We also recommend close management of the project scope and develop a change process to control scope creep. Much of the success will depend on three key areas: (1) maintaining project scope, (2) developing a change process to control failed change initiatives, and (3) consistent advocating of team member participation throughout the process.

Conclusion

It is not always easy to know exactly why a particular person or group resists change. However, experience shows that an intelligent application of the basic five-step change model, coupled with a sound technological implementation plan, leads to more rapid and more productive introductions of technology into organizations. The process can be expensive in terms of time and energy but much less expensive than a technical system that never gains real user acceptance.

The overall success requires an emotional commitment to success on the part of all involved. The staff must believe the project is being done for the right reasons – namely, to further the delivery of higher quality, cost-effective health care. If a project is generally perceived to be aimed at just "saving a quick buck" or boosting someone's ego or status, that project is doomed to fail.

An organization is only as good as its people, and with a major change implementation of an information technology system, people or the "human capital" must be the central focus of the process. A "village" must exist, nurture, and be nurtured before, during, and after the change implementation. Quality and excellence must be the clarion call of the organization, especially during a change process. Quality is important because it raises the bar of accountability across the organization at every level of employment. When employees see the emphasis on quality, the natural progression is toward becoming an individual stakeholder in the organization. In essence, the employee becomes an owner of a part of the organization through their contribution and everyone wants to contribute excellently when they know that their contribution is making a difference. This quality concept specifically rings true in the case of Leading Change in Implementing Technology, and specifically when leading change in behavioral health informatics, where the ultimate challenge is successfully implementing new tools in organizations that often do not welcome them.

Case Study

This chapter has presented roles and functions of key leaders, key frameworks for understanding informatics in organizations, and change management models. While it is not possible to incorporate all these concepts, we thought it was important to demonstrate how one organization went to a major informatics journey.

This is an actual case study of an implementation of a Balanced Scorecard which is an organizational framework for looking at performance, the Key Performance Indicators (KPIs) and Data Management System in a small 100 million dollar non-profit health services organization. There were actually three parts to the implementation:

1. Creating the Key Performance Indicators (KPI's) for the organization
2. Creating an Organizational Balanced Scorecard
3. Implementing a performance management system to collect and report outcomes

The organization where this implementation takes place is in a 40-year-old health services organization that provides a continuum of care in multiple states to children and families. The organizational culture was fully entrenched in its rich history, clinging to the actual and perceived success, the prestigious reputation, and the organizational loyalty to the founder's original passion. "We have always done it that way" was the status quo common response to attempts at systemic change and represented a silo mentality, which perpetuated inter-departmental and individual non-transparency. In fact, what "we have always done" had worked very well in the past, but the competition, the changes in funding, the myriad of licensing and contract requirements, and the diverse dynamics of society and its youth, demanded that the organization evolve and change in tandem with the industry. Interested foundations began consistently requesting organizational outcomes from a performance management system that measured outcomes and created momentum for change and evidence-based decision making.

The golden thread that aided in the unraveling of the status quo of this organization was the creation of its 5-year strategic plan which the organization's leadership deemed necessary in order to emphasize the long-range vision and the necessary tools to visualize and realize the organizational "roadmap" to implementing informatics change. Part of this vision was to direct the course of the organization toward performance management through the implementation of a software-based balanced scorecard and performance management solution.

The executive leadership of the organization recognized the long overdue need for quantitative metrics that reflected the critical success factors of the organization, where it had been previously and primarily qualitative. While there was little doubt that children and families were beneficiaries of innovative programming, no consistent Key Performance Indicators, Balanced Scorecards, or other management methodologies existed to substantiate the measurement of organizational performance. Many contributing factors made creating a comprehensive data management system and Balanced Scorecard a somewhat daunting and unsure endeavor, one that would require precise, hands-on leadership and organizational buy-in.

The CEO, by repeatedly communicating his mantra of "Quality begets Quantity," was in essence verbalizing the fantastic need for a team of quality champions inside the organization to create the cultural changes needed for any permanent systems changes to occur. He hired a Chief Quality Officer who understood change management and had been involved in implementing significant quality improvement plans at the state government level. The Chief Quality Officer (CQO) was first tasked with assessing the current state of affairs. Second, the CQO was asked to create an action plan for the implementation of an organization-wide change in the manner in which data was being collected, aggregated, analyzed, and reported. The CQO immediately sensed the immediate need for a cohesive implementation team, combined with solid leadership support and communications, in order to avoid any system-wide implementation failure of Key Performance Indicators, Balanced Scorecard, and Data Management System.

Where previous administrations of executive leadership had failed to create a momentum for change, based in part on the predicated faith in the founder's legacy, the board of directors and the organizational leadership realized the urgency for a system change to a performance-based organization. The collective "support" from the board and top leadership was in large part due to the vision of the new CEO. This organization's CEO is the quintessential Chief Executive Officer and meets Lorenzi's prescription of "key people for successful implementation."[17]

The CEO, Executive Leadership Team, Clinicians, and key staff and stakeholders must not only understand the implementation but also completely and fully understand the expectations, outcomes and key advantages the technology will provide. Getting this champion level support from these key stakeholders will ultimately determine your level of success. Ideally, the CEO should present and continuously communicate and manage expectations regarding the progress of the implementation, keeping all staff routinely updated on the project and managing expectations.

For instance, early in the implementation process, there will be a lot of activity and seeming progress only to be followed by the hard work of creating content, tables, data entry, software tuning, and other tedious chores that are not flashy or glamorous. It may seem to the casual observer that "nothing is going on" when the bulk of the heavy lifting is being completed here. Core leadership and teams must be diligent to continually manage expectations and communicate achieved milestones at all levels of the organization.

Key Performance Indicators

Identifying Key Performance Indicators was the first order of the day. The broad continuum of care with a variety of program types, and various sizes, and population types and needs, and even more variety in funding streams in multiple states, was the baseline of evaluation when formulating these Key Performance Indicators. Detailed evaluation plans were crafted for each performance indicator. Some departments, Operations for example, had many indicators to identify and evaluate, which presented the immediate challenge of aligning the functions of employees and stakeholders with the organization's strategic plan so that the indicators would be accurate.

Evaluation Plan
Quality – Technology Access (#7)
Accountability: Chief Quality Officer

Goal/Desired Result

7. 1. Decrease number of "organization wide" Program network outages exceeding 4 h/week

7. 2. Decrease number of instances/quarter of Organization Central Database being "off-line" during normal working hours

7. 3. Decrease number of Central Database support tickets opened/month

Activity

Information Services and Information Technology staff members will monitor, mitigate, and respond accordingly to network outages, Organization Central Database "offline", and additional Central Database support tickets from program and support center staff members

Beneficiaries/Clients

Primary beneficiaries are staff members, secondary beneficiaries are youth participating in programs

Indicators/Definition

7. 1. A network outage is an outage that exceeds 4h in 1 week

7. 2. Offline is greater than 15 consecutive min and is not attributable to natural disasters, planned maintenance, power outages

7. 3. Organization Central Database support tickets are created through the help desk or by designated Data Integrity staff members.

Standards of Success/Target

7. 1. Less than two "organization wide" network outages exceeding 4 h/week will occur

7. 2. Less than four instances of Organization Central Database being "off-line" during normal working hours/quarter

7. 3. Less than 16 Organization Central Database support tickets opened/month

Method of Measure/Instrument	Respondents
7.1.–7.2. Downed Facilities calendar 7.3. Organization Central Database support ticket	7.1.–7.3. Designated Information Services staff members

Data Collection	Data Aggregation
7.1–7.3. VP Information Services	7.1–7.3. VP Information Services

Data Analysis

Numbers will be calculated as appropriate by designated department staff member at least quarterly

Reporting

Executive Leadership Team and Operations, at least quarterly

Additional Information

These are new measures

This level of scrutiny and insistency by all cross-functional team members ensured that the indicators were thoroughly vetted and representative of the key performance elements that each department identified as important. This process was tedious but necessary in order to complete true buy-in from each organizational unit. This made a huge difference once we actually started collecting and inputting data, as everyone clearly understood their role.

The Key Performance Indicators for the first Balanced Scorecard totaled 125 and these were an aggregate of all five key functional areas of the Five-Year Strategic Plan of the organization. These five key areas are: Quality, Finance, Human Resources/Professional Development, Growth & Transformation, and Fund Development. Tying the Balanced Scorecard to the five key areas of the organizational strategic plan was the logical next step. Of the 125 total Key Performance Indicators, 12 were identified as most important to the Board and these comprised the monthly Board Brief and ultimately the Board Scorecard.

The organizational strategic plan was carefully crafted, to not only address the need to expand and evolve, both philosophically and competitively within the industry, but to serve as an internal tool for managers to track their initiatives, evaluate and reevaluate their performance indicators in order to keep in step with the organizational mission and vision. This alignment effort aided in communicating the importance of individual performance and how it is tied to the organizational strategic plan, which in turn creates stakeholder buy-in to informatics change.

The Balanced Scorecard

An integrated framework for describing and translating strategy using linked performance measures in four balanced perspectives: Customer, Internal Process, Employee Learning and Growth, and Financial. The balanced Scorecard is a measurement system, a strategic management system, and communication tool (Niven).

Niven (2008) defines the Balanced Scorecard "as a carefully selected set of measures derived from an organization's strategy. The measures selected for the Scorecard represent a tool for leaders to use in communicating to employees and external stakeholders the outcomes and performance drivers by which the organization will achieve its mission and strategic objectives."[18]

The core team agreed essentially with Niven, but modified our balanced scorecard design to include our areas of focus as indentified in the organizational Five-Year Strategic Plan. We talked to Paul Niven and bought a number of his books titled *Balance Scorecards for Government and Nonprofit Agencies*, and found his counsel and books to be very helpful and insightful. We decided that each member of the core and all cross-functional teams would be provided a copy, as well as the CEO, executive leadership, and their key staff. There are many ways buy-in can be achieved but it must happen in order to be successful.

Implementing a Performance Management System to Collect and Report Outcomes

Roger's Diffusion of Innovation Curve

Understanding organizational adoption readiness can be very helpful in assessing the readiness of your teams to accept and assimilate a new technology or model. A review of Rogers Diffusion of Innovation Curve can be useful in understanding where significant barriers to adoption exist, and this knowledge will help accelerate the readiness of the organization to fully adopt the implementation of informatics. Having complete buy-in of the innovators, technologists and visionaries is critical. Your champions will come from this buy-in group and you must start with a heavy weighted group of champions in order to increase the momentum of change and accelerate the buy-in of the rest of the organization.

By consistently "taking the temperature" of the technology system implementation, from its infancy until completion, you are invariably planning strategy and executing tactical maneuvers simultaneously, throughout the implementation process, which will filter out those individuals who are not adopting to the change. As you evaluate key staff and their level of adoption readiness, you will adjust your action plan accordingly in order to secure buy-in. Buy-in is not a head nod but an answer to a specific set of questions, asking your "champions" to religiously support and use the new tools or model. Roger's curvilinear model was helpful as we began identifying key stakeholders for an organizational assessment of adoption readiness. One thing was certain, in which we all agreed, and that was we could not afford to tolerate the Laggards. We felt that non-adoption at some point was not an option, and that we would have to provide the incentive and momentum through strategies that would assure full buy-in of all users. Our feeling was that they needed to adopt or move on. This might seem a little naïve, but it was the premise we agreed to work with as we created our plan for implementation.

The Chief Quality Officer, a veteran and seasoned businessman, tasked with the strategic initiative of designing metrics, pulled together an action team: A productive and tenured Vice President of Information Systems, a strong and unbiased Director of Performance Improvement, a Data Integrity Manager with well-rounded knowledge of the organization's history, and an excellent and engaged Executive Administrator. This group became the core of the implementation team and was the human capital foundation of this particular change implementation.

Early meetings of the "core team" evaluated all current technology and then put realistic action plans in place. The organization owned both a database for collecting program information and a data management system for aggregating and reporting information from disparate data sources. The team immediately upgraded both programs to fully supported versions. The result of this was an immediate improved usage and performance across the organization. For example, upgrading the database caused an immediate drop of help desk support requests by about half, and increased speed in month-end billing processes that were crucial in the procurement of revenue from the state.

Once the preliminary work of purchasing and implementing upgrades for these systems was completed, along with identifying previous informatics implementation failures through cross-functional teams, and formulating evaluation plans to populate the organizational scorecard, the core team began to reach out to departmental leadership to create an organizational balanced scorecard that would hold all stakeholders accountable for their performance.

While we knew from experience that there would be some resistance to change, this became the primary barrier and challenge. Adding to the existing resistant, tenured culture, there was a significant organizational history of poor or total lack of the use of successful technology-based innovation. In fact, the organization found itself in the very difficult role of lagging quality and playing catch-up. This was a successful organization that desperately needed to become more competitive, efficient, evolving, expanding, and in dire need of joining the twenty-first century.

The theorist, Jean Lamarck (1744–1829), reminds us that "only a man of genius could embrace at one stretch the vast totality of all existing things. It seems to me, however, that man has to meet with no lesser difficulties when he tries to reduce the particular facts, witnessed daily by him, to their real causes. This is especially the case when he observes his immediate surroundings."[20]

Technology implementation is not easy, and can never be successfully dictated or implemented by one person, even in a solo practice. The office assistant and others will often have opinions, and choices that need to be respected. Furthermore, leaders need to listen to users and challenge IT developers to create systems that truly transform and innovate behavioral health work and practice.

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Evaluating the Impact of Behavioral Healthcare Informatics

11

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Everything that can be counted does not necessarily count; everything that counts cannot necessarily be counted.

Albert Einstein

The only man who behaves sensibly is my tailor; he takes my measurements anew every time he sees me, while all the rest go on with their old measurements and expect me to fit them

George Bernard Shaw

As anyone who has implemented an informatics system can attest to, one of the most challenging issues when evaluating such a system is developing methods to isolate the effects of information technology (IT) within the dynamic environment of behavioral healthcare. There are many books and articles written about evaluation principles and methods, and this chapter does not seek to supplant them; instead, an overview of evaluation and its role in behavioral healthcare informatics system implementation will be presented. Behavioral health has traditionally spent less on IT as a percent of revenues than the medical and surgical fields, but as shifts in public policy begin to force the hand of change, evaluation of the return on investment of informatics must be undertaken if behavioral healthcare is to maximize its potential.

Many staff in behavioral healthcare organizations struggle with understanding the impact of IT on their organizations. Often people within the team begin pointing to the lack of tangible results even before implementation projects are complete. Some people begin to question the implementation, and they express their anxiety by saying "This isn't going to work." Others are perhaps uncertain, worried about change and their ability to adapt. Many times, organizations act to optimize or indeed focus on short-term performance measures for new technology, but the process of implementing changes may take months by itself and then even longer to realize significant results.

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The high-stake and high-cost[1] decisions linked to information technology implementation pressure the implementers to demonstrate that the new information technology makes a difference in their practices. Many behavioral practitioners fear that new technology efforts must produce measurable results in a relatively short time. The message about the expected effectiveness of technology, including timelines and outcome expectations, needs to be conveyed to the entire staff at the beginning of and during the first 12 months (or more) of the implementation. This is crucial as research has found that perceptions of using electronic health records is usually low during the beginning of an implementation, but greatly increases over the first year of usage.[2] In addition, as time using new IT increases, adherence to evidence-based guidelines for treatment increases as well.[3]

Today, more than ever before, evaluation and outcomes research is critical, as proper use of information technology can lead to more satisfied organizations, healthcare providers, and patients. In the rest of this chapter, the reader is guided through important issues in behavioral healthcare informatics evaluation, from the benefits and challenges to key issues and common evaluation methods. First, however, an operational definition of evaluation and what it does must be addressed.

What Does Evaluation Really Mean?

Usually, the initiating question for an evaluation is “Are the information technology systems implemented in behavioral healthcare achieving their goals?” Although this seems like a logical question to ask after putting an IT system into place, not everyone either wants to take the time or is interested in the answers. People may say “the current system is working fine, and the technology is not available to do what I want anyway” or “we cannot ask the clinicians because we do not have the money for a new system anyway” or “leave well enough alone.” Thus, those responsible for information systems sometimes do not see the need to evaluate, since they have either limited desire or perceived lack of ability to change things. However, there comes a point for most information system leaders when it is important to ask these questions:

- How are we doing in general?
- Are we accomplishing what we set out to do?
- Are we meeting our end users’ needs?
- Are we keeping current technically?

These questions may be may precipitated by a crisis, for example, a shortage of funds, competing needs, obvious failures, and so on. Alternatively, senior administrators may want to know if they are getting their money’s worth from this system. In the case of a new information technology system, there is often a concern with learning whether the new system represents a good approach or if there are any changes needed. Regardless of the impetus, evaluation is the way to answer those questions.

At its core, evaluation and evaluation research are concerned with determining out how well something works or how well a particular goal has been accomplished. That "something" could be an information system, a department within a hospital, or a particular service; goals could be a certain level of improvement in symptoms, usage of a system by practitioners, or time spent on a certain task. Evaluation represents the application of social science research methods to discover important information about the program, practice, or department. This information can then be translated into certain actions designed to improve or ameliorate problems or simply improve existing services.

Realistically, evaluation is undertaken by an individual or organization to respond to specific areas of concern. These areas could be analysis of an existing situation and development of a projected ideal, justification of a current or proposed activity, or analysis of the quality of an activity or operation. One classic definition of evaluation is "the process of ascertaining the decision areas of concern, selecting appropriate information, and collecting and analyzing information in order to report summary data useful to decision makers in selecting among alternatives."[4] This definition of evaluation is based on the following assumptions:

1. Evaluation is an information-gathering process.
2. The information collected will be used mainly to make decisions about alternative courses of action. Therefore, the collection and analysis procedures must be appropriate to the needs of the decision-makers.
3. Evaluation information should be carefully presented to the decision-makers in a useful form with great care taken to avoid confusing or misleading them.
4. Different kinds of decisions will often require different kinds of evaluation procedures.[4]

Since healthcare organizations are in the business of trying to improve the human condition through a variety of organizational efforts, they are always making changes in services, departments, information systems, and so forth. An evaluation of those efforts is important to prove the value of the program or service. An evaluation of a behavioral health informatics system is needed not only to prove its value, but also to determine if the system is doing what it was intended to do.

Common Evaluation Methods

When there is interest in determining how well the information system is working, the evaluation can proceed by several routes. The processes are often foreign to those schooled primarily in the physical sciences and are more familiar and comfortable working with variables that are more precisely measurable and in purely physical terms. One way is through an impressionistic, qualitative inquiry: an individual, a team, or a committee asks questions. Proceeding much as a good journalist does, the investigators talk to the program director, staff members, and recipients of service (i.e., patients). They sit in on sessions, attend meetings, look at reports, and usually in a few weeks or months come up with a report. Much useful information can be ferreted out in this way, but the procedure has obvious limitations. First, it relies heavily on what people are willing to reveal about the situation, often including self-disclosure. There is a noticeable difference if the investigators are from within versus outside the department, as external evaluators may be seen as more objective, but there may be greater reluctance to discuss problems. The journalistic inquiry also depends on the skill, insight, and objectivity of the investigators. If they are rushed, bland, or biased, their assessments may not be useful or accurate. Perhaps, the most significant drawback is to exclusively focus on what is happening at the present. Whatever the merit of its findings, the investigation usually tells little about outcomes, including what effect the system under evaluation has in helping participants achieve the goals that were originally agreed upon.

Another assessment technique is to administer specific questionnaires or structured interviews that ask people's opinions about the program. Superficially, this appears more scientific and objective than the first type of investigation, and it does prevent the more patent intrusion of observers' biases. On the plus side, it also yields clues about program strengths and weaknesses. But again, as a method of evaluation, it is limited by what people divulge and by their immediate time perspective. If longitudinal data collection of this type is undertaken, however, much more important information can be obtained. This can include changes in usage patterns and attitudes over time, allowing comparisons between skills at the beginning of an implementation and the present.

Finally, examining the data within the IT system itself can be an excellent evaluation method. This has the advantages of being free of potential rater/reporter bias and usually much quicker. As an example, the evaluator could see what percentage of paper-and-pencil medical records were completed correctly before an IT implementation and compare that to what percentage were completed correctly after a new system that uses electronic medical records. Or adherence to evidence-based guidelines for medication administration or therapeutic administration could be compared. Alternatively, time spent on completing paperwork before and after an implementation could be tracked across time or almost any metric of patient care or practice that is included within the system.

Regardless of the method of evaluation chosen, it is important to have a proper team in place to perform the evaluation. Persons unfamiliar with interviewing or qualitative data analysis, for example, should not be placed in charge of such an evaluation, and people not skilled in psychometrics and statistical analyses would likely fall short when placed in charge of that type of evaluation. Matching your team to your task, in this as in so many other areas, is key.

Benefits of Evaluation

The true impetus for change in most sectors of healthcare is that the new will outperform the old in some way. When examining use of information technology and informatics in behavioral healthcare, studies have revealed numerous benefits, from providing access to otherwise unobtainable information[5] to more complete, easier to retrieve records[6] to better adherence to evidence-based treatment guidelines.[7] In addition, more "mundane" concerns, such as legibility of handwriting, misfiling of information, and time spent searching through poorly organized charts can be easily addressed via electronic medical records.[8] But evaluation of these systems also provides benefits above and beyond these, for organizations, practitioners, and patients.

Organizations stand to benefit hugely from conducting proper evaluations of IT systems in use in their environments, such as electronic medical records (EMR). Given the high rate of adverse healthcare events due to medical errors, and the subsequent legal difficulties associated with those events, it is imperative for organizations to minimize such errors. Paper and handwritten records are notorious for errors of various kinds, including omitting important information (for example, signatures or dosages), inputting wrong information (for example, misspelling or writing wrong abbreviation), and being illegible by other providers.[9] EMRs can "force" providers to input proper, complete information by not allowing the records to be submitted unless certain criteria are met (that is, all areas of the record filled out). Indeed, such systems have shown 40% increases in completeness and reduced time to retrieve information by 20%, boosting productivity and reducing the chances that important information will be missing.[6,7]

By conducting evaluations of IT usage, organizations can see who is (and is not) benefitting from use of systems like EMRs then target those providers with additional training and resources on the use of technology, allowing the organization to fully reap the advantages of such systems. This targeted training will also prevent those who *are* using IT properly having to waste valuable time on unneeded training, cutting into the ability to productively care for patients. In addition, properly evaluating the informatics system in a particular organization can lead to a better understanding of what services are being most frequently and infrequently used, allowing for more informed decision making regarding what services to continue and discontinue, upgrade or remove.

Practitioners, as the hands-on users of the majority of IT, also have a large number of potential benefits from effective evaluation methods. First, evaluation of IT usage can help practitioners to make sure that they are utilizing an informatics system to its full potential, across areas such as record keeping, information access, and ease of communication with other professionals.[10] For example, using EMRs would result in less time being spent in answering questions about what exactly a word is in a note, or double-checking that medications and dosages are correctly read by nurses or pharmacists.[9] Such time savings can result in either less hours worked or more patients seen in the same amount of hours, both desirable outcomes for professionals. For example, the Danish healthcare system, which is often cited as the most efficient in the world, saves physicians an average of 50 min per day in paperwork.[11] For those individuals working outside of hospitals or organizations, such as private practitioners, making sure that one is keeping complete, easily accessible records can result in less time spent having to dig through older files for information to send to another practitioner for consultation or continuity of care.

Patients are the most removed from the evaluation process, in that they do not directly use the IT systems, but can, in many ways, benefit the most from effective implementation and evaluation of informatics systems. The core of any information system is the data inputted into it, and in the case of behavioral healthcare, all those data come from clients, either directly (for example, a developmental or medical history) or indirectly (for example, results of blood work or testing). Given that research shows traditional, paper and pencil methods of record-keeping to be inferior to electronic systems on a number of factors, it only follows that using EMRs and the like will result in an accurate, thorough record of a client's health and history. This history will not only be more complete, but also more easily transportable, able to be transferred between hospitals and practitioners quickly and easily, with no degrading of content (as it often occurs with copies or faxes, as one example). In addition, research shows that practitioners are more likely to adhere to evidence-based treatment guidelines when using certain types of IT[8], which results in a higher likelihood of positive outcomes for the patient. Evaluation can help to ensure that organizations and individual practitioners are using IT appropriately and effectively, or can help them to reach new goals; either way, patients will benefit.

Critical Evaluation Issues

Mindset of the Evaluator(s)

While the methods and goals of evaluation are crucial, equally important is the individual or group performing the evaluation and the way they approach this often daunting task. Prior to the implementation of the selected evaluation method, several things must be attended to. First, having agreed-upon goals and methods to measure those goals must be accomplished. Imagine going on a road trip with no map, no car, and no place you want to end up. Not only will you not likely go very far, but you would also not know if and when you got to where you were going. Ensuring a clear, doable plan for evaluation allows the rest of the process to proceed effectively and gives you specific tasks to accomplish and a timeframe within which to accomplish them.

Once your plan for evaluation is put into action, the evaluators must carefully follow the agreed-upon plan. If any deviation from the plan is required, an understanding of how this will impact the evaluation as a whole must be considered. For example, if an organization had decided to use a particular outcome measure (for example, number of return visits for medication management, adherence to a specific treatment plan, percentage of records completed correctly) and then in the midst of their evaluation were unable to access that information for certain practitioners/patients, how would that be handled? Would different information need to be collected? Would those be skipped and not counted? How this situation would be handled would need to be communicated to the entire evaluation team, with appropriate changes integrated into the evaluation plan and, if necessary, approved by the appropriate parties.

After the evaluation process is complete, the evaluators should not simply congratulate themselves (although that should happen as well), but should also engage in a reflection and evaluation of the evaluation process itself (see "Evaluating the implementation" below): Difficulties encountered, how such challenges and problems were met and solved, what worked well and what would be changed next time; all of these can provide much needed guidance for the next round of evaluation. Such a recursive model can lead to evaluation becoming even more efficient and effective each time the process is undergone.

Stakeholders

The stakeholders, those who support and/or use the system, need to be included in the evaluation process. This includes identifying appropriate, measurable indicators and developing reliable methods that will yield insightful and valid information about what makes information technology effective in behavioral healthcare. Stakeholders need information on how using information technology changes patient care and what will be the organizational impact of the information technology system, and they need to know the outcomes that can be expected at different stages of the technology's implementation. The evaluation findings must be documented to satisfy diverse stakeholders' needs. Interest in technology's use in healthcare is at an all time high, as is interest in the effectiveness of that technology. Patients and their families want to know if their loved ones are improving and what their future outcomes will be. Practitioners want to know how and if the system is improving their ability to administer effective care. Administrators want to know if throughput is increasing with technology and if outcomes are improving. Funders, policymakers, and taxpayers want to know if information technology is sufficiently promising to continue investing in behavioral healthcare. Documenting and reporting evaluation data to meet these diverse stakeholders' need-to-know presents evaluators with many challenges.

The gap in the data needs of policymakers or administrators and practitioners is particularly heightened. While policymakers and administrators want to see data on the effects of technology (usually on the bottom line), practitioners need information that can be tied to changes in systemic practices to improve outcomes. Policymakers/administrators tend to value reports documenting financial improvements, while practitioners need reports documenting implementation outcomes in order to make sound decisions about their patient care plans. Both kinds of data are important, but each fails to satisfy the needs of the other. The best hope of closing this gap lies in helping all stakeholders to see (1) how information technology can be an effective complement to and component of the existing behavioral medicine system, (2) what technology can and cannot accomplish, and (3) how effective evaluation of new or preexisting technology requires multiple measures in order to determine its impact on multiple levels of stakeholders.

Behavioral Healthcare Practitioner

The role of the behavioral healthcare practitioner is crucial in evaluating the effectiveness of information technology. They must see evaluation as a reflective process to help improve their practice. Technology has the potential to revolutionize what behavioral healthcare practitioners do by several means, including interaction with some patients through technology or delivery of more effective treatments. Information has added new breadth and depth to patient care by increasing the level of quality management. This, in turn, has the potential to transform the role of behavioral healthcare practitioners. Today's practitioners need to know how to manage interactive group dynamics as well as information technological systems.

Implementing an innovation in behavioral healthcare practice can result in practice running before policy. Some existing policies may need to be "transformed" to match the new needs of practices using technology. One evaluation goal is to understand the conditions of technology use and to use that understanding for improving patient outcomes.

What does Evaluation Entail?

The Link to Expectations

Information systems generally aim to provide people access to information that they need as accurately and rapidly as possible. Evaluation is the process needed to determine if the goals and expectations of the system were actually achieved. When beginning an informatics evaluation process, it is important (1) to have a baseline assessment of the current system and (2) to link the evaluation to the comparison of outcomes to expectations. Before any organization decides to implement a new health information system, there are usually specific organizational expectations and goals for the new system. An evaluation will help organizations determine if the new behavioral health informatics system matches those initial system's expectations.

An evaluation process usually has three components: (1) an information gathering section, (2) an assessment of the information gathered, and (3) a decision or future action component. To better enable the organization to make future decisions, the evaluation process should be started at the very beginning of the development or acquisition process for a new health information system.

Baseline Analysis

To understand the real impact of any new system, it is important to measure where the organization is before the development or acquisition process begins. Thus, measuring the state of the systems and the information flows before any action is taken is highly beneficial. However, while the need for baseline information is important, practical reasons may prevent the baseline data from being collected. For example, the top managers may feel that immediate action is needed and that they cannot wait for a systematic evaluation prior to implementing a system. Another reason might be that the organization does not have the resources – money or people – to complete an evaluation of the current system.

One of the major benefits of a baseline evaluation is that it can help the organizational change and senior leaders to thoroughly understand the current system. They can then determine if the "change" direction they are considering will meet the needs of the organization and its people. Another benefit is that the baseline information may be helpful after implementation to prevent spurious comparisons of the new system to the old one. This can come in handy if people start reminiscing about the "good old days" and how wonderful things were before this terrible new system was installed.

When evaluation is not considered until the installation of the new system is completed, the opportunity for an accurate baseline evaluation is lost. Those charged with postsystem evaluation must rely on retrospective reports, with all the risks of memory distortions, or on whatever documentary evidence happened to exist for other reasons at the time the decision to implement the new system was made. Unfortunately, such evidence is usually inadequate for a proper comparison. Sometimes baseline measurements are incomplete simply because of lack of experience and foresight about what data might be needed later.

System Expectations and Goals

Before an organization makes a commitment to changing an information system or to installing a system where one does exist, there are usually many hours of discussion and a clarification about the goals and expectations for the system. Organizational vision and needs are discussed, probable system costs are examined, and many organizational levels and people are consulted before final approval occurs.

In order to complete an effective evaluation of the new information system and the implementation process, it is essential that these realistic system expectations be clarified and used in the evaluation process as a measure of success or failure. The system expectations should be known to all involved in the system design and selection process. The expectations need to be written in simple declarative "capable of" statements, which are in turn used to develop evaluation questions and the evaluation methodology.

In evaluating behavioral health informatics implementations, there are three critical questions. Keeping these concepts separate is critical in evaluation since, if they are confounded in the evaluation process, the interpretation of any outcomes is of questionable value. These questions are:

1. What is the target for the organization on this particular measure of evaluation?
2. How close did the organization come to the selected target?
3. How many resources did it take to reach the level the organization is currently at, and what resources will it take to hit what was defined as the target or goal?

Regarding the first question, there may not be only one target to evaluate. Indeed, this is rarely the case. Instead, multiple targets (patient retention and satisfaction, number of medical errors, time spent on record keeping, etc.) are often evaluated at the same time. In this case, it is important to have goals for each target carefully operationalized and clarified for all evaluators so that a determination can be made of how close (or far away) the organization is from each target (question two). Finally, understanding what "got us here" (the resources used to reach the current level of performance) and what is needed to "get us there" (the organization's actual goal) allows for an examination of resource allotment and how/if it should be changed to improve outcomes.

Evaluating the Implementation

The system implementation process is very important. Was the process smooth and without stress? Did the physicians, nurses, or other practitioners actively participate and feel involved in the process? Did events happen as planned? What were the strengths and weaknesses of the manner in which the implementation occurred? These process-type issues are included in evaluating the actual implementation of a new behavioral health informatics system.

An actual and first-hand account of what is being done is needed to evaluate the actions and events that occurred in the implementation process, especially if the system being implemented is for the total, complex health organization. Very often, the strategies listed originally differ from what happens in the "heat of battle." As such, the person charged with the evaluation cannot assume that the plans and the actual implementation went as stated unless there have been quality control checks throughout the evaluation process. There are a number of reasons for the possible discrepancy, including unclear perceptions or wishful thinking on the part of the staff and unrecognized conflict between people or groups. Evaluation is another reason why a dynamic planning and control process is so important. In addition to the direct planning benefits, such a process also provides a historic project trail for evaluation purposes.

One of the most difficult tasks in completing an evaluation study is finding the best techniques for understanding a process and the effects it has on people and systems and for estimating the degree to which observed phenomena approach the objectives of the program. This process is made easier by clear definitions of the goals and objectives. A practical problem of measurement in many studies is that of obtaining usable information. The application of evaluation techniques to the topic of an implementation process is usually costly and time-consuming, but important in order to redirect future efforts.

Make assessment and developing new abilities for appraising change a top priority among advocates of change. Learning to assess the consequences of significant change initiatives is a complex new territory, often neglected by leaders of those initiatives. In fact, assessment represents an opportunity for those advocating and championing change, particularly for line leaders. If they assume greater responsibility for assessment and measurement of their progress, they can make it a key strategy for accelerating learning. The key shift is to bring measurement and assessment into the service of learners, rather than have it feared as a tool for outside "evaluators."

Evaluating the Quality of the System

After years of work, the health informatics system is implemented. Does the system do what it was originally designed to do? Is the system providing the type of information needed? What are the strengths and weaknesses of the system itself? These types of information must be gathered in the evaluation of the system, with a particular focus on how well it performs and meets expectations.

The same techniques and issues apply to the evaluation of the actual behavioral health informatics system as it applies to the evaluation of the implementation process. The collecting, analysis, and presentation of data and information about the effectiveness of the new information technology-based system is important to determine if modifications are needed – in the system or in the redesign of the current process/information flow.

Time Delays

One should appreciate the time delays that are involved in large-scale change. The ultimate success or failure of IT implementation efforts based only on early results will not accurately reflect whether the system did or did not meet goals. Developing new capabilities is a matter of discipline and of regular practice with particular tools and methods, over a course of years. Those responsible for the information technology implementation can promote a realistic time period for others to realize and appreciate the resulting benefits. Referring to literature which shows gradual improvements over time for usage of new IT systems[2] may help to assuage the desires of administration and others for instant results.

What Do We Do with the Information?

The underlying belief in evaluation efforts is that the study of the data, information, and communication collected furnishes the basis for constant feedback and readjustment of activities within the complex organization. In earlier days, the concept was often referred to as "learning loops" or "feedback loops," but today the emphasis is on building what are known as "learning organizations."[12] The purpose of evaluation, therefore, is to provide information that, if acted on, can help transform the organization to become more effective, efficient, and successful.

The evaluation of complex organizations requires the formulation of objectives and criteria of accomplishment on a much broader scale. It is generally agreed that successful evaluation studies cannot be performed retrospectively, but rather must be built into the programs at their inception for true learning to take place. This is one reason why obtaining baseline information (see above) is so important to a useful evaluation. A number of considerations, therefore, must be taken into account.

- When present from the beginning, the evaluation is less threatening, both because it seems part of the total process and because people come to feel they have had a hand in planning the evaluation.
- When skilled evaluators are an integral part of the planning phase of the system implementation, they can often help to improve the quality of the objectives as their attention is focused on the measurability of achievements.
- Experienced evaluators may be able to contribute substantively to the planning process by drawing on both their experiences and their knowledge of established social science findings. They may be able to suggest methods of known effectiveness and point out known difficulties in both the current operations and the system under development.
- Evaluators who are present from the start can follow the entire system and implementation process through planning, pretesting, and full-scale operations, thereby gathering information and keeping records of actual happenings.

Some organizations have established process action evaluation teams that may be made up of nurses, ward clerks, or other unit staff. The role of this team is to observe the day-to-day operations of the implementation process and to maintain a diary on the use and behavior of the system after it has been fully implemented. There are many ways for organizations to gather data. However, the key is using the data that has been gathered to make positive, proactive changes in the way systems are implemented within the organization and in the way that systems are designed and selected in the future.

Once the information from the evaluation is gathered and analyzed, it must be interpreted and summarized. The results of the evaluation are sometimes best communicated in small doses, allowing changes to be introduced gradually rather than abruptly. This approach reduces the resistance to any changes. If the people who did the evaluation remain as closely connected to the effort as possible and help the change leader and senior leaders interpret and implement the findings, the results of the evaluation are more likely to be adopted than if a report is dropped in the lap of the change manager with no provision made for explaining findings or helping implement action steps.

Conclusion

To evaluate means to assess value. Before the assessment can take place, the desired value must be understood. Evaluation criteria may include the following: "(1) To monitor a steady state so as to determine when a correction is necessary. (2) To identify alternatives in a problem (nonsteady) situation and provide relevant information. (3) To weigh alternative courses of decision-making in terms of relative gains and losses and (4) To determine corrective action and the error-risks involved in various approaches to change."[13] But in order to be useful and fulfill these criteria, the evaluation must be properly planned and implemented. While evaluation can provide numerous benefits, poor evaluation can instead provide numerous headaches. Keeping the principles described in this chapter in mind will allow the organization or individual to gain useful information that can assist in enacting meaningful change.

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How Behavioral Healthcare Informatics Systems Interface with Medical Informatics Systems: A Work in Progress

12

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Developments in the last decade show that behavioral healthcare informatics systems (BHISs) may interface effectively with medical informatics systems (MISs) and show promise for even more effective integration in the future. This chapter will provide examples of implementation techniques and current interface processes drawn primarily from developments in the Veterans Health Administration (VHA).

As previous chapters have discussed, BHISs can be designed to serve single or multiple purposes in facilitating treatment and self-management of behavioral issues. These purposes include gathering, organizing, and evaluating behavioral information for the benefit of both the client and the healthcare system; providing behavioral healthcare decision support; enabling efficient communication about behavioral issues to and from the client and within the treatment team; and supporting the client as an active partner in behavioral treatment. Special concerns for behavioral health include: repeated assessment of behavioral symptoms (e.g., mood, nightmares, or exercise); rapid detection of worsening symptoms (psychotic decompensation, suicidal ideation). Patients with certain behavioral health conditions may be less adept at clear communication with all members of the treatment team, leading to lack of complete and shared information among all team members. A fully integrated healthcare informatics system (IHIS) would inform, organize, remind, document, and interface with other systems such as public health and reimbursement plans.

Although IHISs hold the promise of being cost-effective in any healthcare system, integration is particularly important where treatment encompasses multiple providers and treatment issues involving complex, comorbid problems with high treatment costs and the possibility of high risk errors and negative outcomes. A prominent theoretical model guiding the integration of BHISs with MISs in this type of treatment environment is the Chronic Care Model[1]. Integrated informatics is also probably essential to the implementation of the Patient-Centered Medical Home model of care[2]. The Chronic Care Model synthesized previous research to find that effective care for patients with chronic illnesses requires healthcare systems that: provide patient registries, incorporate an integrated care team, support patient

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self-management, encourage fidelity to evidence-based care by providing decision support and process-outcome evaluation tools, and interface with community resources.

More recently, the Institute of Medicine[3], recognizing the importance of IHISs in supporting high-quality healthcare, identified eight domains of IHIS function: Health Information and Data, Decision Support, Results Management, Communication/Connectivity, Population Health Management, Order Entry, Patient Support, and Administrative Processes. Each of these domains can be applied to behavioral informatics. For example, "Health Information and Data" may encompass behavioral domains such as treatment adherence, self-ratings of mood, or episodes of substance abuse. "Decision Support" may be used to guide clinicians as to appropriate dosage increases for antidepressant or antipsychotic medications. "Results Management" functions at the provider or clinic level to assist adherence to evidence-based treatment for behavioral issues. "Communication/Connectivity" functions are very important in BHISs both to assist the client and treatment team to communicate symptoms, treatment specifics and results, and also to support efficient and error-free functioning of the treatment team.

Research monitoring developments in the use of commonly recommended chronic illness care management processes (CMPs) over the past decade illustrate the need for continuing efforts in BHIS/MHIS integration. There was a 23% increase between 2000 and 2006 in the number of CMPs used by large physician organizations, but out of the chronic illnesses monitored, the illness with the greatest behavioral component, depression, showed the least use of CMPs (0.8 of 3)[4].

Electronic health records (EHRs) are increasingly recognized as an important aspect of providing high-quality healthcare, especially in large healthcare organizations[3]. For example, the VA MIS presents clinical notes, current diagnoses, vital signs, prescriptions and lab data, and even supports graphical display of lab values over time. Behavioral healthcare is essential to providing truly comprehensive healthcare, and accordingly, behavioral informatics systems are a necessary component of EHRs. Despite the important role of an IHIS in supporting behavioral healthcare, MIS design has not always included significant support for behavioral health. Developers of behavioral informatics systems must balance the informatics needs unique to behavioral health issues against the ability to seamlessly integrate with the larger EHR [5]. Ideally, an IHIS would be designed as an integrated system from the ground up.

Recently, the VA has prioritized IT support for involvement of patients as active partners in healthcare, including behavioral health, with the introduction of the MyHealth*e*Vet patient portal (www.MyHealth.va.gov; Nazi et al.[6]). Using this portal, patients can track and graph basic health status information (e.g., blood pressure readings, weight), access educational materials, and renew prescriptions. The site also includes a significant behavioral health component: veterans can complete on-line self-assessments of mood, post-traumatic stress disorder (PTSD) symptoms, and substance use disorders. They can also use the MyHealth*e*Vet portal to access programs supporting behavioral activation for health concerns, notably the VA *MOVE!* Weight Management program (www.move.va.gov). In the future, veterans will be able to use MyHealth*e*Vet to communicate electronically with VA health care providers, get appointment reminders, view upcoming appointment times, and view lab results. However, these IHIS developments are only the beginning and as more functions are added, this online portal could be even more helpful for behavioral healthcare. One example of a critical function would be to link the patient health portal with the electronic medical record, to assist in population-based panel management programs. This function, panel management, is of great importance for care management of chronic illnesses, including behavioral conditions.

Just as hardware development outpaces software design, IHISs must go through an implementation process that determines whether potentially useful software systems actually meet the needs of the client, provider team, and healthcare organization. In this chapter, we will concentrate on issues involved in adding BHIS components to an MIS that already exists or interfacing a new MHIS with a separate BHIS.

In the process of studying the implementation of evidence-based collaborative care for mental illnesses in VHA, we created a software demonstration module (CHIACC[7]) that provided support for care management of depression and schizophrenia, two very different behavioral conditions with different clinical needs.

Behavioral Healthcare Informatics Systems in Primary Care

In mental health, the most successful efforts to improve care have involved implementation of collaborative care models. They are a blueprint for reorganizing practice, and involve changing the division of labor and responsibility, adopting new care protocols, and becoming more responsive to patients' needs[8–10]. In these models, the day-to-day responsibility of illness management falls heavily on patients and their caregivers, and effective care must strengthen illness self-care while assuring that effective preventive and medical interventions occur[10]. Follow-up needs to be active, sustained, and assertively monitored.

Collaborative care is effective for improving primary care for depression[11, 12] while simpler interventions are generally unsuccessful. Interventions that provide collaborative care, however, have been difficult to sustain or spread. We refer to the collaborative care model we were introducing as TIDES – Translating Initiatives for Depression into Effective Solutions.

TIDES is a specific approach based on the more general chronic illness care model. Information systems design is identified as a key component of the chronic illness care model[13]. These models require proactive clinical management of a registry, or panel, of patients with the target condition. Research and clinical projects that implemented collaborative care in the past had to use paper and pencil tracking methods (http://www.rand.org/health/projects/pic/), often combined with Excel or Access databases for generating reports. Few have reported standardized forms of electronic communication. Non-electronic approaches are likely to inhibit program spread, sustainability, and fidelity[14]. The TIDES project used evidence-based quality improvement methods to involve VISN clinical and information systems leadership in designing informatics approaches that supported key collaborative care features and also responded to local conditions.

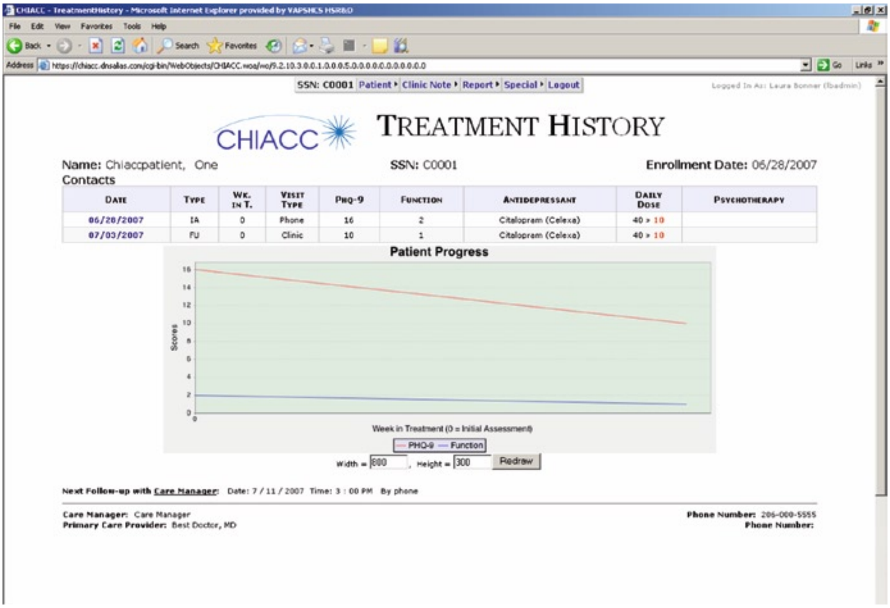
To design the informatics components of TIDES, implementation researchers first involved Veterans Health Administration (VHA) regional Veterans Integrated Service Networks (VISNs) clinical, administrative, and nursing leadership in an expert panel priority-setting process, carried out separately in each VISN[15, 16]. The research team implemented the details of the design priorities indicated by the panel, in collaboration with relevant VISN and local leaders. To support this implementation effort, the research team established several work groups including one focused on information systems. The informatics work group included information systems technical staff, VISN Chief Information Officers, care managers, and clinicians as regular members, as well as two implementation researchers.

VA information systems experts involved in TIDES were of several areas of expertise. Some had particular expertise in the VA's computerized patient record system (CPRS) and how to make use of its features, including programming local modifications. Others had expertise in VISN data warehouses, which store information from local medical record sources such as computer reminders on a regional level. This requires expertise in CPRS and in MUMPs programming (the language in which CPRS was originally written). A third group had expertise or leadership in overall VA computer system capabilities and planning. The informatics work group received input from other workgroups on their informatics needs.

In the initial priority-setting process, the panels placed a high priority on assuring that collaborative care informatics tools were based on the VHA electronic patient record system to the extent possible. Initially, we as other groups found that the architecture and available tools in CPRS were not sufficient to support the necessary functions. As other groups[17–19] have found, creating an MHIS-independent BHIS seemed the only option. If there is a choice, we think the option of expanding the functionality of the MHIS is preferable to minimize adding an implementation barrier and making uptake by clinicians more difficult.

We designed a depression-specific BHIS (CHIACC) using the Xtreme programming approach[20], in which programmers and end users work closely together through all phases of software development to make sure that the developing design will meet the users' needs. Details of the system have been reported elsewhere[7, 21], but it enabled structured assessment with branching logic, incorporated decision support in the form of user choices rather than mandated actions, prepared documentation, and enabled a registry and panel management tracking. The content and level of sophistication were calibrated to the professional skill level of the care managers who would be the primary client assessors (Fig. 12.1).

Concurrently with the development of CHIACC, we were working to optimize collaborative care support in VA's CPRS. There were some features of CPRS that could be adapted to behavioral healthcare purposes. Recent versions of CPRS incorporated the ability to locally program templates that can be used to structure progress notes. TIDES partnered with VA programmers and clinical applications coordinators in three VISNs to develop and test depression-specific consults and "drop-down" progress note templates to incorporate some decision support into CPRS. These tools informed and streamlined depression care while simultaneously documenting assessments and management plans in the patient's medical record. However, the major drawback of templated notes is that information is still textual and not easily retrievable for analysis across time or patients. The advantages of simple templates are that template construction and modification are easy, information can be structured, branching data entry implemented, repetitive entry minimized, and a standard presentation achieved that improves communication to other members of the collaborative care team. Only relevant sections of the templated text are



TREATMENT HISTORY

Name: Chiaccpatient, One **SSN:** C0001 **Enrollment Date:** 06/28/2007

Contacts

DATE	TYPE	WK. IN T.	VISIT TYPE	PHQ-9	FUNCTION	ANTIDEPRESSANT	DAILY DOSE	PSYCHOTHERAPY
06/28/2007	IA	0	Phone	16	2	Citalopram (Celexa)	40 » 10	
07/03/2007	FU	0	Clinic	10	1	Citalopram (Celexa)	40 » 10	

Width = 800 , Height = 300

Next Follow-up with Care Manager: Date: 7 / 11 / 2007 Time: 3 : 00 PM By phone

Care Manager: Care Manager **Phone Number:** 206-000-5555
Primary Care Provider: Best Doctor, MD **Phone Number:**

Fig. 12.1 CHIACC care management patient treatment history screen

visible in the completed note, and standard text blocks can be included to provide guidelines relevant to the patient's specific problems.

As part of the implementation process, we were able to do small scale usability testing comparing CHIACC, CPRS with user templates, and Net-DCMS, another MHIS for collaborative care management of depression developed concurrently[17]. The primary difference between CHIACC and Net-DCMS was that the latter had been designed for use by personnel with less clinical training than nurses and incorporated more rigid assessment flow and decision support logic. Usability testing (Bonner et al., unpublished manuscript) indicated that nurse care managers liked the flexibility of CHIACC and the panel management aspects of both CHIACC and Net-DCMS but were frustrated that data could not be directly exchanged between either system and CPRS.

Our experience illustrated another issue: interfacing a BHIS with an MHIS probably will involve attempting to keep pace with a moving target, both on technical and administrative levels. Any development of this type also will have to generate satisfactory answers to questions of privacy of healthcare data, healthcare system JCAHO credentialing requirements and legal requirements under the Healthcare Information Portability and Accounting Act (HIPAA) and other federal and state legislation.

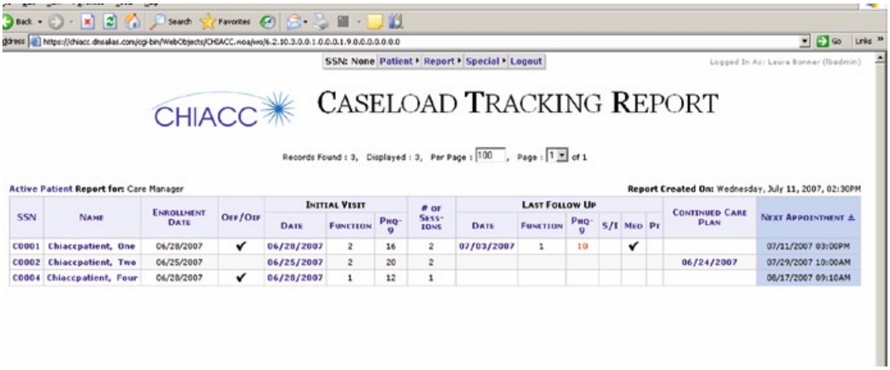
As our TIDES BHIS has evolved over the last decade, we found that the need to disseminate a BHIS to multiple practices within multiple VA Networks ("If you have seen one VA Medical Center, you have seen one VA Medical Center") has restricted us to working within the constraints of CPRS. CPRS capacities have evolved so that currently our data entry procedure generates "health factors," structured data fields that can be manipulated as database elements rather than having the limitations of free text. However, a continuing weakness of the system is in providing support for proactive patient registries or panel management. Panel management is not easily implemented in a MUMPS-based platform, which stores patient data in individual patient kernels rather than relational databases.

IHISs need to be able to respond to evolving clinical priorities. For example, as the CHIACC project was proceeding, the VHA was becoming highly aware of the significant mental health needs of Veterans returning from Iraq and Afghanistan, and also wanted to expand the software to address substance abuse and PTSD. We therefore conducted additional modified Delphi expert panel planning processes to help guide the development for future Primary Care-oriented BHISs to support collaborative care of multiple behavioral health issues. Panelists made specific recommendations about required content for the following conditions: PTSD, depression, suicide risk, substance abuse, and traumatic brain injury (TBI). Some recommendations were disease specific (e.g., presentation of results of neuropsychological testing for TBI) but others were common to multiple conditions (e.g., the ability to graph treatment response over time). Other general content requirements included: support for panel management, including sorting of the panel by clinical priorities and rapid navigation from a list of patients to an individual patient's chart. Specific content requirements included: monitoring of BMI for patients on antipsychotic medications, assessment of suicide risk, brief symptom assessments for depression screening and detailed but still concise instruments for depression follow-up, screening for alcohol use disorders and substance abuse disorders, a structured PTSD assessment, and screening for exposure to blasts or other situations increasing TBI risk. This content illustrates the importance of stakeholder input in BHIS design.

Behavioral Healthcare Informatics Systems in Mental Health Specialty Care

Similar to treatment of mental health in primary care, quality care for those with severe mental illness has been hampered by the lack of accurate clinical data available at the time of the clinical encounter. Clinical notes in either paper or electronic medical records often have little reliable information on symptoms, side effects, or functioning[22]. Similarly, important lab data may be missing or difficult to find. In order to inform quality improvement, one of the needed components is better clinical information on which to base treatment decisions. Potential sources of information could be standardized assessments by psychiatrists, by other staff, by trained raters, or self-assessment by patients, using either paper-based or computer entry.

Self-assessment by patients is certainly possible and would enhance quality improvement efforts, especially if a BHIS enabling valid data entry by the patient was developed and designed in a format that did not require further processing prior to becoming part of the health record. One barrier to such a system is that seriously mentally ill patients often have impaired information processing capacity[23], requiring careful interface design to promote usability and data validity[24]. The Patient Assessment System (PAS) is designed with those goals in mind and has been found to be feasible and reliable[25, 26]. For the PAS, patients sit at a computer terminal with a touch screen monitor, and are presented with questions by



CASELOAD TRACKING REPORT

Records Found : 3, Displayed : 3, Per Page : 100, Page : 1 of 1

Active Patient Report for: Care Manager

Report Created On: Wednesday, July 11, 2007, 02:30PM

SSN	Name	Enrollment Date	OEF/OIF	Initial Visit			# of Sessions	Last Follow Up						Continued Care Plan	Next Appointment ≜
				Date	Function	PHQ-9		Date	Function	PHQ-9	S/I	Med	Pt		
C0001	Chiaccpatient, One	06/28/2007	✓	06/28/2007	2	16	2	07/03/2007	1	10		✓			07/11/2007 03:00PM
C0002	Chiaccpatient, Two	06/25/2007		06/25/2007	2	20	2							06/24/2007	07/29/2007 10:00AM
C0004	Chiaccpatient, Four	06/28/2007	✓	06/28/2007	1	12	1								08/17/2007 09:10AM

Fig. 12.2 CHIACC care management patient registry report

an internet-based system that works in a standard web browser (Fig. 12.2). Questions are presented, one per screen, and also read aloud by a recorded voice, allowing easy use for those with low literacy. Answer choices are presented as a series of buttons, appearing as physical buttons, to be pressed with one's finger. Choices are accompanied by graphical depictions to aid the respondent. Patient burden is reduced by the use of skip patterns so that only relevant questions are presented. PAS design was based on research on how to reduce measurement error and maintain consistency with self-administered measures[27]. We designed PAS to be used by people with cognitive deficits, incorporating features such as audio, internal logic, and prompting when no response is made. Such kiosks are relatively inexpensive (as compared to professional in-person assessors), preferred by patients[26], easy to modify to meet clinic needs, and reduce social desirability and stigmatization concerns[28]. Typically, they can be set up in the waiting room and utilized at each visit.

The PAS system was implemented as part of a large multi-site VA HSRD trial to improve care for individuals with schizophrenia, called EQUIP (Enhancing QUality of care In Psychosis; PI Young). The PAS provided data to patients, their case managers, their psychiatrists, and administrators. For patients, the PAS printed out a one-page summary including the patient's report on key variables for this visit and the previous visit. For case managers, the data were utilized by a panel management system called MINT (Medical Informatics Network Tool[29]). When psychiatrists opened the patient's electronic medical record, a pop-up window appeared, generated from the PAS data. The data provided at the time of the clinical encounter highlighted key current problems and changes in symptoms and side effects since the last visit. Quality report summaries of each psychiatrist's panel of patients based on PAS data were also provided quarterly. Finally, quality report summaries for all providers and their patients were given to mental health administrators to identify quality gaps and service needs.

The EQUIP trial found that routine computerized self-assessment in chronic mental illness could be implemented, as it was reliable and valid, and was well received by patients. However, clinician acceptance varied substantially, illustrating the need for continued work on how best to implement BHISs in the field.

Conclusions

Issues in interfacing BHISs and MISs can be grouped into the following categories: stakeholder requirements, implementation opportunities and barriers, technical interface issues, and ethical and legal requirements. We argue that a merged BHIS/MHIS should be patient centered and should fulfill Chronic Care Model requirements where appropriate. Design processes should be used that enable efficient interaction among stakeholders, content experts, and programmers. One implementation technique uses evidence-based quality improvement, where the BHIS is considered as a tool facilitating evidence-based health care. Since previous studies have found that there is still much progress to be made implementing MISs in different health care venues, system and provider incentives and patient education will likely need to be part of an implementation package. Business case analysis may help with the organization level implementation issues[30].

Further developments will be needed to adequately balance ethical and regulatory concerns with patient access and convenience. For instance, although some EHRs[31] include support for secure patient-provider communication[32], others lag in this area. Although this issue demands the utmost attention to issues of privacy and security, patients are unlikely to perceive such concerns as sufficient reason to avoid support for a service that has become possible in many other areas such as banking and consumer purchasing.

MHIS/BHIS interfacing should include support for ongoing process evaluation, so that necessary mid-course corrections can be made. Given the investment involved, it is probably impractical to think in terms of Plan Do Study Act cycles in which small scale introduction is used to reveal potential problems for correction prior to larger scale roll-out (http://www.rand.org/pubs/monograph_reports/MR1267/mr1267.ch5.pdf) as a development method except at initial demonstration steps. However, phased introduction, starting with likely early adopters to provide the system with a success experience, is advised.

Disclaimer: The views expressed are those of the authors and do not represent the official policy of the Department of Veterans Affairs. CHIACC was funded by VA Health Service Research & Development QUERI grant MHS-03-218.

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Glossary

Balanced Score Card The balanced scorecard is a strategic planning and management system that is used extensively in business and industry, government, and nonprofit organizations worldwide to align business activities to the vision and strategy of the organization, improve internal and external communications, and monitor organization performance against strategic goals. It was originated by Drs. Robert Kaplan (Harvard Business School) and David Norton as a performance measurement framework that added strategic non-financial performance measures to traditional financial metrics to give managers and executives a more 'balanced' view of organizational performance. http://www.balancedscorecard.org/BSCResources/AbouttheBalancedScorecard/tabid/55/Default.aspx

CHIACC CHIACC is an acronym that stands for Creating Health*e*Vet Informatics Applications for Collaborative Care. Informatics support for chronic illness care poses particular challenges. The prevailing model for effective chronic illness care focuses on health system requirements to enable productive interactions between an informed, activated patient and a prepared, proactive practice team. These interactions are necessary for high quality care. However, current research is lacking on how to provide informatics support for these interactions. This project has the following objectives: achieve consensus among experts on the informatics support requirements for chronic illness collaborative care and evaluate an informatics support application for collaborative care of depression and schizophrenia. http://www.hsrcenter.ucla.edu/research/chiacc.shtml

CPRS CPRS is an acronym that stands for Computerized Patient Record System. The Department of Veterans Affairs has an award winning electronic health record called CPRS. They offer test software for people to download and run. http://www1.va.gov/cprs-demo/ CPRS organizes and presents all relevant data on a patient in a way that directly supports clinical decision-making. The comprehensive cover sheet displays timely, patient-centric information, including active problems, allergies, current medications, recent laboratory results, vital signs, hospitalization, and outpatient clinic history.

Data Standards Data Standards are documented agreements on representations, formats, and definitions of common data. Data standards improve the quality and share-ability of environmental data by: (1) Increasing data compatibility, (2) Improving the consistency and efficiency of data collection and (3) Reducing data redundancy. Environmental data standards provide a common vocabulary for citizens, local governments, states, tribes,

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federal agencies and private sector organizations to communicate about environmental data. http://www.exchangenetwork.net/standards/

EQUIP Effective, Collaborative Care for Schizophrenia (EQUIP-2) is a research project to improve understanding of patients and their needs, so that the VHA can provide better care. The project plans to assist VISNs in using evidence based quality improvement to implement and sustain chronic illness care for schizophrenia; 2) evaluate the intervention's impact on patient, provider and organizational outcomes. In a controlled trial, determine the effect of the care model relative to usual care; and 3) study processes of and variations in care model implementation and effectiveness. http://www.hsrcenter.ucla.edu/research/equip2.shtml

JCAHO The Joint Commission, formerly the Joint Commission on Accreditation of Healthcare Organizations (JCAHO), is a private sector United States based not-for-profit organization. The Joint Commission operates accreditation programs for a fee to subscriber hospitals and other health care organizations. The Joint Commission accredits over 17,000 health care organizations and programs in the United States. http://en.wikipedia.org/wiki/JCAHO

MUMPs MUMPs stands for **M**assachusetts General Hospital **U**tility **M**ulti-**P**rogramming **S**ystem. MUMPS is a programming language created in the late 1960s for use in the healthcare industry. It was designed for the production of multi-user database applications. It continues to be used today. It is currently used in electronic health record systems as well as by other non-medical networks.

Net-DCMS NetDSS is a free web-based decision-support system designed to help care managers deliver chronic care services to patients with depression. NetDSS is based on the chronic care treatment model for depression, also known as collaborative care. https://www.netdss.net/

NIST NIST is the National Institute of Standards and Technology, a unit of the U.S. Commerce Department. Formerly known as the National Bureau of Standards, NIST promotes and maintains measurement standards. It also has active programs for encouraging and assisting industry and science to develop and use these standards. http://searchsoftwarequality.techtarget.com/sDefinition/0,,sid92_gci212662,00.html

Plan Do Study Act Cycles Plan, do, study, act, or PDSA, is a quick way of improving work processes that allows teams to make a small change, then test and evaluate it. They can either adopt the change or reject it if it doesn't work. http://www.lmpartnership.org/learning/training/tools_pdsa.html

Reflective Practice Reflective practice is a term that carries diverse meaning. For some, it simply means thinking about something, whereas for others, it is a well-defined and crafted practice that carries very specific meaning and associated action. Along this continuum there are many interesting interpretations, but one element of reflection that is common to many is the notion of a problem (a puzzling, curious, or perplexing situation). What that problem is, the way it is framed and reframed, is an important aspect of understanding the nature of reflection and the value of reflective practice. It is also a crucial (but sometimes too easily overlooked) aspect of learning about teaching. http://goliath.ecnext.com/coms2/gi_0199-1469844/Effective-reflective-practice-in-search.html

Also: Reflective practice is accepted as being a key component of professional education and practice in health and social care. However an emphasis on self reflection frequently fails to broaden the lens to take into account wider issues of power and inequality, to move beyond technical rationalism and remains at the individual level rather than being embedded within relational notions of dialogue both within teams and across professions. http://www.leeds.ac.uk/medicine/meu/lifelong06/papers/P_SueSmith_KateKarban.pdf

Supported Employment Referral Supported Employment services consist of paid employment for persons for whom employment at or above the minimum wage is unlikely, and who, because of their disabilities, need intensive ongoing support to perform in a work setting. Supported employment services are provided in a variety of settings, particularly work sites in which persons without disabilities are employed. Supported employment includes activities to sustain paid work including training and supervision. http://ddsn.sc.gov/providers/medicaidwaiverservices/mrrd/Documents/Default/Chapter10SE.pdf

Templated Notes Templated clinical notes provide pre-defined section headings that require free text entry of information in a narrative style. In addition, long strings of symptoms may be present that require completion of check boxes, and embedded information such as headers that include patient name and demographics, active medications, vital signs, or laboratory results stored elsewhere. Templated notes may also contain user defined formatting, additional white space denoting note sections, or other visual cues. It is assumed that the use of highly templated note documents encourages consistent data collection, allows data consistency checks, and aids in the process of order generation, clinician reminders, and communication. Use of templated note documents and standard section headings is one example where structured data collection has been applied to unstructured data sources. http://www.biomedcentral.com/1471-2105/10/S9/S12

Xtreme Xtreme or Extreme Programming (XP) is a software development methodology that is intended to improve software quality and responsiveness to changing customer requirements. As a type of agile software development it advocates frequent “releases” in short development cycles that is intended to improve productivity and introduce checkpoints where new customer requirements can be adopted. http://en.wikipedia.org/wiki/Xtreme_Programming

Index

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