Process Improvement with Electronic Health Records

A Stepwise Approach to Workflow and Process Management

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Preface

Quality improvement is a cornerstone of health care. Yet managing the efficiency and effectiveness of workflow has not always been considered an integral part of healthcare quality improvement. This is especially true as electronic health records (EHRs) are being implemented. This new technology impacts clinicians in ways most never anticipated. There are many benefits from EHRs, but there have also been unintended consequences—often from lack of attention to workflows and processes and their connection points.

This book was written to overcome the paucity of guidance on workflow and process management specifically associated with EHR implementation, adoption, and optimization. Within the context of EHR then, workflow and process management is the application of a focused approach to understanding and optimizing how inputs (in any form—raw data, semi-processed data, and information from knowledge sources such as EBM) are processed (mentally or by computers using algorithms and clinical decision support [CDS] rules) into outputs (information) that contribute to an immediate effect or downstream effects (which also contribute to creation of further knowledge).

Workflow and process management for EHR focuses on mental processes, which have been described by Dr. Sam Bierstock as "thoughtflow," performed by knowledge workers. The clinical transformation that an EHR is expected to bring about is not just the movement from paper to electronic documentation. It is technology that contributes to a fundamental change in how medicine is practiced. The original Institute of Medicine (1991) study on computer-based patient records observes that "merely automating the form, content, and procedures of current patient records will perpetuate their deficiencies and will be insufficient to meet emerging user needs."

The chapters in this book introduce workflow and process management in health care and set the stage for a ten-step approach to applying workflow and process management principles at whatever stage a care delivery organization is in its EHR journey. Each chapter includes specific guidance and tools, as well as case studies. Healthcare knowledge workers are said to learn in a "see one, do one" mode. Stories bring reality to theory and practical advice.

Chapter 1: Introduction to Workflow and Process Management in Health Care introduces the topic to the healthcare environment, describing the clinical

transformation that knowledge workers are expected to achieve in adopting EHR. Chapter 2: Workflow and Process Management Overview defines terms and compares workflow and process management for EHR to other continuous quality improvement (CQI) methodologies and to change management.

The ten steps for workflow and process management begin with Chapter 3, Step 1: Assess Readiness for Workflow and Process Management. It urges care delivery organizations to take a critical look at their culture, to educate all stakeholders, to set goals for EHR outcomes, and to provide a workflow and process management governance structure.

Knowing what processes need to be addressed in EHR workflow and process redesign is covered in Chapter 4, Step 2: Compile Process Inventory. Care delivery organizations may well have applied CQI techniques to various workflows and processes in the past, but the EHR environment often breaks down or combines processes differently than in the traditional departmental or task approach. Workflow and process management for EHR must be patient centered, not staff or task centered.

Chapter 5 covers Step 3: Select Tools and Train Team. EHR vendors often point out that workflow and process changes that come about as a result of EHR capabilities are the responsibility of the care delivery organization itself. Even though some support and guidance from experts can be helpful, it is likewise true that the people who know the current workflows and processes best are those who are currently performing them. Workflow and process analysis and redesign actually help initiate change management.

Chapter 6, Step 4: Current Workflows and Processes dives into the specifics of documenting current workflows. It discusses the level of detail necessary for workflow and process mapping to be effective in understanding "thoughtflows" and the information needs of clinicians.

Chapter 7, Step 5: Obtain Baseline Data describes the purposes and uses for collecting baseline data. Not all care delivery organizations opt to collect baseline data as they may not have an interest in or, in many cases, the patience, for later conducting benefits realization studies. Still, such activities can be motivational—and provide the evidence that knowledge workers especially require to adopt change.

Chapter 8, Step 6: Validate Workflow and Process Maps urges care delivery organizations to step back and ensure that current maps represent reality. Improvements cannot be effected on workflows and processes if workarounds and problems associated with current workflows and processes are not well understood. It does little good to map a current workflow and process as it is supposed to be performed. Part of validation is also capturing variations. And once again, engagement of all stakeholders helps them take ownership of changes to come.

Chapter 9, Step 7: Identify Process Redesign Opportunities describes the process for getting stakeholders to create, document, and validate new workflows and processes. It may seem like many steps to get to this point, but mapping

current workflows and processes initiates changes that take considerable time to "gel." Mapping current workflows and processes also has valuable outputs of its own—it educates about EHR and helps the organization specify EHR requirements for vendor selection. The redesign of workflows and processes actually represents third and fourth outcomes that help the organization implement EHR and gain adoption, and later optimize use.

Chapter 10, Step 8: Conduct Root Cause Analysis to Redesign Workflows and Processes is a step that should be performed concurrently with Step 7, but may also be performed some period of time after redesigned workflows and processes have been implemented. Redesigned workflows and processes may be found to not work well, or require further change as the environment changes with ever new technology, new regulations, or new clinical research findings. Root cause analysis is not new to health care, but often has not been applied to IT issues.

Chapter 11, Step 9: Implement Redesigned Workflows and Processes is the culmination of the work in all previous steps, although as noted above may well not be the last time redesign and implementation is necessary. This chapter also dives more deeply into change management, discusses how to create change agents, and offers suggestions for using a few "tried and true" change management tools.

Chapter 12, Step 10: Monitor Goal Achievement with Redesigned Workflows "closes the loop" on the book and urges care delivery organizations to use continuous workflow and process management to celebrate their successes and to view course correction as not something bad but a part of the learning process that all relatively new technology implementations require.

Acknowledgments

A special thank you is extended to each and every organization that has written articles, been written about in news stories, or sought consultation about their successes and challenges with respect to workflows and processes in an EHR environment. These teachings have contributed to the rich experience base that compiling such a book requires.

Appreciation is also extended to the staff at CRC Press, especially Kristine Mednansky and Frances Weeks, for their expertise and patience with a passionate author. They say a bit of eccentricity is necessary to be creative, yet surely it tests the wits of those who must execute the product. By the same token, readers must be thanked as they are asked to be equally creative in their workflow and process designs while serious about achieving the goals for EHRs.

Two unsung heroes who likely are unaware of their status include Anita Cassidy and Keith Guggenberger who wrote *A Practical Guide to Information Systems Process Improvement* in 2001 under the same publisher. This book, with a general focus on information systems, was inspirational in its clear cut approach to workflow and process management. In fact, the connection to the publisher was made when an offer was extended to co-write a second edition or a companion book on process improvement for the EHR environment.

Finally, while writing a book the author is often immersed in a cocoon that is impenetrable to friends and family. My husband, Paul, deserves an extra special thank you for his indulgence that allows me to write what I am so passionate about and who has directed my career for over 4 decades.

About the Author

Margret Amatayakul is a health information management professional with a passion for automating medical records since her first professional job included creating a retinal disease registry on punch cards! She is currently president of Margret\A Consulting, LLC. The firm provides integrated delivery systems, hospitals, physician practices, vendors, health plans, their business associates, and the legal and investment communities with consulting, freelance technical writing, and educational programming to improve quality and cost-effectiveness of the strategic business of health care through IT. Margret is also adjunct professor in the health information and informatics management master's program at the College of St. Scholastica, and co-founder and member of the board of examiners of Health IT Certification, LLC. Margret has formerly held positions as the associate executive director of the American Health Information Management Association (AHIMA), associate professor at the University of Illinois Medical Center, and director of the medical record department at the Illinois Eye and Ear Infirmary. She is the author of numerous books, textbook chapters, and articles on electronic health records and HIPAA/HITECH privacy and security compliance. She has served on the board of directors of the Healthcare Information Management and Systems Society (HIMSS) and is active in several other professional health informatics organizations.

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Chapter 1

Introduction to Workflow and Process Management in Health Care

> Many EHR implementations focus on the impressive features of the EHR software—ability to graph results, display images—rather than the workflow requirements of the clinician users.
>
> **—Barry P. Chaiken, MD, 2011**

This chapter sets the context for the importance of workflow and process management in health care, in general, and more specifically for optimal use of the electronic health record (EHR) and other health information technology (HIT). It describes the characteristics of knowledge workers who often challenge the ability to achieve benefits from EHR and HIT, and distinguishes knowledge management from heuristic thought and professional judgment that continue to be required as clinicians who are knowledge workers use computer systems. It provides case studies describing examples of workflow and process improvements, and how workflow and process management generates opportunities for further improvement.

Context of Workflow and Process Management in Health Care

It is well known that workflow and process management's roots are in manufacturing and industrial engineering, starting as early as the 1920s with process charts and work simplification. More recently, *business process management* (BPM) is being adopted as "a systematic approach to making an organization's workflow more effective, more efficient, and more capable of adapting to an ever-changing environment" (SearchCIO 2005). A business process is an activity

that accomplishes a specific goal. BPM seeks to reduce human error and miscommunication and focus stakeholders on the requirements of their roles. SearchCIO includes in its definition that BPM is often a point of connection within a company between a line-of-business and the information technology (IT) department when the business process can be aided by IT.

Specific to health care, *quality improvement theories* such as Six Sigma, Total Quality Management, Business Process Reengineering, and Lean Systems have been embraced by a number of care delivery organizations (CDOs). In 2009, the Joint Commission created a Center for Transforming Healthcare focused on creating solutions to highest-priority healthcare quality and safety problems using Lean Six Sigma and change management tools with a focus on reliable measurement it calls Robust Process Improvement.™

Despite the widespread use of BPM in other industries and to some extent in health care in the face of specific needs, few CDOs or their IT vendors utilize these techniques in their implementation of EHRs and HIT. The result has been well-documented lower adoption rates of automation in health care than in other industries, less than ideal outcomes from EHRs and HIT, and even controversy over whether EHRs really can improve patient safety, quality, and cost of care. Yet where EHR vendors do use workflow and process management techniques, there appear to be better results, as evidenced by the frequency of acclaim the CDOs and their vendors earn (HIMSS Davies Award n.d.).

There is a critical need in health care to recognize that HIT is less about technology and more about its effect. In discussing the Centers for Medicare & Medicaid Services (CMS) (2010) incentive program for making meaningful use of electronic health records, David Blumenthal, MD (Wagner 2009), former director of the Office of the National Coordinator (ONC), observed that

> Meaningful use [incentive program for adopting certified EHR technology] is not a technology project, but a change management project. Components of meaningful use include sociology, psychology, behavior change, and the mobilization of levers to change complex systems and improve their performance.

The federal government is seeking to use Health Information Technology for Economic and Clinical Health (HITECH) and its Affordable Care Act (ACA) to achieve health reform: to enhance the quality of care, improve patient safety, expand access to care, and reduce the cost of care. The healthcare industry must find a way to make EHR and HIT successful.

Workflow and Process Management for Clinical Transformation

The term *clinical transformation* has been used to describe the scope of change needed in health care. While not the sole factor, automation plays an important

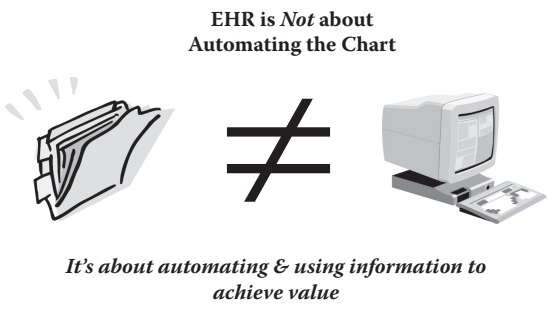

Figure 1.1 The value of EHR technology. (From Copyright © Margret\A Consulting, LLC. With permission.)

role in such transformation. Barry Chaiken, MD (2011) notes, "As organizations rush to satisfy meaningful use criteria…, many are turning their focus to a rapid deployment of EHR systems. Unfortunately, EHR adoption is just one tool used to transform health care, and not the single transformative activity so many believe it to be." He goes on further to propose that

> Health care transformation requires a comprehensive vision of care delivery that understands the importance of effective workflow in delivering care. Technology expands the options available in designing workflow… Implementing IT using workflows designed for paper-based processes fails to leverage the benefits inherent in the technology… lead[ing] to severe inefficiencies and medical errors. Proper use of IT requires workflow redesign that safely leverages the technology to enhance processes and workflow while delivering higher levels of safe and efficient patient care.

Another way to put this is that an EHR is not about automating the chart; it is about automating and using information to achieve value (Amatayakul 2011) (Figure 1.1).

Challenges of Workflow and Process Management in Health Care

So why has it been so difficult to institute workflow and process management to achieve the clinical transformation that EHR and HIT are supposed to support?

Ball and Bierstock (2007) describe the issue that "Vendors long have developed systems based on presumptions about the way clinicians work, but without a clear understanding of how clinicians think. Although workflows are complex and varied, they can be observed, described, measured, and addressed." Dr. Bierstock has coined the term *thoughtflow* to describe the need to understand how clinicians think—and then work, to appreciate the process used to obtain, assess, prioritize, and act on information.

The notion of understanding how clinicians think with respect to how they may use a computer is, in itself, transformative. Workflows and processes that traditional computer systems are intended to perform are those that process vast amounts of data into information. Users then gain value from the rapid and tireless processing performed by the computer.

However, most clinicians do not view themselves as processing vast amounts of data that would require a computer to perform. They process mentally all the data they need to make decisions about a patient, and then document a summary of that information—largely for reimbursement and legal purposes. They neither want to take the time to record all the data, nor rely on a machine to generate an answer for them. In addition, the structured format of the information generated from a computer has generally not been conducive for later review or to relate to others the patient's story. To clinicians, then, a computer slows them down, disrupts their entire thought process, and does not generate useful information for them.

What often is not appreciated by clinicians, however, is that patient safety and quality-of-care improvements are expected to come from the application of *evidence-based medicine* (EBM), which is knowledge generated by a large amount of data from clinical trials. A specific patient's data can be processed against the EBM to aid the clinician in clinical decision support. Unfortunately, EBM is often viewed as cookbook medicine (Timmermans and Mauck 2005; Swensen et al. 2010), and has not always been well developed or disseminated in a manner that is necessarily useful to the clinician in an individual patient care situation (Tonelli 2006).

Many studies have described unintended consequences from the use of EHRs—factors that would steer anyone away from their use. However, Temple (2011) describes the importance of studying studies—including recognizing that many studies are based on the adoption of technology that existed in 2005–2007 or even earlier, and many of the studies acknowledge that workflows and processes were not considered in either the selection or implementation of the systems.

Perhaps Simmons (2011) sums up best the importance of analyzing workflow in making the EHR selection and implementation: "… the EHR system will only do what you tell it to do. If you don't fully understand the workflow and information process of your [organization], your EHR system won't provide you with the highest level of efficiency possible." Adler (2007) notes that many who have implemented EHR when asked what they would do differently say, "spend as much time as possible planning, which should cut down on surprises as the project proceeds." Planning includes workflow redesign both before selection and during implementation. In fact, Dr. Adler's article is illustrated with a picture captioned "The Swamp of Shoddy Planning." The full scope of what an EHR can and cannot be expected to do must be understood; and clinicians who are expected to use the EHR must understand how they can best take advantage of what the EHR can do for them.

Workflow and Process Management Defined for Health Care

Within the context of health care and EHR/HIT, then, *workflow and process management* must be considered the application of a focused approach to understanding and optimizing how inputs (in any form—raw data, semi-processed data, and information from knowledge sources such as EBM) are processed (mentally or by computer using algorithms and clinical decision support [CDS] rules) into outputs (information) that contribute to an immediate effect and/or downstream effects (which also contribute to creation of further knowledge) (Figure 1.2).

Although terms such as business process management, process redesign and process improvement are often used, this book makes an effort to use the term "workflow and process management" for some very specific reasons:

1. Despite that health care could benefit from adopting better business practices; "business" is a term that does not resonate well with clinicians—who are the primary focus of the clinical transformation needed in health care.
2. "Redesign" is a term that often implies to new users of EHR that the technology will force them to change how they work—and, frankly, this is neither necessarily true nor desired. Redesign of workflows and processes should be

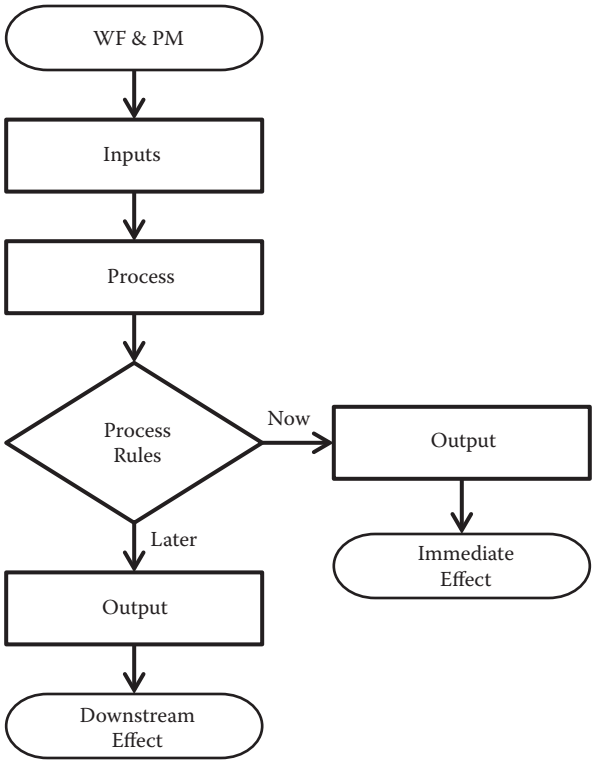

Figure 1.2 Workflow and process management in health care. (From Copyright © Margret\A Consulting, LLC. With permission.)

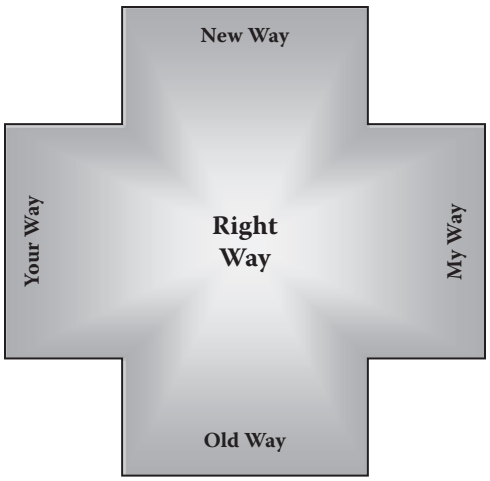

Figure 1.3 Redesign for the right way. (From Copyright © Margret\A Consulting, LLC. With permission.)

done because it is the right thing to do, not to get rid of the old (paper) way, do things only your way, or do things only someone else's (vendor's) way (Figure 1.3).

3. "Improvement" is also a loaded term. In fact, many clinicians are beginning to chafe at what appears to be constant hounding to improve. Health care in the United States does need to improve on many fronts, but making the assumption that all workflows and processes in the old way are no good does not help those who generally are very well-intentioned. A constant focus on improvement rather than doing the right thing (which should automatically lead to improvement) could also put pressure on control processes that may seem too time-consuming for a "Lean" environment yet are critical to patient care.

A case study set in a healthcare environment illustrates the potential for workflow and process management in health care to reap positive results:

Case Study 1.1: Workflow for Preventive Screening

Between 2007 and 2010, the Centers for Medicare & Medicaid Services (CMS) conducted a study to improve preventive care services in clinics (specifically seasonal influenza vaccination, pneumococcal vaccination, colorectal cancer screening, and breast cancer screening) through the use of HIT. It engaged their Quality Improvement Organizations (QIOs) throughout the United States to study how EHRs could help improve the rate of preventive screening. After recruiting the required number of clinics, baseline data were collected. Then workflows and processes were documented, and potential opportunities for redesign were reviewed with the clinics. Specific refinements necessary in the EHR also were discussed with EHR vendors. In addition, clinics were supplied with educational

material for both providers and patients, as well as support for ongoing data collection and reporting (McGann 2007).

Although there may well have been a Hawthorne effect that contributed to the observed improvement, a number of workflow and process changes were identified that contributed to the desired level of improvement set by CMS. These varied by vendor and clinic, but included the following (Amatayakul 2010):

- Ability to generate a report of preventive service performance (i.e., some EHRs were not able to perform this basic function initially). Several clinics distributed these "report cards" regularly to their clinicians; and in some cases posted them in public areas for patients to be reminded of the importance of such screenings, setting up both a competitive environment for clinicians and reinforcement for patients.
- Ability to generate reminder letters or postcards; and in one instance to link to a telephonic system for automated calls to patients.
- Ability to record when a patient self-reported that a preventive service was performed elsewhere (e.g., flu shot at the grocery store) so that the clinic was given "credit" for checking on the screening.
- Ability to record preventive services performed on the clinic's patients by staff at health fairs via a smart phone app.
- Making a change in the software to provide the list of preventive screening measures due at the time the physician recorded the patient's assessment and plan in the EHR rather than at the time the physician first opened the patient's record (i.e., thereby addressing the patient's primary concern first but still being reminded of outstanding screenings).
- Making a change in the software to split the list of preventive screening measures to appear as more specific alerts when different members of the clinic used the EHR—hence dividing the workload as appropriate for the type of patient (e.g., the scheduling clerk could remind any patient with a previously recorded flu shot that one was needed; the nurse at check-in could discuss the need for a mammogram with female patients according to age and medical history; and the physician would discuss the need for a colonoscopy at the conclusion of a visit).
- Receiving a feed from the state's immunization registry to pre-populate childhood immunizations. (Even though this study was directed to Medicare beneficiaries, many clinics identified they needed help with other screening reminders as well.)
- Developing a policy that required specialists to refer patients due for a screening to their primary care provider. This included a hyperlink back to the check-out desk that would trigger staff to offer to make an appointment for the patient.

In Case Study 1.1 described above, either or both a *workflow* (sequence of steps or hand-offs performed) and a *process* (manner in which work was performed)

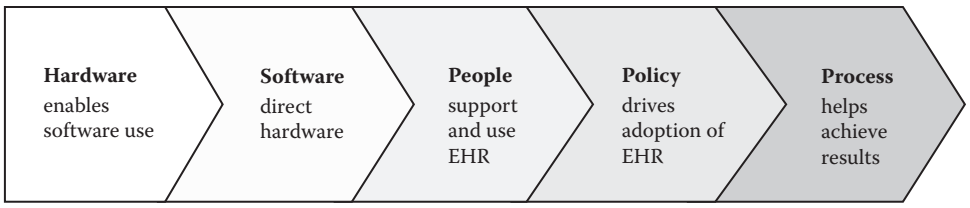

Figure 1.4 EHR system components. (From Copyright © Margret\A Consulting, LLC. With permission.)

were addressed. The result often entailed a combination of workflow and process redesign along with an organizational policy or procedure update and some change management tactics to ease people into understanding and adopting the changes.

A key factor, then, in appreciating workflow and process management for health care as it adopts EHR and HIT is that a system of hardware, software, people, policy, and process is necessary. A *system* is a set of elements that work together to achieve a common goal or purpose. Some experts suggest that, following the *80/20 rule*, hardware and software contribute only 20 percent, and some suggest even only 10 percent, of what makes an EHR successful; while change management, executive management commitment, and workflow and process management contribute at least 80 percent. Unfortunately, such a system has been difficult to achieve in the United States, as suggested by the US Department of Health and Human Services (HHS.Govarchives, n.d.):

> The health care 'system' in America is not a system. It's a disconnected collection of large and small medical businesses, health care professionals, treatment centers, hospitals, and all who provide support for them. Each player may have its own internal structure for gathering and sharing information, but nothing ties those isolated structures into an interoperable national system capable of making information easily shared and compared.

While hardware and software are the technical underpinnings for HITECH and health reform, it is people, policy, and process that really make the difference in how well the technology is used and how effective it is in creating health and healthcare value (Figure 1.4).

Workflows and Processes Performed by Knowledge Workers

In 1959, Peter Drucker made popular the phrase "knowledge worker" when he described a shift in workforce trends from manual laborers to those who accumulate and use expertise in a given domain. Socialcast (2011) observes that knowledge workers are becoming the fastest-growing sector of the world's

workforce, while lamenting that with only 40 percent of Americans obtaining a college degree, an imminent shortage of knowledge workers in the United States is looming. Lesser (2011), however, suggests that the knowledge worker who is skilled at "gathering and synthesizing knowledge into coherent and useful observations" will become increasingly obsolete in the years ahead—because knowledge is becoming increasingly ubiquitous. In fact, today, the concept of knowledge management has less to do with managing knowledge workers and more to do with compiling knowledge and making it readily available. In health care, Alvai et al. (2010) define knowledge management as "the use of IT to enhance and facilitate evidence-based clinical decision making"—suggesting, it is believed, that

- *Knowledge management* is the compilation of knowledge, which can be performed by machine
- *Knowledge workers* apply knowledge, which still requires heuristic thought and professional judgment by a human

Lesser sees the knowledge worker being replaced by the "insight worker," who he describes as "a person who is able to translate observations into insights that can deliver impact." Perhaps it is not the terminology applied to these workers that is important, but that they can effectively apply knowledge (whether internalized or through using knowledge resources) in complex situations, often under extreme time pressures, and with a high degree of uncertainty—which is how Stead and Lin (2009) have characterized the current state of health care. EHR vendors in their hold-harmless contract clauses often use the term *professional judgmen*t in describing that EHR technology does not make clinical decisions and is not a substitute for competent, properly trained, and knowledgeable staff to analyze the information presented by the software. There is currently much debate about just how much trust can and should be put into HIT—and if one cannot trust the technology, why buy it? Alternatively, EHR or other HIT that is viewed as a medical device would come under the Food and Drug Administration (FDA) regulatory powers, a move they are strongly considering and one that has many concerned about the impact that would have on product sales and innovation.

Still, it must be acknowledged that understanding knowledge workers within the context of workflow and process management for HIT is important because knowledge is generally considered the product of data being processed into information with human experience applied to that as illustrated in Figure 1.5. Some extend this continuum to add wisdom—the evaluation of whether the knowledge is of value (Ackoff 1989). Weinberger (2010) even questions the oversimplification of the continuum in favor of a more complex knowledge-generation process that is social, goal driven, contextual, and culturally bound.

Appreciating what knowledge workers do and how that impacts their use of IT has a direct impact on managing workflows and processes in such an

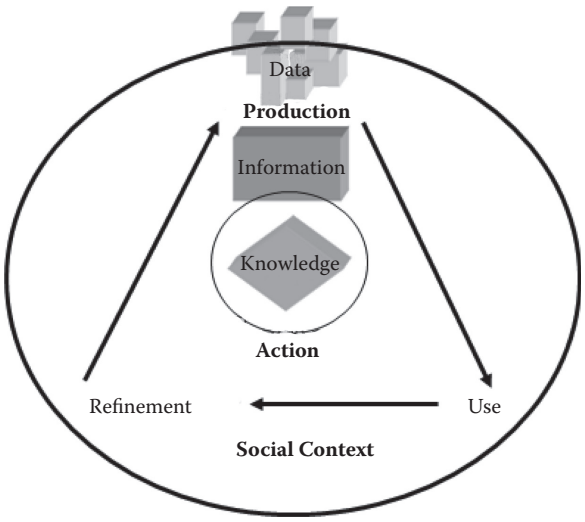

Figure 1.5 Data–information–knowledge generation. (From Copyright © Margret\A Consulting, LLC. With permission.)

environment. A key difference lies in the fact that in generating and applying knowledge, there are few visual clues present that make the workflows and processes apparent. In a manual worker environment, every step in a process and the sequence of those steps can be seen. Where the paper chart on a door in a clinic was an indicator that the room contained a patient, the paper chart no longer exists. Printed and color-coded forms served similar purposes. The challenge now is to understand the world where knowledge workers or insight workers look into the "black box" that is the vast resources of the computer and process that knowledge in their own "black box" that is the equally mysterious brain. Consider the following Case Study 1.2.

Case Study 1.2: Diagnosis–Drug Selection

A physician (endocrinologist) who had used an EHR for several months was desirous of using it "better." He was not sure what that meant, but he was convinced that he was not using it to its full potential. As a result, he sought a consultant skilled in workflow and process management to observe him as he performed his work with his patients. The first patient visit observed was an immediate challenge. The patient had come for one of her regular three-month diabetes check-ups, but also complained of having a urinary tract infection that was getting worse, despite that her primary care physician had given her a prescription a few days prior. As the primary care physician was now on vacation, she asked her endocrinologist for help.

The endocrinologist was highly sympathetic, and stated he would give her a different prescription. He called up the woman's universal medication list on his EHR and identified with her which drug she was taking for the infection.

The consultant could not see what the endocrinologist was thinking next, but could see him move his mouse to a link to the Internet from his EHR, then pull away from the link. He next picked up a paperback *Physician Desk Reference* and flipped through it—not stopping on any given page. Finally, he opened his e-prescribing screen and selected a drug. The screen showed a "green light" that the drug was on formulary for the patient's pharmacy benefits, and no alert appeared that the drug was contraindicated. The endocrinologist asked the patient if she still wanted to go to the retail pharmacy identified in the system, and upon her positive response struck a key invoking the prescription transaction to be sent to the designated pharmacy. He told the patient to be sure to see her primary care physician if the new drug did not solve the problem or seek emergency care in the event of any significant reaction.

After the patient left and the endocrinologist and consultant debriefed, the endocrinologist acknowledged that, not being a urologist and so not knowing other choices of suitable drugs for this patient, he was frustrated by the fact that he could not use the EHR to perform a search for a better choice of drug given her diagnosis and symptoms. He stated that he considered calling a colleague, but decided he had neither the time nor the inclination to expose his lack of knowledge in front of his patient, so he simply entered a drug he knew from his medical school days that was in the same class of drugs as the one she was taking and hoped that the system would alert him to any serious issues. While fortunately in follow-up with the endocrinologist the patient did get better on his choice of drug, it was observed that at that time there was no EHR that had the type of clinical decision support he was seeking. His only other alternative was to review a list of drugs by class in his *Physician Desk Reference* or automated drug knowledge base, reading about each drug in turn to make a potentially more informed decision.

While in Case Study 1.2 the potential for redesigning the process was not positive, it illustrates both the difficulty in "seeing" the process and the need for a better product that would make knowledge easier to extract and use. (As an aside, studies have repeatedly shown that clinicians have significant informational needs that are not met in their practices, with estimates that one clinical question arises per patient visit, and as many as 70 percent of these questions go unanswered (Ketchell et al. 2005; Ely et al. 2007).)

Challenges and Needs for Workflow and Process Management for Knowledge Workers

Understanding knowledge workers and the knowledge-management challenges they face is important not only to appreciate how difficult it is to understand and redesign their workflows and processes because they cannot be seen, but also to

appreciate what workflow and process challenges they face and how the characteristics of knowledge workers may impact their ability to adopt new workflows and processes even when they are right for them.

Clearly, from the two case studies described already, workflows and processes performed by clinicians as they acquire data, process it into information, and apply their experience to generate and apply knowledge are largely performed mentally. It should also be clear that "little things" mean a lot. Consider the following Case Study 1.3 summarized from The Health Care Blog (Pullen 2010).

Case Study 1.3: Sequencing of Data in an EHR

Ed Pullen, MD, observes on The Health Care Blog that EHRs "have a bad reputation among many physicians for generating progress notes that are so verbose and filled with standard phrases that they are nearly useless to other physicians, and even to the physician who produced the note in the first place." He observes that EHRs are very good, and possibly too good, at creating documentation to assure payment and reportedly good at standing up to legal scrutiny because they are generally more complete and follow standards of practice. However, he notes that EHRs have been engineered to intentionally create a "SOAP note" familiar to physicians from years of use of paper charts. As a result, **S**ubjective and **O**bjective information are described first, then **A**ssessment and **P**lan. However, most consultants or physicians who want to refresh their memory of the patient generally want a quick understanding of the patient's condition and treatment, not the details of how the diagnosis and treatment plan was determined. Dr. Pullen suggests that having to scroll down to see the end of notes, which tend to be longer in the EHR, is time-consuming and may be missed if a reader is unwilling or forgets to scroll down. He suggests that the EHR be designed to obviously capture the information in the existing sequence, but to display it in reverse order, as APSO. He concludes his post with, "We need to modify our work processes to make our technology work for us, not try to use the technology to electronically reproduce previous workflows."

Responses to the post described in the above Case Study 1.3 were positive, with one commenter reporting on an anonymous survey of pediatricians who acknowledged making at least one diagnostic error a month, and just under half stating that at least once a year an error was made that harmed patients. When asked to identify the reasons for the diagnostic process errors, about half cited a lack of information in the patient's medical history or failure to review the medical chart. While obviously both can be attributed to human error, the workflows and processes associated with EHR should make documenting in and reviewing of the chart easier.

The Institute of Medicine in its first patient record study report (Dick and Steen 1991) described the notion that EHRs "encompass a broader view of the record than today, moving from the notion of a location for keeping track

of patient care events to a resource with much enhanced utility." It is such enhanced utility that must be designed into products and adopted into workflows and processes.

Unfortunately, part of the issue with adoption of EHRs is that clinicians are only now just beginning to understand the potential for what enhanced utility can be afforded by an EHR. Knowledge workers often display certain traits, or characteristics, that may preclude them from taking advantage of such enhanced utility. Knowledge workers

- Are able to work on many projects at the same time
- Learn in a creative, inquiry-driven, and self-controlled manner
- Are able to multiply the results of their efforts through soft factors such as emotional intelligence and trust
- Need to be empowered to make the most of their deepest skills
- Make decisions autonomously, where traditional command-and-control paradigms are not effective for them to contribute to achievement of organizational interests

Students of physicians, and many physicians themselves, agree with many, if not all, of these characteristics. Physicians routinely go from the diabetic patient with a urinary tract infection if "only" to another diabetic patient but this one with cancer. They have mastered much knowledge, but do so on their own terms. Never put them in a classroom with other physicians to learn how to use the EHR, as each will feel that he or she is the only one who does not know how to use a computer, will be extremely embarrassed, and essentially shut down their learning process until they can apply their intuition to learn on their own. It is often said that other than their knowledge, physicians' only assets in caring for patients are time and trust; take either of those away and they will perform well below their potential. Both CDOs and patients have put physicians on a pedestal because of their skills; yet because physicians fear failure (and the threat of a malpractice lawsuit) perhaps more than anything else, they often appear to be ultra-conservative, plodding, and resistant to change.

Atler (2005) as well as Matson and Prusak (2010) describe the need to better manage knowledge workers (in all industries) because they are the key source of growth and opportunity. Atler notes, however, that because "they don't like to be told what to do, they enjoy more autonomy than other workers, [and] much of their work is invisible and hard to measure," they are left alone without the process improvement that other workers benefit from. This reinforces the notion that knowledge management is not managing knowledge workers, but supplying knowledge that knowledge workers can tap into to better perform their work—but that they often get no help to use and that they resist when such help is made available to them.

The result then is very much about the *law of supply and demand*. If clinicians do not demand such functionality and usability, there is no incentive for

vendors to supply it. Interestingly, while a corollary may seem to be if clinicians do not know what to demand, there will surely be no supply, this is not quite the case. In many cases, as clinicians start to adopt EHR, they envision much greater functional capabilities than the system can supply—sometimes leading to product improvement; but unfortunately more often, it seems, disappointment and what are considered failed implementations with no feedback to vendors.

This discussion may suggest that physicians are the only knowledge workers in health care, and that is certainly not true. However, it does seem that others who could and should be characterized as knowledge workers in health care often operate in the shadows of physicians and thus do not display and sometimes do not operate as knowledge workers. Conrad and Sherrod (2011) urge nurse managers to "develop knowledge worker skills related to data gathering, analysis, and identifying clinical trends and patterns … As unit leaders, nurse managers need to equip themselves with skills to harness the power of electronic data systems and rapidly translate patient findings and information into knowledge that informs and produces quality patient-care outcomes."

More advanced forms of BPM, and ideally workflow and process management for HIT, "incorporate human interaction management so that many people and systems interact in structured, ad-hoc, and sometimes completely dynamic ways to complete one to many transactions" (Vom Brocke and Rosemann 2010). In describing Ochsner Health System's EHR implementation, Belmont (Guerra 2011) observes that they adopted the mantra that "integration will trump preferences." He observes that while this did not mean the vendor's way was the only way, it did mean that when someone said, "I want to do it my way," this was a signal to "sit down and say, 'Can you live with the integrated version of this?'"

Key Points

- The economic and clinical health of America depends on health reform, aided by **health information technology**. The U.S. healthcare system is in need of a clinical transformation that focuses on using **electronic health records** in the **right way**.
- To optimize use of **hardware** and **software** that may aid in creating an effective and efficient healthcare system, management of **workflow** and **process** performed by **people** who are knowledge workers and within the context of an integrated **policy** structure is vital.
- **Knowledge management** and **business process management** alone are insufficient to meet emerging **knowledge worker** needs. **Integration** is needed at every level, from system interoperability to sharing health information across the continuum of care and engaging all stakeholders in the value proposition.

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