<table>
<thead>
<tr>
<th>FOCUS</th>
<th>Case Studies in Implementation and Change Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLUS:</td>
<td>- Leveraging Technology to Educate New Health IT Leaders</td>
</tr>
<tr>
<td></td>
<td>- Creating a Repeatable People/Process EMR Activation Strategy</td>
</tr>
</tbody>
</table>
Demonstrate your value without saying a word.

Résumés/CVs may list your experience and knowledge, but an ISACA® certification designation after your name proves it.

www.isaca.org/certification-jhim

December Exam Date: 10 December 2011
Registration Deadline: 5 October 2011
COMMENTARY

4 Editor's Report: Process Improvement and Managing Change—Goose-and-Gander Equity
Richard D. Lang, EdD
6 The HIT Futurist: The X Factor—Leaders' Responses to the Uncertainty of Health Reform
Jeffrey C. Bauer, PhD
8 Technology: Peering Through the Cloud—Cloud Computing and Healthcare
Rick Krohn, MA, MAS
10 Legislation: Increased Risk—The Scramble of Federal Privacy and Security Compliance
Susan A. Miller, JD, and Gerry Bliss
12 Nursing: Informatics' Role in the Future of Nursing—Health IT and Health Professional Organizations at Crossroad
Mark D. Sugrue, RN-BC
16 Executive Leadership: Looking Out for the Independent Practice—It's Time for Health IT Leadership to Step Up
Jack Hueter
18 Meaningful Use: What's Next? Meaningful Use Stage 1 Is Underway
Alexandra Mustafaraj
20 Workforce: Transforming Nursing Practice through Technology & Informatics

FOCUS: CASE STUDIES IN IMPLEMENTATION AND CHANGE MANAGEMENT

28 Ready, Set, Go!: Creating a Repeatable People/Process EMR Activation Strategy at University Hospitals of Cleveland
By Kathleen A. Supan, RN, PMP
The team at University Hospitals was challenged to implement an EMR, including CPSE, at seven facilities in 18 months. Developing an implementation strategy that would ensure that deadlines were met was the first step. A detailed activation plan was developed that addressed logistics. Issues management needed to guarantee that issues were being identified, triaged, escalated and managed with velocity and that clinical leaders participated in this process. As they completed their last activation in November 2010, the activation toolkit has gone through many iterations and improvements which could benefit others who are undergoing similar implementations.

36 Change Calendars: Safety, Sanity and Success Amidst an Avalanche of Change
By John R. (Skip) Valusek, PhD, CPHQ; Beth Elchek LaVelle, PhD, RN, CEN; and Meghan B. LaVelle, MS, RN, CEN, ACNS-BC
This article discusses the use of a change calendar at two acute care community hospitals to improve patient safety and caregiver satisfaction, and decrease change fatigue by transforming the avalanche of change into a safer "snowfall." This culture shift requires that leadership transition their project planning from being singularly project-oriented to end-user oriented, with a system perspective. Organizations will also enjoy increased probability of success of the implemented projects.

FEATURES

42 Financing Research and Framework Development for an HIE: Can HIEs Really Achieve Financial Sustainability?
By Chris Cavanaugh, EdD; Ken Coburn, MD, MPH; Sharon Dorogy; William (Buddy) Gilliespie, CTO; Steven J. Fox, Esq.; Mark Jacobs, MHA, CPHIMSS, FHIMSS; Denise Reeser, MBA; Camilla Hull Brown, MBA; Barbara Burke, EdD; and Marlorrie Brown
Faceted with myriad health information technology and exchange initiatives, the Pennsylvania eHealth Initiative conducted a research project challenging assumptions surrounding achieving financial sustainability of health information exchanges. This research included interviews with 11 financially sustainable/innovative HIEs across the nation; in-depth interviews with stakeholders in Pennsylvania who together represent 13 healthcare groups; and an assessment of the demographic factors in Pennsylvania impacting HIE sustainability.

51 Implementing BCMA—Workaround Avoidance in Barcode Medication Administration Systems
By Charles Still, MBA; Avis Hayden, PhD; and Edward Lanoue, RPh
Awarded a grant from the Agency for Research and Health Care Quality, Southwestern Vermont Medical Center (SVMC) implemented their BCMA system aggressively, addressing the occurrence, reasons and solutions to workarounds of best practices. SVMC nurses achieved an inpatient barcode scanning rate in excess of 99 percent and a medication scan rate in excess of 97 percent. This article will review the processes SVMC used to implement BCMA, which included incorporating 2-D data matrix barcodes, creating tools to measure scan rates, and identifying and mitigating workarounds. These process enhancements may be rapidly adopted by other organizations to improve medication safety.

56 Virtual Integration—The Role of the Electronic Health Record
By Bert Reece; Elise Spoto; and Colin Konschak, FHIMSS
Relaxation of the Stark regulations, which allows hospitals to donate up to 85 percent of EHR-related software and services, paves the way for utilizing EHR technology and implementation to integrate with community physicians. However, hospitals need to understand the benefits and risks before undertaking virtual integration. The approach employed by an integrated delivery system provides an example of the financial, legal and technological considerations that can help hospitals avoid costly mistakes and maintain positive relationships with physicians. By planning carefully, hospitals can utilize virtual integration with EHRs to partner with physicians and promote efficient management of patient care.

62 Workforce Challenges—Leveraging Technology to Educate New Health IT Leaders
By Roger Kropf, PhD
The increasing need to educate health IT leaders will require the use of other educational methods in addition to classroom instruction, seminars at conferences and Webinars. The author has 12 years experience offering a “blended” course on health IT for managers and clinicians in an MBA program. The course combines face-to-face classroom instruction and online discussion. This reduces the time away from work and the travel required. But it has far greater benefits, including the development of a capacity to analyze situations and develop and defend solutions. Participants share knowledge and begin to grasp the differences in their environments that require attention. This method is compared with other teaching methods and its advantages are explained.

68 Beyond Frameworks, Websites and Report Cards—Evolve an Analytical Culture for Population Health Improvement
By James Studnicki, ScD; John W. Fisher, PhD; Christopher Eichelberger, MS; Colleen Bridger, PhD; Kim Angelon-Gaetz, MSPH; and Debi Nelson, MA
Health status differences between U.S. communities and subpopulations are an intractable, long-standing national problem. A landmark 1998 Institute of Medicine (IOM) report described a data-driven continuous quality improvement process for community health status which has yet to demonstrate its effectiveness. Community health status will not be advanced by static frameworks or scorecards alone, but rather by providing granular data and empowering local communities with a flexible and powerful analytic capability to explore and identify their own unique determinant-outcome relationships and practice priorities.
No words more clearly articulate the current state of healthcare Process Improvement and Managing Change; even more so in our world of health IT. For years, CIOs and their health IT ilk relished the concept of change (for other people) and proudly wore the moniker of “change agent.” Then along came ARRA, HITECH and meaningful use. Now, even the change agents are crying “uncle.” Why? Well, no one is yielding to organizational dynamics that impede change. Some are just charging ahead at lightspeed, ready or not, to capture a significant payment boost to our withering bottom lines.

IT systems can be a technical success, but fail organizationally without a steady change-management process (see Valusek). Many of us cling to false assumptions that perpetuate bad systems. For example, “People want this change, and once we turn it on they’ll adapt,” or “As long as we provide adequate training and answer all of their questions, everything will work out just fine.”

Piling on more change to an organization already suffering from change fatigue promotes bad processes and dangerous workarounds (see Hayden, et al.). As a result, important process improvements will be delayed or not occur at all. Less conspicuous issues, such as partial acceptance and makeshift shortcuts, delay or compromise the expected benefits of the project.

We need to focus on the primary group affected by each change project. The group’s willingness, readiness and ability to change are key factors for success. A clear owner of the affected process must stand as the process change agent. Again, IT often fails in this role. These agents should be directly responsible for the change’s success by ensuring that end-users understand the impact of the change and the breadth and depth of the proposed initiative. Further, the scope of the project and how success will be measured should be fully understood by every stakeholder.

Communicating change is a simple concept rarely done well. One cannot overcommunicate on a project that introduces significant change. Change agents must be good communicators. But the information that actually gets communicated is what separates the average communicator from the transformational leader. All of the information that is vital for the improvement project must be shared so that decisions are not made in a vacuum. This process of information-sharing also results in an inherent sharing of power. When others have information, they feel more capable and personally connected to the project. They understand the rationale behind difficult decisions because they can see the big picture. Critical information, such as budget reports, competition activity, benchmark analyses and other strategic indicators are vital to all members of the project to understand the rationale for the change and prepare to make a difference—information is power.

Setting realistic targets and goals. This is the main reason a phased approach is chosen. If an organization's culture is not conducive to rapid, widespread change, process improvement initiatives need to be broken into suitably sized chunks. Once there is a complete set of actionable goals that align with the project’s objectives, agents/leaders can measure how well their individual units are coping with and meeting these objectives by measuring their progress against the goals.

When this method of accountability is used, there is little ambiguity regarding what is expected. All project members have a way to answer questions at critical decision points: “Will my decision help us attain one of our goals or objectives?” Additionally, this process binds people...
in a collaborative pursuit of each goal. Individuals learn to work together by recognizing that they need each other to accomplish each goal.

**Keeping it simple and the same.** Once the goals, groundwork and rules for the change initiative are in place, the hard part begins: designing a new process that will be better, safer and more efficient. Understanding and addressing user involvement, ownership and accountability will ensure buy-in and engagement, but it will not guarantee a better process.

The Institute for Health Improvement (IHI) stresses that in order to improve a process it needs to be standardized and simple to follow.

When there are many variations, mistakes are inevitable. In research, a study is considered invalid and unreliable unless it is repeatable. Yet we design complex processes in healthcare with very little standardization or much thought given to simplification. Power, fiefdoms and convenience trump simplification and standardization when process change is introduced.

For example, how many times have we made large investments in IT systems only to modify these systems to fit into a broken and inefficient process? Why? Because we don’t have the time or energy to really map each step, throw out redundant procedures or persuade power brokers that things can be done more efficiently and safely with fewer people (less people = smaller budget — less power). How many unsafe processes are out there because of organizational inertia? Quite a few, I think.

Finally, IT departments need to change.

We have introduced change for years but haven’t changed ourselves. We are quick to lament when others resist change, but how many health IT shops are run like a business? With the advent of clinical integration across the continuum, IT divisions will need to compete with RECs and other companies vying for the community ambulatory business (see Konschak). Even with a sizeable Stark-allowed donation, docs are the toughest customers in the world.

“What have you done for me lately” is a common mantra when providing EMR services to physicians. You need to change your hospital-based IT unit into a professional services organization. IT analysts need to document all of their time as if it were billable — because someday it will need to be if we are to survive. We’ll need to compete with other lean and mean competitors. We’ll need to deliver what we promise, deliver it without workflow interruption, and keep delivering it with shorter time-frames, at lower costs, with less reimbursement. We’ll need to do all this while keeping our IT experts happy and well paid, while at the same time, increasing the workload and decreasing the available resources. Yes change is hard. But, real change can only occur when all stakeholders share a common misery — only then will everyone work together to change.

The Summer 2011 issue of JHIM contains an assorted collection of special-interest columns and articles that focus on process improvement. These articles include: Ready, Set, Go! Creating a Repeatable EMR Activation Strategy at University Hospitals of Cleveland; Safety, Sanity and Success Amidst an Avalanche of Change; and Workaround Avoidance in Barcode Medication Administration System. These contributions and case studies provide useful knowledge and strategies as we prepare our organizations for IT-enabled process improvement.

In addition, special-interest columns and articles provide valuable information and insight on the following topics:

- Leaders’ Responses to the Uncertainty of Health Reform; Now is the Time for Health IT Leadership to Step Up and Help Our Physicians; Meaningful Use: Stage One is Underway; Informatics Role in the Future of Nursing; Peering Through the Cloud; The Scramble of Federal Privacy and Security Compliance.

Finally, I would like to thank the professional staff at HIMSS, the peer reviewers and the editorial review board for all the behind-the-scenes work that goes into producing each issue. JHIM continues to look for new ways to provide relevant, important and useful information for healthcare professionals, academicians and HIMSS members. If you have any comments or suggestions that could help us improve in any way, please feel free to e-mail me at rlang@dh.org.

---

“MOST OF US are about as eager to be changed as we were to be born, and go through our changes in a similar state of shock.”

—James Baldwin
NEWS MEDIA tend to present a glib, misleading perspective on the future of health reform. Stories about HITECH usually say that the law will (not might) give providers $27 billion for adopting electronic health records and related systems. Press coverage of the Affordable Care Act (ACA) generally states that 35 million more Americans will get health insurance over the next few years. (However, inconsistent numbers hint at an underlying problem. Stories report HITECH’s expected disbursements as low as $18 billion and as high as $33 billion. The estimated number of additional residents to be insured under ACA varies within a range of 10 million.)

If these reports are to be believed, healthcare’s problems are being solved, and we should invest in businesses that will reap the benefits of reform—vendors installing health information systems, insurance companies selling more policies, hospital companies profiting from fewer uninsured patients, etc.

But a careful review of underlying reality suggests otherwise. For a variety of reasons, the latest reform laws are unlikely to be implemented as enacted and their financial impact is likely be much less than expected. The laws’ net effects may even be negative for HIT vendors, healthcare providers and payers that failed to pursue a viable contingency plan while awaiting the promised windfall.

REASONS FOR UNCERTAINTY
The reform laws could fall far short of expectations for at least four major reasons, each with a reasonable probability of occurring:

**Economic stagnation.** The budget projections behind HITECH and ACA assumed that the American economy would rebound by now. However, most economists believe that recovery is still weak and tenuous. The stock market’s gains in 2010 and declining unemployment in early 2011 mask deep structural problems that hinder growth in disposable income—a key variable for the future of medical enterprises because reform shifts significant responsibility for payment from third-parties to consumers.

**Political instability.** Serious financial problems across Europe, rapid economic growth in some Asian and South American countries, and increasing incidence of natural disasters also stand in the way of growth that was expected to generate funds for health reform in the United States.

**Legislative gridlock.** HITECH and ACA were made possible by shaky coalitions that have frayed badly, if not completely fallen apart. Neither program would pass in the current Congress due to increased divisions within both parties and rise of the Tea Party. Republicans now control the appropriations process in the House of Representatives, but they do not have the power to repeal and replace reform laws in their entirety. All they can do is push amendments to modify or eliminate some key provisions. Democrats did not retain the presumed opportunity to fix admittedly flawed laws. Good outcomes are hard to imagine under such circumstances.

**Administrative compromise.** Flawed legislation is already creating serious problems in the healthcare delivery system, so aggrieved stakeholders are using political pressure to influence implementation powers delegated to the administration (i.e., approximately 2,000 “the HHS Secretary shall...” provisions in the laws). Unforeseen regulatory outcomes have already diverted HITECH from original expectations, and ACA waivers have been issued to almost all who requested them. Compliance with the original laws is becoming the exception rather than the rule, raising further questions about news stories based on literal readings of HITECH and ACA.

**Court Decisions.** The laws, particularly ACA, are subject to many legal challenges in state and federal courts. Judicial restrictions on implementation were originally seen as highly improbable, but the outlook has shifted to a fairly widespread belief that some parts (if not all) of the laws might be overturned. Second-guessing the Supreme Court has proven to be particularly tough in recent sessions. If justices can decide a
For a variety of reasons, the latest reform laws are unlikely to be implemented as enacted and their financial impact is likely be much less than expected.

Presidential election, they can decide the fate of health reform. Whether they will is the wild card in the game.

Any one of these forces could be a serious roadblock on the road to health reform, but their cumulative effect makes the legislated promises even more improbable. Stakeholders who proceed solely according to the letter of the reform laws are likely to be caught by some unpleasant surprises. And even in the unlikely event that HITECH and ACA are implemented as originally enacted, serious systemic problems will vex healthcare delivery. Demand for health services will outstrip the supply, for example. More people with insurance will have less access to care. Prices for medical services will rise, making care less affordable. The law of unintended consequences was not repealed.

Now What?

Inefficiency is rampant in the medical sector of the American economy. Health reform was originally a bipartisan effort to bend a wasteful cost curve, but it degenerated instead into a politically polarized overhaul of the payment process. The resulting legislation doesn’t address the fundamental problem that politicians and interest groups set out to solve. Indeed, the reforms will make things worse if demand rises without widespread improvements on the supply side of the marketplace.

Prospects are grim, but the situation is not hopeless. The good news is that all healthcare organizations—providers, payers and their suppliers—have a lot of slack in their operations. Studies consistently suggest that 25 percent to 35 percent of operating expenses could be put to better use. Our real challenge is building data systems that allow managers and clinicians to reallocate the wasted resources, truly making care more affordable by lowering its production costs and price.

The mission-critical tasks of becoming efficient and effective simply cannot be accomplished without information technology. However, the challenge is much bigger than becoming a “meaningful user” or creating an accountable care organization. The ongoing battle over health reform cannot be won without health IT leaders who look beyond the minutia of reform laws, see the bigger picture and provide the information to build a healthcare system that does things right all the time, as inexpensively as possible. Our nation’s best health systems have recognized that they cannot afford to wait for uncertain help from HITECH and ACA. JHIM

Jeffrey C. Bauer, PhD, is an internationally recognized medical economist who forecasts the future of health care and develops practical approaches for improving efficiency and effectiveness of the delivery system. Visit www.jeffbauerphd.com.
Peering Through the Cloud
Cloud Computing and Healthcare

As defined by NIST, it’s “a model for enabling convenient, on-demand resources (e.g., networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.”

And for the rest of us, there’s this simple description: Cloud computing is a set of remotely hosted, on-demand networks and services. There are multiple cloud types—the public cloud, the private cloud and now the community, hybrid and personal clouds.

The public cloud is operated by a cloud services provider and can be accessed by any paying customer, in the private cloud the infrastructure is operated exclusively for one organization, the community cloud serves several organizations, the hybrid combines elements of both public and private clouds.

Another wrinkle—SaaS (software-as-a-service) is the twin of cloud computing. The difference, in few words, is that cloud computing is the computer layer running on the Internet, and SaaS is the service delivered through the cloud. Or put another way, the cloud delivers computing as a utility, SaaS delivers an application (such as CRM) as a utility. In sum, cloud computing is complex, multi-faceted and landing on healthcare in a very big way.

In its many flavors, cloud computing is one of healthcare’s hottest trends.

Though we may not realize it, the cloud has arrived in healthcare and that’s part of its appeal—transparency. It’s becoming an option for mainstream computing applications; the cloud is ideally suited to support growing healthcare technologies like remote medical imaging and data storage, mobile health and health information exchange.

First-time purchasers of EHRs are opting for cloud-based systems, attracted by the prospect of offloading the expense and complex process of EHR implementation and maintenance. There’s a race to the bottom getting underway in EHR pricing as cloud-based systems gain a foothold—especially among smaller hospitals and practices.

The cloud is part of a winning combo—mobile, cloud computing and healthcare are the trifecta of technology and service convergence, the platform for a huge wave of industry innovation. We’re still in the opening stages of cloud computing, but the baseline requirements for that innovation have already been met—the healthcare industry is becoming comfortable with mobile devices and Web-based services. The possibilities for cloud applications in healthcare are huge, and its cumulative impact on the industry is at this early stage, unknowable. But the advantages of cloud in healthcare—cost, flexibility, scalability and elasticity of resources are a potent combination that can be leveraged across health IT enterprises.

To gain respectability, the cloud has been forced to overcome some persistent myths. It’s been suggested that cloud computing is useful only for data storage, that it is a security sieve, that it’s unreliable and that users exercise little control over the ownership and access to their data.

While sending sensitive data “into the ether” is an unsettling concept, the security and reliability issues of the cloud—particularly in the realm of healthcare—are overstated. Layers of security have been architected into cloud-based healthcare solutions, and there isn’t body of evidence to suggest that with proper security the cloud is more vulnerable than any other computing platform.

With a sensitivity to HIPAA and HITECH, cloud-based solution vendors have been very careful to architect reliability and data protection features into their products. A survey of cloud benefits in healthcare includes:

Cost. Cloud services are commonly priced on a pay-as-you-go basis, and users
only pay for the bandwidth and services they need. Cloud users forego the capital expense of dedicated staff, hardware and software, and ongoing system maintenance.

**Real-time data exchange.** The cloud removes the gridlock that accompanies data exchange between siloed repositories, and accelerates clinical collaboration between staff, facilities and enterprises.

**Storage and archiving.** The sheer volume of clinical information, from EHR to medical imaging, is growing increasingly complex and costly. The cloud offers a right-now alternative to already crowded data centers and stretched IT resources.

**Security.** Despite much hand-wringing, cloud security tends to be as secure as on-premise solutions, if not more so, and commonly includes features such as military-grade encryption and auto ID.

The trend line is clear: Many early stage health IT companies are opting for a cloud architecture, and are deploying cloud services across the spectrum of healthcare delivery. There are now cloud services mated with **RFID**, with transcription, with telemedicine, with back-office functions like revenue cycle management, with multi-channel communications (voice, text, pictures, video), with image archiving, analytics and the list goes on.

But as with any health IT architecture, there are concerns that must be addressed for a successful cloud deployment. Compatibility is an issue. Cloud applications must be configured to operate seamlessly within an organizational network, and should be accessible via browser and not be conflicted by network firewalls.

User confidence is an issue. Clinicians are wary of data ownership and control under the cloud. It’s a problem of perception—the heightened regulatory standards of HIPAA create a shared anxiety about failures and breaches when sensitive data is entrusted to third parties. Who owns the data, how is it being used by third parties and what are the HIPAA related liability implications? The rub: It’s still too early in the game to deliver ironclad guarantees about performance and reliability across the range of cloud applications.

Despite these concerns, the cloud is undeniably a force multiplier that is poised for explosive growth in healthcare. The planets are lining up—pay-as-you-go, resource pooling, adaptability, user transparency and rapid deployment are selling points making the cloud a rising star in the health IT firmament. One concern—the hype surrounding cloud computing may prompt a headlong rush of clinical applications to the cloud, regardless of the wisdom in migrating mission-critical processes in the quest for cost savings and operating efficiencies. On balance, however, the sheer volume of the market opportunity makes the cloud a sure bet—a dominant force in health IT—within the next two to three years.

**FOOTNOTE**

Increased Risk
The Scramble of Federal Privacy and Security Compliance

Healthcare covered entities under HIPAA and HITECH have a problem to solve, and that is to reduce vulnerabilities for breach of protected health information (PHI). Let's face it, covered entities have known this for some time now, even before HIPAA and HITECH, and yet we keep hearing about major breaches, including a recent one that involved a whopping 1.7 million individuals. The authors devoted an entire JHIM column to this subject. (Blass G, Miller SA. Protection Detail: Protecting Against Breach of Electronic Protected Health Information. JHIM. 24(3):7-8.)

THE SCOPE
With the ever-increasing sharing of electronic protected health information (ePHI), the scope of risk continues to increase. And with it comes additional guidance, both regulatory and advisory. In addition to federal regulations, there are additional agencies to consider as well when drawing up your federal information security implementation roadmap.

THE GUIDANCE–REGULATORY AND ADVISORY
So with the problem in mind, let's focus on the extensive guidance that exists today. There are minimally seven federal agencies and advisory boards that discuss privacy and security and write regulations, including the:

- Office of Civil Rights.
- Office of the National Coordinator.
- Centers for Medicare and Medicaid Services.
- Commerce Department.
- National Institute of Standards and Technology.
- National Committee on Vital and Health Statistics.
- Federal Trade Commission.
- President's Council of Advisors on Science and Technology.

The Office for Civil Rights now controls HIPAA privacy and security. They write all the regulations, guidance and report documents for privacy and security, plus they are the enforcement agency for HIPAA privacy and security, and breach events. They plan to begin proactive audits this year. Covered entities should begin to organize their evidence of due diligence and conduct internal audits periodically. This is a form of self-protection in this new enforcement environment.

The Office of the National Coordinator writes the standards and implementation specifications regulations for meaningful use and EHR certification regulations, including the privacy and security requirements. ONC also is the parent of NHIN, DIRECT and CONNECT, the gateway and services and policies to the network of networks.

The Centers for Medicare and Medicaid Services writes that meaningful use regulations that outline all the measures and objectives including the privacy and security measures and objectives. Covered entities need to conduct an information security risk analysis as mandated under the Meaningful Use Stage 1 requirements.

The Commerce Department in late 2010 released a report entitled “Commercial Data Privacy and Innovation in the Internet Economy: A Dynamic Policy Framework.” This report recommends consideration of a new framework for addressing online privacy issues, and articulates core privacy principles for consumer protections.

Healthcare organizations that provide patient portals should consider the ideas in this report.

The National Institute of Standards and Technology is part of the Commerce Department. It writes the Special Publications (SP) 800 series of documents including SP 800-66, outlining the HIPAA Security Rule. This document is mandated on the 22 federal agencies that deal with healthcare information. It also is an excellent guide for private entities that hold, use and create healthcare information. In addition, NIST is the lab for all the testing under the Permanent Certification Program Final Rule.

The National Committee on Vital and Health Statistics is an advisor to the Secretary of Health & Human Services on all things HIPAA, including privacy and security. Current topics include sensitive data and the secondary use of data.

The Federal Trade Commission put out...
a report in December 2010 focused on consumer privacy protections in the Internet environment, “Protecting Consumer Privacy in an Era of Rapid Change.” It is a proposed framework for business and policy makers. The thing to remember is that the FTC has privacy enforcement in this area. Healthcare organizations need to pay attention to this document as they develop or update consumer Web sites.

The President’s Council of Advisors on Science and Technology issued a report in December 2010 entitled “Realizing the Full Potential of Health Information Technology to Improve Healthcare for Americans: The Path Forward.” This is a major push forward in interoperability and it will impact Meaningful Use Stages 2 and 3.

A LITTLE OVERWHELMING?

Do you feel overwhelmed with all of this? Do you feel a little lost in this thicket of groups, agencies, advisory bodies all dealing with privacy and security? Though they are no longer siloed, they are not all joined at the hip either. A change in one area can have more than ripple effect in other areas. For example, the NHIN does not have a federal-level provider directory, nor do they anticipate developing one. Interoperable data exchange will not work without a provider directory. So, what will NHIN do? They say they are going to develop standards and specifications on the federal level for use on state level. That is all well and good, but it is the case of closing the barn door after the horses have escaped. The states have been working on provider directories for the past five or six years.

CONCLUSION

Covered entities need to understand the requirements for information privacy and security across the federal organizations, both in a business sense and technical sense, in addition to the requirements for EHRs, interoperability, meaningful use and other related areas. It is increasingly important for covered entities to implement strong governance, internal audit, monitoring and focused resources that are in sync with the vision, mission, strategies and tactics of their organization in all of these interrelated areas. With an ever-expanding scope of requirements along with limited resources, it is important for covered entities to continue to improve their process for efficient management, documentation and collaboration, both internal and with their external third parties, such as software vendors, HIEs, non-staff physicians and more.

Over time, we can hopefully look back and say “Remember when we used to have all of those breaches of ePHI along with other compliance problems?” We can get there by focusing on guidance and implementing a governed process of due diligence. JHIM

Gerry Blass has over 35 years of experience in health IT and compliance. Blass provides IT and compliance consulting services and software that automates the management and documentation of healthcare compliance activities. Gerry is the President & CEO of Blass Consulting and Compliance LLC.

Susan A Miller, JD, has 35 years of professional leadership experience spanning teaching, biochemistry research and law. Since 2002, Miller has provided independent consultation and legal services to numerous healthcare entities, including DHHS/CMS.

Blass and Miller are co-founders of HIPAA 411, a linked-in group.
Informatics’ Role in the Future of Nursing
Health IT and Health Professional Organizations at Crossroad

HE 2011 ANNUAL HIMSS CONFERENCE & EXHIBITION adjourned on Feb. 24, 2011, with record attendance and a mind boggling number of preconference symposia, educational sessions, posters, virtual learning and networking opportunities, and more than 900 vendors displaying the latest and greatest health information technology solutions.

Even long-time veterans of the industry concede that never before has such emphasis been placed on the value offered by health IT and never before has the expectation been higher. The federal government agrees and is putting money behind its belief that health IT can help with efforts to reform our struggling healthcare delivery system.

Through the HITECH Act of 2009, billions of dollars are being pumped into the industry to accelerate adoption of enabling technologies by 2015 and to promote its successful implementation as defined by meaningful use criteria. Providers from the largest for-profit integrated delivery systems to community hospitals struggling to stay afloat all the way to the sole provider practitioner are trying to figure out how to receive the government incentive, adopt the technology all while trying to take care of patients in one of the most challenging era’s for both the US economy and its failing healthcare system.

The magnitude of the change related to adoption of health IT notwithstanding there is also significant change simultaneously occurring in the very professional organizations that support the delivery of care. Nursing represents the largest segment of the healthcare workforce, with more than 3 million registered nurses in the United States (HRSA, March 2010).

The nursing profession has struggled for decades with a core professional definition around who nurses are, what nurses do, how to educate the next generation of professionals and perhaps most importantly how to raise the voice of nursing and lead the national effort to transform healthcare as we know it.

On Oct. 5, 2010, the Robert Wood Johnson Foundation and the Institute of Medicine (RWJF/IOM) released a landmark report that gets to heart of the crisis within the nursing profession.

The Future of Nursing: Leading Change Advancing Health (Robert Wood Johnson Foundation and the Institute of Medicine, 2010) is seen by many as a crucial work for the profession and a call to action for all. This consensus report endorsed by physician and nursing leaders alike explores the issues facing the nursing profession today and offers recommendations for the future. While the details of the recommendations are emerging there is little doubt that nursing informatics professionals will be called upon to offer their expertise in the transformation of nursing.

According to the 1989 Graves and Corcoran definition, nursing informatics is a specialty that combines nursing science, computer science and information science. The American Nurses Association has formally recognized the specialty since 1992, and its credentialing agency—the American Nurse Credentialing Center offers the opportunity for aspiring informatics nurses to gain Board Certification in the specialty.

According to a recent survey released by HIMSS, today’s informatics nurses are increasing in number. The results as compared to previous surveys from 2004 and 2007 continues to suggest that nurse informaticists play a critical role in the implementation of various clinical applications including clinical/nursing documentation and clinical information systems, computerized practitioner order entry (CPOE) and electronic health records.

Furthermore, in comparison to previous surveys, the 2011 salary data suggests a substantial increase for nurse informaticists as the average salary increased by 17 percent from 2007 and 42 percent from 2004. The value that informatics nurses bring is well recognized within the profession as evidenced by the results of this survey. Nursing informatics as a specialty within nurs-
ing, therefore is well positioned to assist the profession in meeting the challenges identified in *The Future of Nursing* report.

*The Future of Nursing* report identifies eight key recommendations for the profession to consider. These recommendations are organized into three broad categories of leadership, practice and education.

### Practice

The key recommendations from the report related to nursing practice include:

- Remove scope-of-practice barriers.
- Increase nurse residency program.

The report shows that nursing practice is challenged on many fronts. One example explored in the report relates to the disparity in practice between Advance Practice Registered Nurses (APRN) across the United States. Despite national standards for education and specialty certification of APRNs there is great inconsistency from state to state in how APRNs are allowed to practice.

In some states APRNs are allowed to practice independently, others allow for some autonomy as it relates to prescription writing and many require a collaborative arrangement with a physician to diagnose, treat and prescribe. Even that level of collaboration however, varies from state to state.

As nursing informatics professionals know, the role of technology and informatics to support nursing practice is crucial; regardless of practice setting. In the example cited in the report above with APRNs, informatics can help promote the value of this specialty practice through data and information. APRNs for example may be eligible for Meaningful Use funding under the Medicaid program as they meet the Medicaid definition of an eligible professional. Interestingly, these same practitioners are not eligible for incentive dollars from the Medicare program further accentuating the disparity.

That disparity notwithstanding, APRNs and their nursing informatics colleagues should work hand in hand to ensure that the HITECH incentives are obtained to help...
support practice. Additionally, and perhaps more importantly, informatics skills and competencies are fundamental to demonstrating outcomes of the care provided by APRNs.

Collecting and assimilating the data collected in this practice setting will be essential to measurement and reporting of outcomes. This is also true for every nurse practicing in every environment. Without good data and information to demonstrate the value of nursing practice nurses will not be able to move the profession forward.

EDUCATION

Nursing has struggled for decades with entry to practice and the multitude of educational pathways available to enter the profession. The profession has also struggled with the ability of its academic institutions to keep pace with rapid advancements in medicine as well as significant changes in the practice environment and the role of modern day nurse. One of the most challenging issues in the education arena, however, is the aging of our faculty.

Key recommendations from the report related to nursing education include:
- Increase the proportion of nurses with a baccalaureate degree to 80 percent by 2020.
- Double the number of nurses with a doctorate by 2020.
- Ensure that nurses engage in lifelong learning.

These recommendations are bold and aggressive and will require close collaboration between practice and academia. Informatics competencies will need to be defined for all levels of practice and will need to be built into revised nursing curricula. Deans of schools of nursing will need to move away from thinking about informatics as a standalone course and move toward embedding informatics competencies in all didactic and clinical courses.

Simulation technology is another great example of how academia and informatics can come together to help achieve the goals identified in the report related to transition to practice. While more and more institutions are implementing simulation laboratory environments few have the informatics experts on staff to be able to thread through the concepts of data, information, knowledge and wisdom to support critical thinking. Rather, simulation labs are implemented with a task or skills based focused. Again, informatics experts can help in the design and implementation of effective simulation environments.

LEADERSHIP

During times of great change stakeholders look to leadership for guidance. Never before in the history of the nursing profession has the need for leadership been greater. While there are many great nursing leaders there are few who are able to advocate for the profession at a national level and to directly define, shape and influence public policy.

The key recommendations from Leadership include:
- Expand opportunities for nurses to lead and diffuse collaborative improvement efforts.
- Prepare and enable nurses to lead change to advance health.

Nursing informatics leaders and nursing management leaders will need to join forces to collectively address these recommendations. All nursing leaders must understand the implications for informatics in practice and must demonstrate by example. Embracing technology is one step that nursing leaders.

CONCLUSION

The last of the eight key recommendations from the report is: Build an infrastructure for the collection and analysis of interprofessional healthcare workforce data.

This recommendation speaks directly to the nursing informatics community and is a call to action. Building the infrastructure will require close collaboration with nursing informatics professionals and other members of the interprofessional team who not only understand the underlying data requirements but can offer to assist in translating and mining that data into meaningful information about the workforce. Informatics nurse stakeholders are uniquely positioned to help define national, minimum data sets that can be used as part of interprofessional workforce surveillance. Nursing informatics professionals have a strong history of interprofessional collaboration and will need to embrace, own and be accountable for this recommendation.

These are historic times for the healthcare industry and the profession of Nursing. Informatics provides an opportunity to help transform not only the care delivery system, but the very professions it relies on to deliver safe, effective and evidence-based care. JHIM
YOUR DEGREE IS CLOSER THAN YOU THINK

INFO SESSION
Wednesday, April 27, 6 p.m.
CUNY Graduate Center
365 Fifth Ave. at 34th St.
Segal Theatre

NEW MAJOR
Health Information Management

ONLINE BACCALAUREATE
A quality degree that is affordable and convenient.

Open to students with 30 or more college credits. Offering majors in:
• Business
• Communication and Culture
• Health Information Management
• Sociology

APPLY NOW! START CLASSES IN THE FALL
www.sps.cuny.edu/online • 212.652.CUNY (2869)
Looking Out for the Independent Practice

It’s Time for Health IT Leadership to Step Up

In the past six months I have had the opportunity to work with the New Jersey Regional Extension Center (REC). To highlight, 62 RECs across the United States have been established and funded by the Office of the National Coordinator to assist non-hospital-based physician practices in selecting, implementing and becoming meaningful users of electronic medical records (EMR).

RECs support primary care practices with 10 or fewer physicians. This includes Federally Qualified Health Centers and primary care offices in urban and rural areas. New Jersey has few rural physician offices, so most of my direct experiences are focused on practices in urban and suburban communities.

Many readers of JHIM focus on hospital IT solutions. My article argues that the EMR implementation complexities facing hospital environments are similar to those impacting independent physician practices throughout the United States.

As health IT leaders, we should be helping these physician practices select the vendor EMR application that fits their needs, implement the system with minimal impact on productivity issues, and understand the core objectives and quality reporting requirements of attesting as eligible provider meaningful users.

At HIMSS11 it was very interesting to see how many new vendors have entered the marketplace, given the surge for meaningful use for hospitals and eligible providers. I could not help wonder, though, how many small physician practices would have found the event overwhelming?

Although I have worked with many physicians as a health system CIO and a consultant over the past years, most were supported by hospitals. It was an eye-opener to see how many of these independent practices are still running paper-based medical records with racks of files—usually in their basement—that they need to retrieve to obtain historical patient information.

While this might seem archaic, we should realize that the cost of EMR systems and the impact on productivity during implementation are major barriers for many independent physician practices.

Additionally, there has been minimal focus on adequate and affordable EMR systems for small practices. Moreover, the ARRA era has seen a glut of new vendors and enhanced practice management applications in the marketplace. While this has given physicians more choices, many physicians do not know where to start and have turned to the RECs or to their health systems for assistance.

Beyond choosing vendors, physicians must also consider application service provider (ASP) solutions (remote hosting) and understand that EMR applications must be certified under the ONC certification process. As noted by many physicians that I met, they were taught how to treat patients, not how to select, implement and utilize computerized systems.

There is also the age-gap issue (it is real). Physicians that have recently graduated are skilled in the use of EMR solutions, whereas physicians that graduated more than 15 years ago typically were not trained to use computerized systems for patient care. I know several doctors close retirement who say they will retire first before investing the time and money for a compliant EMR.

Here is an example of what I have encountered:

A one-doctor practice in a poor urban area that is eligible under Medicaid. The doctor’s wife is the office manager and acknowledges they need to seriously look at an EMR solution, especially with flexible Medicaid stimulus benefits.

The doctor, in his mid-50s, is very uneasy using computers. The biggest concerns are the initial cost and the ability of the doctor to start utilizing the EMR applications as a meaningful user. The office manager feels that the doctor will be the biggest challenge, since he has a hard time with the basic uses of the computer, including typing. Fortunately, the practice is leveraging the
AT HIMSS11 IT WAS VERY INTERESTING to see how many new vendors have entered the marketplace, given the surge for meaningful use for hospitals and eligible providers. I could not help wonder, though, how many small physician practices would have found the event overwhelming?

ONC-funded resources from the REC to guide them through the selection process and help identify the impact on workflow as he becomes more comfortable using the EMR. This practice is just beginning and will slowly ease into becoming a meaningful user.

Another example I have encountered is a seven-doctor practice qualifying under the Medicare stimulus program. In this case, the practice decided to move forward with the same system they use for practice management and billing. Based on the initial assessment with the office manager and the champion physician, the age of the physicians in the practice is relevant to their ease with computers and it is likely that one physician in the practice will retire before accepting the EMR (this came directly from the physician).

Several independent practices that I have talked to are also deciding to join larger Independent Physician Associations (IPA) or health systems as the investment, time and commitment is too overwhelming for them to take on the move to full automation. I believe we will see this occurring a lot in the next several years, especially with primary care physicians.

From my perspective, RECs are a significant resource to independent physician practices and I applaud CMS and ONC for their incentives to help these physicians. As healthcare leaders, no matter what capacity we are and what type of organization we work for, we have a responsibility to step up and leverage the support needed to help our physicians embrace this leap in health IT in our hospitals, clinics and practices.

Our background and experiences with IT education, vendor selection, workflow redesign, project management, training and go-live support are areas that we can offer support to our physician practices in the communities.

Additionally, there is a significant leap for the physicians to move from go-live to meaningful use and we must give them the guidance and support to get to this stage. I encourage all health IT leaders to help clinicians in this effort. Many practices would welcome the help and guidance, and I am already seeing the benefits of these supportive efforts and the trust and goodwill between the RECs, the affiliated physician practices and the health systems.
What’s Next?

Meaningful Use Stage 1 Is Underway

Stage 1 Meaningful Use criteria have been finalized and organizations are driving efforts to either avoid penalties or capture a portion of the early adopter pot of gold. Is it time to consider what’s next? How closely will Stage 2 finalized criteria match the original framework? Will the timeline change? How well positioned will you be to respond to Stage 2 criteria?

There is no lack of meaningful use Web sites, blogs and opinion pieces in which you can share your thoughts, concerns and/ or fears. I peruse many of sites periodically, but I like to go back to the archives and re-read the original proposed regulations and criteria. I actually enjoy getting into the rhythm of the legalase of it all. And as I re-familiarized myself with the original intent of ARRA/HITECH, several realities became clear to me. They are as follows:

A Standardized Approach to Data and Processes is a Requirement for Success

Sooner or later, organizations must standardize their data (terminology and values) and be able to share this data throughout the organization, as well as throughout the healthcare system. The number of possible variations in processes and data must be simplified. Organizations must begin streamlining their application portfolios, eliminate redundant systems and determine their set of applications that comprise the core electronic health record. Data standardization success requires a level of rigor to exist within the IT organization and re-enforced by the informatics/process re-design personnel. Change control is an essential pre-requisite.

Interface engines should not be a crutch that allow organizations to introduce a multitude of one-off applications. Every application potentially introduces new formats for data and work processes. These interface mazes become data management nightmares and further complicate data-sharing opportunities. The game is really less about the number of automated technologies than it is about the level of usage of a core set of standardized, certified technology.

Need to Hardwire a Culture of Change

An organizational infrastructure (skills, focus) is required to anticipate the automation train taking us toward the electronic health record and prepare the organization to implement within increasingly tight timeframes.

To respond quickly and sustain necessary changes, organizations must work from a system perspective. Health system personnel must head in the same direction for the same purpose to achieve the same result. Operational structures must be in place to reinforce these behaviors.

A core team of informatics, performance improvement, clinical content, decision support and quality personnel, must stay focused on implementing Stage 1 meaningful use, while also familiarizing themselves with the criteria that makes up Stage 2, advanced clinical processes; and Stage 3, improving outcomes.

Health systems know they will be resource constrained and must work smarter under these constraints and still provide consistent, high quality, safe care. A culture of change is upon us, we need to accept it, even embrace it and challenge our staff to find even more effective ways to standardize, simplify and optimize their work processes.

The Three Stages of Meaningful Use Are Just the Beginning

Once the healthcare industry starts down this path, there is no turning back. Meaningful use criteria and their respective stages are taking the healthcare industry on a journey from data management (Stage 1) to information management (Stage 2) through to knowledge management (Stage 3). The criteria will become more complex and ever expansive; today it is data standards within an organization and positioning to share that data outward. Stage 2 appears to now incorporate population health risk analysis and impact of care processes on the risks as well as the acute illnesses.

So, what will Stage 2 contain?

Finish Stage 1 Standardization and Sharing

Portions of Stage 1 criterion were deferred. We will need to finish Stage 1 criteria pertaining to data terms and definitions and the standardization of administrative workflows. These are critical pre-requisites to decreasing costs and gaining process efficiencies.

Implement interface engines using stan-
SOONER OR LATER, organizations must standardize their data and be able to share this data throughout the organization, as well as throughout the healthcare system. The number of possible variations in processes and data must be simplified.

A SHIFT TO POPULATION-FOCUSED DATA STORAGE AND ANALYSIS CRITERIA

There is considerable language about developing and populating population-focused data bases. Population health management processes will take center stage in Stage 2. These processes define targeted populations, collect data on those populations in the form of health risk assessments, histories, environmental analysis and then propose prophylaxis programs and disease management protocols for use when these populations encounter the health system. These programs will build the research, knowledge systems for healthcare.

This criterion will require an investment in additional technologies. Organizations will need to move beyond their patient specific repositories and acquire and implement data warehouse solutions where the aggregated non-patient specific data can be stored from many sources and mined to respond to population-based questions.

SUMMARY

The goals for meaningful use can be summarized as follows: standardize, automate, eliminate. There is a presumption that automation will streamline work processes, increase processing speeds and eliminate waste. This will level the information technology playing field, reduce technology variability and in turn, allow for virtual movement of an individual’s health record; truly a womb-to-tomb lifetime record.

So now that I have shared with you my thoughts regarding Stage 2, I think it’s time to leave you with some questions to ponder. After all, why should I stay up at night talking to myself when we can all participate in this debate.

- ARRA/HITECH and its goal for automating healthcare processes and hard wiring their use (MU) should then level the automation playing field of organizations. Does this now mean that there will be an expectation that health systems will have to demonstrate a minimum level of quality outcomes or they won’t receive any funding, payments or even remain in business?
- The healthcare organizations that remain must now grapple with how they will differentiate themselves. Differentiation equals outcomes plus services. Will the differentiation occur in the integrated use of those technologies as part of an outstanding patient experience? At what cost?
- What will happen to the patient populations who are at risk? What if the factors that contribute to the risk are self-induced? I believe there is a movement toward a model of accountability, if that is true, what will be the cost to the consumer who is non-compliant vs. the consumer who is?
- I also believe we will have opportunity to wrestle with these questions over the next four to five years. As we have seen with Stage 1, lofty goals are often tempered by current realities. The goals, at times, must be scaled back in order to be adopted. Stage 2 will need to significantly build up steam in order for the meaningful use train to stay on its current schedule.
Nurses are key leaders in developing the infrastructure for effective and efficient health information technology that transforms the delivery of care. The 2010 landmark report from the Institute of Medicine & Robert Wood Johnson Foundation, The Future of Nursing: Leading Change, Advancing Health, proposes criteria to transform the nursing profession, leading to new roles and leadership positions for nurses in the redesign of the health care system. Following on this report, the HIMSS Nursing Informatics (NI) Community thought it would be helpful to lay out additional details in an NI agenda that would support the IOM/RWJF report recommendations in a position statement. HIMSS Board of Directors has approved this position statement that describes how we must transform nursing practice through technology and informatics. The position statement was developed by leaders from the HIMSS Nursing Informatics Community, which represents over 2,900 members, and is intended to not only serve the nursing profession but also the broader healthcare industry and HIMSS membership at large.

The Future of Nursing: Leading Change, Advancing Health report highlights that “The United States has the opportunity to transform its healthcare system, and nurses can and should play a fundamental role in this transformation. However, the power to improve the current regulatory, business, and organizational conditions does not rest solely with nurses; academia, government, businesses, healthcare organizations, professional associations, consumers and the insurance industry all must play a role.” HIMSS concurs with this statement and has outlined specific actions in the position statement that should be taken by each of these stakeholder groups.

Nurses are an integral part of successfully achieving improved outcomes and optimal wellness for our patients, as well as overall population health management. Because of the breadth and depth of nursing engagement in all aspects of healthcare, nurse leaders are in a key position to influence healthcare reform and the multidimensional needs across all care settings. As a result, a new type of nurse leader role is emerging: the “Nursing Informatics Executive” or Chief Nursing Informatics Executive.
NURSING INFORMATICS is a well established specialty within nursing, which has evolved to be an integral part of healthcare delivery and supports safe, high quality, patient-centric care.
The IOM report on The Future of Nursing asserts the U.S. healthcare system has the opportunity to transform itself. Nurses are active leaders in this transformation. Nurses have already taken a leadership role in embracing technology as a necessary tool to innovate the delivery of healthcare. Nurses must take on this leadership role to improve safety and efficiency, bring evidence for decision making to the point of care, and empower patients to be involved partners.

Data collected in the 2011 HIMSS Nursing Informatics Workforce Survey show that nurses who serve in informatics roles are experienced clinical experts, with half of the respondents indicating they have at least 16 years of clinical experience. Nurse informaticists use their depth of knowledge and understanding of the patient care process, combined with the power of technology, to contribute to the care of the individual and to the transformation of healthcare.

CONNECTING THE CONSUMER

Care teams are no longer bound by physical space, encouraging use of electronic connectivity and virtual strategies to support the care delivery of the future. According to the eHealth Initiative’s “Top Trends for 2011,” the combining of the national dialogue on healthcare, the Meaningful Use criteria that incent providers toward patient engagement, and the number of digital patient engagement tools now available – from smart devices, to patient portals – “should mark 2011 as a tipping point year for patient engagement.” Patients and their families are increasingly taking their rightful place at the center of the healthcare delivery model. According to statistics compiled during a Pew Research Center survey (February 1, 2011), 59% of adults, including older adults, use technology to access healthcare information. Internet-savvy patients can access extensive details about their health problems, treatment options, and the history of others who have similar diagnoses. In turn, these consumers have high expectations about their decision-making rights and are becoming vocal about their rights.

When patient-centric processes encourage patient engagement, nurses and other healthcare team members across care settings can work in partnership to enhance the well-being of consumers. Nurses working in community settings have typically used this approach because they provide care in consumers’ homes, work places, community clinics and schools. Now it is possible for others to make similar visits virtually and use technology to engage with patients in a completely different way. Using a patient-centric approach, nurses and other providers in acute and residential care facilities can help drive the industry toward a seamless approach across the care continuum that stays focused on the patient. It is expected that consumer demands for accurate, timely, and complete health-related information and partnership with healthcare professionals will only increase.

Personal health information is a valuable resource to individuals, their families, and the doctors, nurses, and other healthcare professionals who provide treatment and care. In its Quality Chasm report, the IOM outlined several dimensions of patient-centered care, including respect for patient’s values, preferences and needs; coordination of care; physical comfort and emotional support; involvement of family and friends; and information, communication, and education. The goal is to “customize care to the specific needs and circumstances of each individual,” making care respond to the person, not the person to the care. And who better than nurses to work with patients to help patients see the value of their contribution to their care and participate using electronic tools?

IMPLICATIONS FOR TIME & PLACE OF CARE

Technology is revolutionizing the way that healthcare is delivered with a steady infusion of new solutions into clinical environments. At the same time, outside of healthcare, both clinicians and consumers are learning to incorporate technological solutions into their daily lives with tools like high-speed data networks, smart phones, handheld devices, and various forms of patient engagement in social media exchanges. Bringing these types of technologies into the healthcare marketplace will transform the time and place for how care is provided. Having individuals who understand the unique complexities of healthcare practices along with how to best develop technological tools that positively affect safe patient care is essential. Nurses integrating informatics solutions into clinical encounters are critical for the transition to an automated healthcare environment that promotes the continuum of care across time and place, in addition to wellness and health maintenance activities.

The physical location for the delivery of care is changing. Healthcare environments have begun incorporating an abundance of technology such as wireless solutions, mobile computers, and automated exchanges between clinicians and patients. Adapting to these new environments requires a shift in expectations for how care is delivered and communicated. This shift also necessitates a greater understanding of the constant evolution of new solutions being introduced into care settings as technology evolves. Nurses are at the core of this evolution as the care providers with the greatest amount of direct patient contact. These changes provide both opportunities and barriers to moving beyond the four walls of a clinician’s office, outpatient department or hospital room to provide care.

Healthcare has become a global environment, offering care solutions that are delivered remotely. The technology of today allows the healthcare team to connect with patients absent the barriers of time or physical proximity. Virtual office visits, online appointment scheduling, mobile laboratories, electronic medication prescribing, and patient portals connected with electronic medical records are changing the way in which care is provided. Nurses also play a critical role by helping patients set up their own personal health records (PHRs), or explaining to patients how to use a patient portal. The initial work can be formidable, especially for those patients with healthcare literacy barriers. Telehealth exchanges are increasing in number, especially in underserved rural populations. New technologies
offer opportunities to provide quality care to patients in remote settings, improving the access to specialized resources. The challenge for this type of care is ensuring that the automated solutions fully interact with one another, as well as with the clinicians using them.

The need for system integration and interoperability is now the most important factor for the success of technology in healthcare. As noted in the responses of 660 nurse informaticists participating in the 2011 HIMSS Nursing Informatics Workforce survey, almost one-third of the respondents rated lack of integration/interoperability as a top barrier to their success. A standalone solution cannot survive without consideration for the upstream and downstream impact on other technologies in place. Being able to share and compare data between healthcare organizations and across time is the right thing to do for patients – both for the individual patient’s quality of care and for the secondary use of analyzing the data across patients to study the efficacy of our practice, and how we contribute to patient outcomes. Systems must be able to exchange data with one another to achieve these objectives. Having skilled individuals in place to help drive the direction of these electronic interchanges is as important as the technology itself.

**HIMSS Position**

Nurses are key leaders in developing the infrastructure for effective and efficient health information technology that transforms the delivery of care. Nurse informaticists play a crucial role in advocating both for patients and fellow nurses who are often the key stakeholders and recipients of these evolving solutions. Nursing informatics professionals are the liaisons to successful interactions with technology in healthcare. As clinicians who focus on transforming information into knowledge, nurse informaticists cultivate a new time and place of care through their facilitation efforts to integrate technology with patient care. Technology will continue to be a fundamental enabler of future care delivery models and nursing informatics leaders will be essential to transforming nursing practice through technology.

The Future of Nursing report includes eight key recommendations organized around three broad categories of Lead-
ership, Education and Practice. Nursing informatics professionals support all nurses regardless of practice setting. As such, the implications of the IOM report for healthcare are far reaching. Table 1 describes HIMSS’ recommendations, prepared in collaboration with ANA and ANI.

The transformation of nursing practice that results from the IOM’s Future of Nursing report recommendations will have a profound, long-term effect on the profession of nursing. Nursing informatics professionals are uniquely positioned to aid in this transformation, as the management of individual and organizational change is core to its practice.

**NURSING INFORMATICS LEADERSHIP**

The Future of Nursing report is not only about nursing but the future of healthcare in the U.S. Nurses are an integral part of successfully achieving improved outcomes, optimal wellness and overall population health management. Because of the breadth and depth of nursing engagement in all aspects of healthcare, nurse leaders are in a key position to influence healthcare reform and the multidimensional needs across all care settings. As a result, a new type of nurse leader role is emerging: the “Nursing Informatics Executive.” HIMSS expects a growing demand for this strategic and operational role to permeate the majority of healthcare organizations to support not only nursing practice, but the entire care delivery team in anticipating and adapting to changes in the healthcare environment. Emerging nursing informatics leadership roles are critical to engage in the necessary transformational activities and bridge the new care delivery models into clinical practice with the right technology solutions.

The movement towards ACOs emphasizes the drive toward population health management, also providing opportunities for expanded nursing roles including a greater need for nurse informaticists to support the ACO framework for an organization. Nursing informatics leaders are needed to engage in ACO strategy development, implementation and execution. It is critical for nursing informatics leaders to lead change management efforts to shape behavior and thinking beyond current models. These models are frequently physician-centric and/or acute care-centric and should evolve to a more coordinated care approach that includes all appropriate care team members.

In ACOs, care coordination is not only focused on improving quality, patient safety and outcomes, but also on managing costs. Technologies must integrate both clinical and business solutions to monitor and inform outcomes. Nursing informatics leaders are essential stakeholders who orchestrate what information must be provided, how it is captured and documented to support patient care, as well as monitoring the associated financial and business indicators to track and report on outcomes management. Technology will continue to be a fundamental enabler to the future care delivery models and nursing informatics leaders are essential to transforming nursing practice through technology.

Additionally, preparing the workforce for the 21st century is essential and will include an ever-increasing focus on education and usability of technology. Nursing informatics leaders must lead by establishing the strategy and plan for their respective organizations, resulting in technology and informatics that become a natural interwoven component of care delivery and workflow. Academia and research settings must not only train the future workforce, but foster innovations in nursing practice leveraging research-based evidence. Nursing informatics leadership roles are in a prime position to bridge research, education and practice settings to achieve innovations for nursing practice and prepare the workforce for the future.

**THE DEMAND FOR TECHNOLOGY INFRASTRUCTURE**

Since 1977, the nursing profession has relied on workforce data from the Health Resources and Services Administration (HRSA). Part of the Department of Health and Human Services, HRSA is the primary federal agency providing policy leadership and grant support for health professions workforce development, “helping to ensure the United States has the right clinicians, with the right skills, working where they are needed.” Published every four years by HRSA’s Bureau of Health Professions, the National Sample Survey of Registered Nurses is the primary source of statistics on trends over time for the nursing profession, which is the nation’s largest health profession. This report, The Registered Nurse Population: Initial Findings from the 2008 National Sample Survey of Registered Nurses, includes comparisons from eight recurring surveys, 1980 through 2008. Data in the survey cover educational background, practice specialty areas, employment settings, position levels, job satisfaction and salaries, geographic distribution, and personal demographics such as gender, racial/ethnic background, age and family status.

Without this quadrennial report, nursing would not be able to assess whether there is an adequate supply of nurses in order to more easily identify an impending shortage. The survey’s findings also make evident the current trends in nursing practice, including specialty and educational preparation—data which are essential for being able to optimally respond to the needs of our rapidly evolving healthcare system. However, in today’s high-tech world where we can obtain and distribute information globally in a matter of seconds, a quadrennial, static report seems woefully insufficient. Immediate access to real-time data on the nursing workforce requires an information infrastructure that supports the timely collection and analysis of the information needed to inform and predict changes in nursing practice and education to meet future healthcare needs.

The 2010 Affordable Care Act mandates the creation of both a National Healthcare Workforce Commission to help gauge the demand for healthcare workers and a National Center Workforce Analysis to support workforce data collection and analysis. It is essential that once implemented, these programs place a priority on accurate predictions of the healthcare workforce needs. Some key questions include how many primary care providers does the nation require to be able to provide more accessible, quality healthcare? How can nurse practitioners and other advanced practice nurses leverage...
WE BELIEVE THAT NURSES and nursing informatics specialists are vital to accomplishing the goals described in the HIMSS position paper and advancing healthcare transformation through the use of health IT.

their own practice as well as develop partnerships to relieve the current shortages in primary care providers? How can technology and patient participation in a patient-centric record impact the resource requirements for healthcare delivery? An improved information infrastructure will support systematic monitoring of healthcare workforce shortages and surpluses, and allow coordination of the collection of data across federal surveys and in the private sector.

CALL TO ACTION

Vendor organizations that develop electronic systems for clinician use should employ nurse informaticists in analyst, leadership and officer roles in order to:

- Design systems that are interoperable, patient-centric, and user friendly.
- Educate engineers, systems analysts, and other non-clinical positions on healthcare operations and clinical processes so safe, patient-centric, and user friendly systems can be designed.
- Develop educational support for care organization users.
- Actively engage in care delivery model changes and understand how nursing roles can operationalize these new models.
- Take a broader view in developing technology solutions that support the care delivery team and all role types across the ACO.
- Replace outdated, ineffective quality models with transformational outcome, information-driven paradigms. Nurse informaticists are critical at the forefront of these efforts.
- Assist in the testing process of systems to ensure user expectations are met.

Provider organizations should develop informatics departments that include nurse informaticists in order to:

- Implement systems that are interoperable, patient-centric, and user friendly.
- Educate IT and non-clinical staff on healthcare operations and clinical processes so safe, patient-centric, and user friendly systems can be designed.
- Develop educational resources that include workflow and care process changes and not just use of the health IT software.
- Actively engage in clinical practice and care delivery model changes and understand how health IT facilitates or augments these new models.
- Manage EHR and health IT implementations like clinical practice change projects and not as IT implementations.

Provider organizations should employ nurse informaticists in leadership roles such as a Nursing Informatics Executive, Chief Nursing Informatics Officer (CNIO), Chief Clinical Information Officer or Vice President of Nursing Informatics in order to:

- Partner with the CNO and other executive leaders to lead the healthcare transformation in embracing technology that is interoperable, patient-centric, user friendly and focused on quality outcomes.
- Lead efforts to increase information literacy and use of evidence in the delivery of healthcare.
- Champion the redesign of clinical workflow and processes essential for the adoption of new technology.
- Guide EHR and health IT implementations from system selection through the project lifecycle, including implementation, evaluation, optimization and practice transformation.
- Incorporate information literacy and informatics competencies into the job descriptions and job standards for all nursing staff.

Nursing informatics leaders should be knowledgeable and current in public policy initiatives in order to:

- Translate the impact of public policy initiatives into practice and care delivery while having a voice in the planning, implementation and execution of EHR systems to achieve the requirements of the industry changes.
- Articulate the organization’s vision and strategy for clinical transformation, actively engaged in managing change and measure success through established metrics.

Government agencies should recognize that regulations and reimbursement policies that remain exclusively physician-focused will not achieve the goals of healthcare transformation in the U.S. Recommendations include:

- Public policies and regulation language should reflect all provider roles,
allowing all clinicians, particularly nurses, to practice to the full extent of their education and licensure.

- Accreditation standards should be developed that require nurse informaticists to be involved in all clinical technology implementations.
- Nursing informatics leaders should be engaged in all levels of health IT policy and strategy-setting committees and initiatives.
- Nursing informatics leaders must be knowledgeable and well-versed in current public policy initiatives and participate in advocacy and educational efforts directed to policy makers.

**Academic organizations** should integrate informatics content throughout the nursing undergraduate and graduate curricula.

- Include information literacy, nursing terminologies, electronic health records, usability, clinical decision support, personal health records, human factors design, evidence-based practice, telehealth, privacy and security of electronic records.
- Incorporate information literacy and informatics competencies into the performance expectations for all nursing students.
- Incorporate information literacy and informatics competencies into the job expectations for all nursing faculty.
- Promote and financially support faculty development in informatics and information technology.
- Supplement patient care experiences with human simulation laboratories that are integrated with electronic health records.

**CLOSING REMARKS**

The IOM Future of Nursing report has stimulated accelerated efforts among nursing organizations to collaborate and unite on behalf of nursing and future care delivery in the U.S. It is through the collective wisdom, expertise and strategizing of individuals and groups that the recommendations of the Future of Nursing Report will be achieved. Examples of collaboration include the tri-council position statement in support of The Future of Nursing report, RWJ Campaign for Action, AMIA NIWG, AONE/HIMSS joint position statement of the role of the nurse executive (in press), and Center to Champion Nursing and the Champion Nursing Coalition sponsored by AARP. HIMSS believes nurses must lead, and be visible, vocal and present at the table for all significant healthcare reform initiatives. Collaboration and unified messaging among all stakeholders are keys to success. We believe that nurses and nursing informatics specialists are vital to accomplishing the goals described in this position paper and advancing healthcare transformation through the use of health IT.

We would like to acknowledge the role of the HIMSS Nursing Informatics Committee and the 2,900 members of the HIMSS Nursing Informatics Community, of which this body of knowledge represents. The following individuals have generously contributed to the development of this position statement: Dana Alexander, RN, MSN, MBA, Chief Nursing Officer, GE Healthcare Integrated IT Solutions; Karen Carroll, RN, PhD, Manager, Nursing Informatics, Children’s Memorial Hospital; Willa Fields, RN, DNSc, FHIMSS, HIMSS Board of Directors, Professor, San Diego State University; Elizabeth C. Halley, MBA, RN, HIMSS Nursing Informatics Committee Chair, Principal Health Information Technology, MITRE Corporation; Karen S. Martin, RN, MSN, FAAN, Healthcare Consultant, Martin Associates; Judy Murphy, RN, FACMI, FHIMSS, HIMSS Board of Directors, Vice President, Information Services, Aurora Healthcare; Cheryl D. Parker, RN, MSN, PhD, Sr. Clinical Informatics Spec., Motion Computing, Inc., Contributing Faculty, Walden University School of Nursing; Joyce E. Sensmeier, MS, RN, BC, CPHIMS, FHIMSS, FAAN, Vice President, Informatics, HIMSS; Mark D. Sugrue, RN, BC, Director, PricewaterhouseCoopers; Marianela Zytkowski, DNP, MS, BSN, RN, Director of Nursing Informatics, Cleveland Clinic Health System; and Christel Anderson, Staff Liaison, Director Clinical Informatics, HIMSS. JHIM

**REFERENCES**

Yes, you can...
Build your local or regional HIE with this new resource from HIMSS

- High-level overview of HIE
- Direct experiences of HIE experts
- Tools for planning and implementation, including case studies, templates and references
- Extensive research on sustainable HIE revenue models
- Details on creating a governance structure

Now there’s a practical, structured approach to forming an HIE. Order yours today!
www.himss.org/store

MONTANA IS CALLING YOU…….
Executive Director of Health Information Technology
Seeking individual to provide vision, leadership, mentoring and education in the development and implementation of Northwest Healthcare’s technology goals and initiatives. The Executive Director leads the HIT Department in the strategy, planning and implementation of enterprise information systems and solutions. The Executive Director supports effective delivery of healthcare services and improved business value for Northwest Healthcare’s internal and external customers. Provides strategic and tactical planning, development, evaluation and coordination of the information and technology systems for Northwest Healthcare. Facilitates communication between staff, management, vendors and other resources throughout the organization. Oversees the operations and management of all networking systems; local area network, wide-area network and wireless wide-area network. Organize and manage clinical informatics staff in the delivery of organizational goals and objectives. Is an effective problem solver, delivering response and solutions in a timely manner. Leads by integrity and discipline providing for excellence in leadership, customer service and respect developing the same level of excellence in the HIT team. QUALIFICATIONS: Bachelor’s Degree required. A Master’s Degree is preferred. Experience and expertise weighed against education. Eight or more years in complex healthcare environments. Demonstrated experience with healthcare information technology systems. Demonstrated experience with HIT department management at the senior level with increasing levels of responsibility. Experience with and understanding of strategic and business planning methods, tools and processes. Experience leading organizational change and department development in several healthcare systems or hospitals. A working knowledge of technical infrastructure architecture, design, planning and implementation.

COME JOIN THE TEAM!
NORTHWEST HEALTHCARE
LAURIE O’LEARY/HUMAN RESOURCES
310 SUNNYVIEW LANE, KALISPELL, MT 59901
(406) 752-1706 FAX (406)751-4123 loleary@krmc.org
www.nwhc.org EOE

ONLINE DOCTORAL PROGRAM for
HEALTHCARE INFORMATION SPECIALISTS

Focus on development of Information Systems for roles in health policy, strategic management, and leadership.

Would you like to:
- Obtain a leadership position within a larger healthcare organization?
- Move into teaching?
- Become a policy advisor or advocate?

Our DHA is the program for you!

NOW ACCEPTING APPLICATIONS FOR 2011

Please contact us at:
Division of Health Administration and Leadership
Medical University of South Carolina
843-792-3849 dha@musc.edu
www.musc.edu/chp/dha
Ready, Set, Go!

Creating a Repeatable People/Process EMR Activation Strategy at University Hospitals of Cleveland

By Kathleen A. Supan, RN, PMP

ABSTRACT
After two years of enterprise design, build and testing, it was time to “birth this baby.” Our experience told us that a well-designed and tested product may not be appreciated by our clinicians if the implementation was not executed well. The team at University Hospitals was challenged to implement an EMR, including CPOE, at seven facilities in 18 months.

Developing an implementation strategy that would ensure that deadlines were met was the first step. Considerations in this planning included logical sequencing of facilities, phasing in functionality vs. a Big-Bang approach, and spacing between each facility to allow for issues resolution and stabilization between facilities.

Once the timeline was developed, a detailed activation plan was developed that addressed logistics such as pre-implementation stakeholder engagement, backload strategy, transitions from legacy systems, command center procedures, end user support, as well as daily stakeholder communications. Issues management needed to guarantee that issues were being identified, triaged, escalated and managed with velocity and that clinical leaders participated in this process.

As we completed our last activation in November 2010, our activation toolkit has gone through many iterations and improvements which could benefit others who are undergoing similar implementations.

KEYWORDS
Enterprise design, implementation, EMR, CPOE, eMAR, workflows.
More complex workflows (dialysis, transplant, pediatrics) and provider roles (residents, medical students, advanced practice nurses) in our academic tertiary center, required further modifications before we could go live in this 900-bed facility. Our timeline was adjusted so that this implementation was delayed until May 2010, followed by a rapid deployment of the remaining three hospitals from August through November, using a Big Bang approach.

From a change-management standpoint, introducing all of the changes at one time permits the clinical staff to process those changes and adjust while we have our highest level of support staff at their elbows.

With the phased-in approach, we observed that our clinicians’ were in a constant state of flux, and their anxiety increased each week as we introduced new functionality, just as they were getting used to the previous changes. Another concern that we had, was how to keep our staff from burning out during this constant state of activation. Using the Big Bang approach eliminated the feeling of constant peaks in support challenges at each facility. With Big Bang, typically the first several days are very intense, followed by a gradual decline in clinicians’ need for attention.

While we did not phase in functionality at the 900-bed facility, our clinical leaders elected to divide the facility into three phases:

- Week 1: Pediatric hospital.
- Week 4: Women's hospital.
- Week 6: Adult medical surgical, adult ED, rehab and SNF units.

The Adult Medical Surgical implementation was further divided into three phases:

- Day 1: Surgical units.
• Day 3: Medical units.
• Day 5: ED, rehab and SNF units.

This strategy required a great deal of scrutiny around bed assignments by our bed coordinators to keep the surgical and medical patients physically segregated by units for two days. Amazingly, we were successful, allowing the surgical and medicine physicians to manage this transition graphically.

STAKEHOLDER ENGAGEMENT

Rapid Big Bang deployment on a large scale worked well, because we developed a well documented and precise activation plan with our clinical leaders. Part of our strategy was based on lessons learned from several other organizations who we had engaged in sharing their experiences with us. We invested time and resources in preparing each of the facilities for the activation process. We sent out the “scouts” in the form of our change management team at least three months prior to go-live.

Change-management activities included a readiness assessment, leadership engagement, weekly management meetings, review of critical workflows and a communications blitz. In our weekly meetings, we repeatedly reviewed the implementation plan with the facility managers so that they could prepare their staff for the EMR implementation and knew what to expect on a day-to-day basis.

ORDERS BACKLOAD FOR GO-LIVE

Backload planning was initiated several months prior to activation. The future state workflow being introduced required that each patient record be populated with key patient data including all active patient orders, allergies and weights, prior to turning the system over to the end users.

Our first task was to establish the source of truth for orders and other clinical data that would be back-loaded into the EMR. During our analysis, we found much variability in where clinical data could be quickly retrieved from hospital to hospital.

In our community hospitals, we were able to use the Kardex in combination with the medication administration record, as well as written physician orders in the paper chart. In our academic medical center, where we were using a legacy CPOE system, we were able to use a patient care summary report as the data source for backload. During our analysis, we found that our data sources were often not complete or accurate. For example, we found active orders for some patients that included paralytics and ventilator settings along with diet and out of bed activity orders. To mitigate the risk of loading incorrect information into the EMR, we conducted a chart “orders hygiene” campaign with our clinicians during the week before go-live.

Securing the appropriate staff for backload should be started early to ensure that you have the appropriate numbers, skills and knowledge of the patients. The best candidates are the people who know the patients, as they will have the greatest knowledge of whether the patient information/orders that they are entering are actually correct. In our teaching hospitals, all of the backload of orders was accomplished by the residents on the service that was covering the patients.

Our associate CMO rallied the residency program directors early in the process to make sure that we had residents engaged in the chart cleanup and that they were appropriately assigned to the backload activities.

Additionally, residents were offered an incentive of $45 per hour. In the other facilities, we had some participation by the hospitals, but typically, a pharmacist entered all of the medication and IV orders and the nurses entered the remaining orders, as well as the allergies and weights. A lesson learned at one of our early hospitals, is that we should have pushed harder for more pharmacists to staff the backload function.

The EMR went live without the medication backload being completed, which created serious issues for the nursing staff on the first day, as the eMAR was not complete. Leveraging that experience was very effective in getting commitment at the following hospitals to provide necessary pharmacist staffing at all costs. Sharing pharmacists between the facilities for backload was an effective strategy for staffing.

A backload team was assigned to each unit (residents, nurses, pharmacist, EMR staff). Backload activities were conducted in a room on the unit so that the team had ready access to the patients’ charts and caregivers, if they had questions about the patients’ orders. Two months prior to go-live, we tested our assumptions and processes by performing backload simulations, using actual patient records, with clinicians who had no experience with the software. This exercise was very helpful in identifying gaps in our source data, the need for very explicit instructions to clinicians performing the backload, and determining what level of staffing we would need.

We concluded that the team would need one hour to complete the entry and validation of orders on an average patient. Generally, we staffed one back-loader (resident or nurse) for every six to eight patients. Backload staffing in the ICU’s needed to account for more complex orders, allocating 90 minutes per patient.

As an example, on the day that we backloaded all 10 of our adult medical units (170 MedSurg and 40 ICU patients), our staffing was as follows: 30 residents/hospitalists/nurse practitioners, 22 nurses, 12 pharmacists and 24 EMR staff (internal and contractors). It is imperative that all members of the backload team are scheduled explicitly for this activity and are not involved in patient care.

Backload is a time-sensitive activity. The risk of starting before the medical staff complete their rounds, is that many of the orders will have changed, creating a fair amount of rework. Since our go-lives were always scheduled to occur at midnight, we generally scheduled our backloads to begin at noon, giving the team 12 hours to complete this task.

At least two EMR project team members were in each room to coach the clinicians through the backload tasks and act as room coordinators. The nurses on the backload team were recruited from the super user pool, as they had a deeper knowledge of the software prior to the backload. Clearly the super users’ experience in the backload process strengthened their position as super users during the go-live.

Controls at many levels need to be built...
into the process to keep the teams on track. Delays in completion of the backlog will jeopardize your ability to go-live. Control documents to help us manage the process were developed, including a backlog checklist (see Fig. 2) that the clinicians used to document explicit task completion for each patient.

A patient’s backlog was not considered complete until two clinicians compared the paper chart to the new system and signed off on the checklist that all orders had been entered correctly. An EMR lead was assigned to function as the hospital backlog coordinator, rounding from unit to unit to check status of each team and flex resources when a particular unit fell behind or encountered problems. This allowed us to react quickly to prevent delays in completing this monumental task.

When the backlog of a patient’s chart was completed, the outside of the chart was stickered to indicate that the backlog was complete. This was a visual cue to the unit secretary that any orders received on a completed chart must be communicated to the backlog team so that they could update the patient record in the EMR. Because of our chart cleanup, control documents and most important, well planned staffing, we were able to complete our backlogs well before the midnight deadline in all of our facilities. At midnight, in the hospitals

---

### Figure 2: Backload Checklist

<table>
<thead>
<tr>
<th>Backlog Steps</th>
<th>Checked/Entered by (Initials)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Print PCSIS Patient Care Summary for this patient when physician/np arrives to enter orders</strong></td>
<td>Nursing</td>
</tr>
<tr>
<td><strong>Print PCSIS Med Profile for Pharmacist</strong></td>
<td>Nursing</td>
</tr>
<tr>
<td><strong>Attach backlog checklist to Patient Care Summary</strong></td>
<td>Nursing</td>
</tr>
<tr>
<td><strong>Enter Weight</strong></td>
<td>Nursing</td>
</tr>
<tr>
<td><strong>Enter Allergies, If reaction not documented in PCSIS enter Unknown reaction in EMR</strong></td>
<td>Nursing</td>
</tr>
<tr>
<td><strong>Enter Labs, Enter lab results in PCSIS</strong></td>
<td>Nursing</td>
</tr>
<tr>
<td><strong>Enter Family/spouse's name into Family/spouse's name (name)</strong></td>
<td>Nursing</td>
</tr>
<tr>
<td><strong>PCSIS Patient History - Do not backload</strong></td>
<td>Nursing</td>
</tr>
<tr>
<td><strong>PCSIS Medical &amp; Surgical History (can be added after backload day) - Significant Events - Medication/Surgical History</strong></td>
<td>Nursing</td>
</tr>
<tr>
<td><strong>Enter orders from Risk Scoring</strong></td>
<td>Nursing</td>
</tr>
<tr>
<td><strong>Enter Admission Order: Admit to CICU Adult</strong></td>
<td>Physicians/np</td>
</tr>
<tr>
<td><strong>After Allergies and Weight are entered</strong></td>
<td>Physicians/np</td>
</tr>
<tr>
<td><strong>PHARMACY VERIFICATION</strong></td>
<td>Pharmacist</td>
</tr>
<tr>
<td><strong>All med &amp; iv orders verified by Pharmacist</strong></td>
<td>Pharmacist</td>
</tr>
<tr>
<td><strong>VALIDATION</strong></td>
<td>Activation Team &amp; Floor nurse</td>
</tr>
<tr>
<td><strong>Clear Check Orders Flag on each patient</strong></td>
<td>Nursing</td>
</tr>
<tr>
<td><strong>Validate EMR Orders lab against PCSIS POS report (or PCSIS online)</strong></td>
<td>Physician and Nursing</td>
</tr>
<tr>
<td><strong>Following Pharmacy verification of orders, RN validates EMR w/PCSIS meds schedule &amp; updates based on most recent med time</strong></td>
<td>Activation Team &amp; Floor nurse</td>
</tr>
<tr>
<td><strong>Mark all work sets and PAIR tasks scheduled for prior to midnight as “NOT DONE” with reason “EMR Backload”</strong></td>
<td>Nursing</td>
</tr>
<tr>
<td><strong>11 PM: Print PCSIS ORD Report for each patient from time backlog completed (after 16) to current time</strong></td>
<td>Nursing</td>
</tr>
<tr>
<td><strong>22</strong></td>
<td>Nursing</td>
</tr>
<tr>
<td><strong>12:30 to 1:00 am all orders in PCSIS, using host key, after Alice has called the command center to give the go ahead</strong></td>
<td>Nursing</td>
</tr>
<tr>
<td><strong>Midnight</strong></td>
<td>Nursing</td>
</tr>
</tbody>
</table>

---

When the chart was completed, the outside of the chart was stickered to indicate that the backlog was complete. This was a visual cue to the unit secretary that any orders received on a completed chart must be communicated to the backlog team so that they could update the patient record in the EMR. Because of our chart cleanup, control documents and most important, well planned staffing, we were able to complete our backlogs well before the midnight deadline in all of our facilities. At midnight, in the hospitals
where we were moving from paper orders to CPOE, we removed any blank paper orders sheets from the charts and replaced them with a colored paper reminding staff that orders were now being entered directly into the EMR.

Backload activities can be stressful; preparation of the environment can have a big payoff. Our checklist included making sure that each team member had the appropriate security to execute their tasks, that we had enough laptops and they were properly configured, ample office supplies were in the room, checklists and control documents to track progress on each patient were prepared. Adequate ventilation in the room, cold drinks and snacks and comfortable seating can only help.

TRANSITIONS FROM LEGACY SYSTEMS

We had a variety of different legacy order entry systems that were being replaced by our new EMR. It was important for us to understand the orders interface processing between these systems and our downstream Lab and Radiology systems. We wanted to make sure that we did not duplicate orders that may have already been processed by our legacy systems to the downstream systems. We determined that all of our legacy systems used the same processing. Future dated, or daily orders, were transmitted to the downstream systems each day via an early morning batch job.

When back-loading lab and radiology orders, we did not enter orders for the following day, but allowed the legacy system to transmit these HL7 messages. When the last morning batch job was completed, the interface between the legacy system and the downstream system was turned off. During the backload, we instructed the clinicians to only enter lab or radiology orders for T-2 or later.

Planning for the decommissioning of our legacy order entry systems as well as determination of long term retention of the associated data was started many months prior to the activations. In our organization, this project was managed by IT&S staff, who were not involved in the actual implementation of the new software.

ACTIVATION LOGISTICS

Support Staffing. There are many critical success factors around a CPOE implementation: physician input into design, providing a large number of order sets (we have nearly 800) to facilitate order entry, as well a flexible and robust training strategy. Our experience has been that the shoulder to shoulder support provided to our clinicians during an activation is a key differentiator in terms of clinician acceptance of the new workflow.

We started by establishing baseline staffing numbers. On each unit we followed this formula, based on total nurse staffing on each unit (nursing staff includes RNs, as well as patient care assistants and unit secretaries):

- Week 1: One activation support staff per three nurses.
- Week 2: One activation support staff per four nurses.
- Week 3: One activation support staff per six nurses.
- Weeks 4 and 5: One to two rovers thru the hospital (depending on size).

In addition, our team collaborated with each facility’s CMO to develop a customized physician-support strategy. We worked with each CMO to identify high volume as well as resistive physicians who would need focused support. In those situations, an EMR team member was assigned to shadow a specific physician or physician group on a daily basis, until the physician felt comfortable with the application and workflow.

A dedicated physician resource was assigned to the ED and several to the perioperative area, where support for the anesthesiologists and surgeons in a very fast moving environment is essential. Our organization has achieved our goal of an overall 85 percent direct provider order entry using this strategy.

We applied the same concepts to our staffing assignments during activation that many of us used with patient assignments as nurse managers. To provide continuity, the activation team stayed with the same assignment on a daily basis. This allowed the clinicians on a particular unit or team to get to know their support staff and develop a relationship of trust. The activation team was able to build on the day to day experiences of the staff, identifying each day the workflows needing reinforcement and staff needing more focused support. Each unit had a “lead” support person assigned daily. The lead was instructed to introduce themselves to the nurse manager to make sure they knew who to come to if they needed help, while the lead would seek out the manager when policy issues or resistance among the staff was encountered. The lead was to touch base several times a day with the nurse manager, thus developing a partnership.

One of our guiding principles for the
activation support team was that their job was to shadow the clinicians and to coach them during key activities such as taking vital signs, medication administration, shift handoffs, and order entry, particularly during the first week. Staff needed to remain highly visible to the clinicians, and were easily identified by a blue vest. Waiting for someone to ask for help would not foster the rapid integration of the new system into the clinical workflow. Staggering off unit breaks was essential to ensure that there was always a “blue vest” visible and available.

So, where do all of these activation resources come from? At our highest staffing level, we had nearly 100 activation support staff positioned on our units and clinical departments. There were three categories of resources on our activation team: EMR staff, super users and third-party contractors.

Our change-management team educated our clinical leadership early in the project that they needed to make a commitment to developing a strong pool of super users who could support their colleagues, not just during the activation period but for the long term. Nearly 10 percent of the nursing staff was identified as super users, and all nurse managers, educators and clinical nurse specialists were required by our CNO to become super users. They attended a one week boot camp as well as a one-day refresher just before go-live.

Boot camp content covered workflows and software functionality as well as change management concepts that would better prepare the team to function in a support role. Each super user was required to provide 48 hours of activation support on their unit which meant that the unit managers had to backfill four shifts for every super user on their unit during the activation period. Clearly, the collaboration and sponsorship of nursing leadership is key to this strategy. We began having these discussions months prior to activation so that the nurse managers could plan for the backfill of this staff in their unit schedules.

Additionally, nursing leadership opted to “staff up” on the units the first few days to allow each nurse to have a smaller assignment, as we knew that they would be slowed down as they adjusted to the new workflow. There was a big payoff with this strategy; staff felt supported during the implementation and made the transition smoothly.

Third-party contractors can be very expensive, and we knew that we would have to make a considerable investment in these resources, so we planned early and made sure that these costs were incorporated into our budget. While these folks had solid expertise in the use of the Allscripts software in their own clinical practice at other organizations, we provided them with a very thorough orientation to our configuration and workflow, using job aids. We were able to leverage the same team of consultants with each facility activation, so in essence, they became an extension of the EMR team.

Command Center Logistics. We learned quickly after our first activation that the command center and the associated processes needed to be tightly controlled. In our early activations, our command center was a bit chaotic, sometimes feeling like “Where's Waldo?” Our team didn’t always know how to contact key resources, or were unclear on procedures for issues resolution. Transitioning our command center to more of a military model had a marked impact on our ability to function more efficiently.

Some best practices that we implemented in our command center:

ASSIGN COMMAND CENTER ROLES AND RESPONSIBILITIES

- Phone/issues logger: Answer phone, triage calls, log issues in the issues database.
- Lead: Assigns priorities to issues, assigns issues to FAST team, tracks progress on critical issues, coordinates content for daily communications.
- Security team: Take all calls related to access.
- Tech team: Take all issues related to hardware configuration.
- FAST team: Applications analyst who are assigned to all workflow and application issues.

To minimize confusion, we established assigned seating for these roles so that each team was identified by their physical location rather than by names or faces. At any given time, there could be as many as 15 people in the command center with many new faces coming in from various vendors. Just seating staff in logical workgroups made handoff of issues and collaboration much smoother.

MAINTAIN A VISIBLE DAILY STAFFING ROSTER

In the command center it was critical that the lead knew exactly who and where we had staff positioned so we could insure that we had adequate staffing, and we could react quickly by dispatching resources when crisis calls came in. After many iterations, a daily staffing roster was developed which listed each unit/department and names of the support staff assigned to this area. The lead on each unit and their phone number was called out.

We secured a large, flat-panel monitor that was mounted in the command center with this roster displayed at all times. The view was sized so that scrolling was not necessary to view all of the content. Sounds simple, but this strategy had a significant impact in alleviating some of the confusion that we had been experiencing. During our busiest weeks, we were supporting as many as 40 units/departments; a quick view allowed us to react quickly.

DEVELOP AN INTERNAL COMMUNICATION PLAN

After trying pagers (too many steps) and walkie-talkies (too noisy), we needed to establish a more robust team communication strategy. Because of the issues that we had with cell phone reception throughout the facility, these were not a dependable option. Vocera communications devices would have been an optimal communication device, however, our organization had not invested in the infrastructure needed to support this technology.

Our team was able to leverage the voice over IP technology that was already in place in all of our facilities, and the IP por-
The risk of starting before the medical staff complete their rounds, is that many of the orders will have changed, creating a fair amount of rework.

Table phones were relatively inexpensive. Each of the team leads on the units and in the ancillary departments was given an IP phone. Other key members of the support team including the command center lead, physician support lead, tech lead and executive on call also carried a phone. We built the phone book or speed dial, so that phones were associated with a role, not a person. We learned that it was not as important for the staff in the field to know WHO was functioning in a role, but how to contact a resource quickly.

Frequently, we were presented with the challenge of getting a communication out to our entire support staff quickly. In one instance, we were experiencing system performance issues which forced us to call a brief downtime. We needed to get consistent and timely updates and instructions out to our team. Using our online emergency broadcast software, we were able to broadcast voice instructions to our support team’s IP phones in a matter of minutes.

**DEVELOP A STAKEHOLDER COMMUNICATION PLAN**

Regardless of how impressive your EMR solution is, and how well you planned your activation, it still represents a significant disruption to clinician workflow. Keeping in close touch with the clinicians, providing feedback to them quickly on issues, and giving them ample opportunities to give input will increase the likelihood that they will partner with the EMR team in problem solving, when issues arise.

Our strategy for accomplishing this was in the form of daily conference calls/meetings. Meetings at 6 a.m. and 6 p.m. were scheduled for change of shift handoffs for the activation support team. The clinical leadership was invited to attend these, and often did.

A daily 30-minute 2 p.m. status meeting was required for clinical leaders and we consistently had good attendance. Our clinical leaders felt strongly that they needed to provide us with guidance on what issues to focus our resources on and we welcomed this input! Issues review and clarification of new workflows were covered, and frequently the discussions turned into negotiations between department leaders with the EMR team facilitating.

Following the 2 p.m. meeting, a small group of EMR leaders drafted a daily HOTSHEET communication which highlighted solutions, tips, and current issues. This communication tool was printed at change of shift and distributed to the team leads to take back to their assigned unit/department. Additionally, these hot sheets were distributed to the clinical staff in e-mail form every evening. Getting these communications in the hands of the physicians was an ongoing challenge, and we relied heavily on our physician support team to get the word out.

**MANAGE YOUR ISSUES**

The most fundamental strategy for issues management is to develop a tool that supports quick logging of issues, captures essential data elements related to each issue, and includes reporting functions. With the exception of security and hardware issues, the command center lead reviewed each issue before it was logged and assigned the appropriate priority and resource to work the issue. Only critical and high issues were worked in the command center. All other issues were simply logged for future review; enhancement requests made up a large volume of these medium or low issues.

Critical issues were always reviewed with clinical leadership at the 2 p.m. meeting. It was not uncommon for them to change a priority from critical to high, or escalate an issue that we may have assigned as a high or medium priority to critical. The process worked!

A function of the command center lead was to review open issues on a regular basis and make sure that our FAST team was appropriately updating and closing issues. We reported summary data on issues daily: number of high and critical issues open, as well as number closed. At one point, we had a few thousand issues logged; it was important not to focus on such an overwhelming body of work, but just keep focusing on critical and high issues and continue to review and reprioritize. An exercise we repeated many times was determining which high priority issues were more important than others.

**USE AUDITS TO PROVIDE DATA TO MEASURE ADOPTION**

In our early implementations we struggled to develop a methodology to provide feedback on adoption of new workflows to our clinical leaders that was stronger than anecdotal observations.

Along the way, we developed an audit schedule for each facility. We had to make sure that we were selecting processes to audit that were meaningful to the clinicians and that were relatively easy to gather data on. We repeated the same audits at least three times so that we could demonstrate trends, which were typically positive. Processes that we audited included:

- The activation support team. The clinical scheduled for change of shift handoffs for meetings at 6 a.m. and 6 p.m. were in the form of daily conference calls/meetings, when issues arrive.
- Will partner with the EMR team in problem solving, when issues arrive. Input will increase the likelihood that they giving them ample opportunities to give feedback to them quickly on issues, and keeping in close touch with the clinicians, providing feedback to them quickly on issues, and giving them ample opportunities to give input will increase the likelihood that they will partner with the EMR team in problem solving, when issues arise.
- Regardless of how impressive your EMR solution is, and how well you planned your activation, it still represents a significant disruption to clinician workflow. Keeping in close touch with the clinicians, providing feedback to them quickly on issues, and giving them ample opportunities to give input will increase the likelihood that they will partner with the EMR team in problem solving, when issues arise.
- Develop a stakeholder communication plan. Regardless of how impressive your EMR solution is, and how well you planned your activation, it still represents a significant disruption to clinician workflow. Keeping in close touch with the clinicians, providing feedback to them quickly on issues, and giving them ample opportunities to give input will increase the likelihood that they will partner with the EMR team in problem solving, when issues arise.
- Manage your issues. The most fundamental strategy for issues management is to develop a tool that supports quick logging of issues, captures essential data elements related to each issue, and includes reporting functions. With the exception of security and hardware issues, the command center lead reviewed each issue before it was logged and assigned the appropriate priority and resource to work the issue. Only critical and high issues were worked in the command center. All other issues were simply logged for future review; enhancement requests made up a large volume of these medium or low issues.
- Use audits to provide data to measure adoption. In our early implementations we struggled to develop a methodology to provide feedback on adoption of new workflows to our clinical leaders that was stronger than anecdotal observations. Along the way, we developed an audit schedule for each facility. We had to make sure that we were selecting processes to audit that were meaningful to the clinicians and that were relatively easy to gather data on. We repeated the same audits at least three times so that we could demonstrate trends, which were typically positive. Processes that we audited included:
FOCUS: READY, SET, GO!

- Absence or presence of admission orders (use of admission order sets).
- Medications not signed off by nursing and respiratory staff.
- Acknowledgement of new orders by nursing staff.

Audit results were typically reviewed as part of the daily 2 p.m. status calls; managers and leaders were always very interested in the results and anxious to see improvements when we generated follow up audits.

As the activation period came to a close, we worked with hospital leadership to develop a schedule for ongoing meetings. At several of our hospitals we continued daily status meetings for an additional week or two, then gradually moved to a monthly EMR/Operations meeting at each hospital. These meetings serve as a strong format for managing each hospital’s issues, and field requests for enhancements and fixes. Additionally, our super users’ engagement is maintained by way of regular super user meetings and updates. Because we have a standardized enterprise designs, requests for enhancements must go through a system wide prioritization and approval process.

Much like when a woman is in labor, the pain of activations can be quite intense. Moms who are well prepared for childbirth, and have a solid support system during this transition do the best job of managing the stress and unexpected events of childbirth. The “birth plan” for our EMR was well thought out and incorporated every conceivable event that we could anticipate. When “our baby” was finally born, our team was exhausted, but relieved.

Now on to the important work of nurturing our “baby” into the next developmental phase. JHIM

Kathleen Supan, RN, PMP, is a graduate of St. Vincent Charity Hospital School of Nursing as well as Ursuline College where she received a BA in Health Services Management. After a 15-year in clinical practice as a staff nurse, nurse educator and nurse manager, Supan began a career in Clinical Information Systems, working as an implementation consultant for a vendor. She has served in various hospital based IT positions, as well as working as an independent consultant for eight years. Over the last 20 years, Supan has led several large scale clinical system implementations in several multi hospital health systems. In her current position as the EMR Inpatient Director at University Hospitals of Cleveland, Supan was responsible for the design, build and implementation of CPOE and clinical documentation as well as the planning and execution of the activation strategies at each of the UH facilities. Kathleen has been certified as a Project Management Professional by the Project Management Institute since 2004.

WE WANT YOUR RESUME!

Are you tired of the job search grind? Let the search come to YOU!

By posting your anonymous resume on HIMSS JobMine, you can significantly increase your chances of landing that dream job in the healthcare IT industry.

TAKE CONTROL BY POSTING YOUR RESUME TODAY

JobMine.HIMSS.org

Follow us on Twitter @HIMSSJobMine
FOCUS

CASE STUDIES: Implementation and Change Management

Change Calendars
Safety, Sanity and Success Amidst an Avalanche of Change

By John R. (Skip) Valusek, PhD, CPHQ; Beth Elchek LaVelle, PhD, RN, CEN; and Meghan B. LaVelle, MS, RN, CEN, ACNS-BC

ABSTRACT

When informatics and electronic medical record implementations have to compete with many other changes for healthcare staff’s attention, projects’ success are significantly threatened. The rapid succession of changes require not only awareness but also cognitive understanding and psychomotor application, yet are often implemented without awareness of the other changes and initiatives that are pulling at the attention of direct and indirect caregivers. Frequently, even critical changes are buried in the avalanche of change, increasing the risk of incomplete project deployment. This increases the risk of errors that may adversely impact patient safety—the very risk that many of the changes were meant to avoid.

This article discusses the use of a change calendar at two acute-care community hospitals to improve patient safety and caregiver satisfaction, and decrease change fatigue by transforming the avalanche of change into a safer “snowfall.” This culture shift requires that leadership transition their project planning from being singularly project-oriented to end-user oriented, with a system perspective. Organizations will also enjoy increased probability of success of the implemented projects.

KEYWORDS

Change management; patient safety; change fatigue; burnout; staff satisfaction; electronic medical record implementation.

BACKGROUND

Amount of simultaneous change as it relates to patient safety has been largely overlooked by the healthcare industry.
FOCUS: CHANGE CALENDARS

Duffy’s editorial noted:

*The solution to every problem is change. And the volume of these solutions has morphed into yet another problem... for better or worse, each change has an immediate potential for impact on error, satisfaction, hand-off of information, process flow, patient safety, efficiency, employee morale and productivity... Although change cannot be eliminated, proper management can influence effective outcomes.*

Simpson and Knox noted multiple cognitive factors that contribute to error, including stress and fatigue, lack of familiarity with a task, trying something new under pressure, information overload, workload and multi-tasking, doing more with fewer resources, favoring production over safety, task saturation, and task prioritization. Considering that changes rarely occur as single, nicely discrete tasks, these cognitive factors can compound and interact to create an avalanche of change that buries direct and indirect caregivers on a daily basis.

Informatics initiatives and electronic medical record implementations are critical to patient care, but when they compete with many other changes for healthcare staff’s attention, projects’ success are significantly threatened. The rapid succession of changes require not only awareness but also cognitive understanding and psychomotor application, yet are often implemented without awareness of the other changes and initiatives that are competing for the attention of direct and indirect caregivers. Frequently, even critical changes are buried in the avalanche, increasing the risk of incomplete project deployment. This increases the risk of errors that may adversely impact patient safety—the very risk that many of the changes were meant to avoid.

**ESTABLISHING A NEED TO CONTROL CHANGE**

To plan a meaningful intervention, we needed a baseline assessment of the perceptions of change and its effect on the staff. Our system includes three acute care hospitals, one long term acute care transitional hospital, 12 primary care clinics and 30 specialty centers. A convenience sample of bedside nurses at two of our acute care community hospitals were asked to complete printed or electronic baseline surveys containing eight questions.

Site A was a 401 bed urban hospital (2008 survey); Site B was an 86-bed suburban hospital (2010 survey). Response patterns were similar for nurses and ancillary staff. The results presented here are from the 320 surveys returned from staff nurses. Table 1 depicts the results of five of the survey questions. Despite the different sites and two years between surveys, baseline results were similar.

Distribution for the responses was slightly skewed for all questions. Responses indicated that staff nurses often “encounter multiple, simultaneous changes at work. Unfortunately, for the majority of respondents, simultaneous changes were felt to be manageable only “sometimes” (see Figure 1). The majority of staff also felt they were in information overload; an average of 11 percent even indicated that they were “almost always” in information overload (see Figure 2).

We will conduct the same survey at each hospital after the change calendar has reached “steady state” (anticipated at approximately two years after implementation). Ideally, the distributions of the data for questions related to number of simultaneous changes, difficulty prioritizing, and information overload will shift toward the sometimes/rarely/never responses while having adequate preparation and feeling that changes are manageable will trend towards the often/almost always responses.

Nurses and ancillary staff were: (a) aware of the magnitude and impact of

<table>
<thead>
<tr>
<th>Question: How often do you...</th>
<th>Hospital</th>
<th>PERCENT WHO RESPONDED:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Never</td>
<td>Rarely</td>
</tr>
<tr>
<td>Encounter multiple, simultaneous changes?</td>
<td>A</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>0</td>
</tr>
<tr>
<td>Feel simultaneous changes are manageable?</td>
<td>A</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>1</td>
</tr>
<tr>
<td>Have adequate preparation to do something new?</td>
<td>A</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>3</td>
</tr>
<tr>
<td>Have difficulty prioritizing tasks?</td>
<td>A</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>9</td>
</tr>
<tr>
<td>Feel in information overload?</td>
<td>A</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>1</td>
</tr>
</tbody>
</table>
simultaneous change; (b) sometimes felt they could manage the amount of change; (c) were often in information overload; and (d) were evenly divided about having adequate preparation for changes. The responses to scaled items and written comments supported our hypothesis that the unit nurses at least occasionally experienced a feeling of change overload. Nurses made it very clear that almost any change in the facility was felt at the “sharp end.” This was particularly apparent in the text from a nurse who took the time to document all the simultaneous changes occurring on her unit at the time of the survey:

Professional partnership model; medication reconciliation; new staff starting/orienting/precepting; new nursing students; new hospital planning; new equipment (SCD pumps, ceiling lifts); focus on decreasing overtime; focus on increasing team playing; focus on patient Picker scores “would you recommend?”; telemetry training; new protocol for insulin pens w/discharged patients (needle packets); added EduNET modules outside our usual time frame (diabetes, moderate sedation, influenza); management changes; construction/detours outside and inside building; EMR changes/updates monthly; relocation of our supply room; focus on email as primary source of information/no paper postings; daily Medicare discharge notices; patient room changes/loss of private rooms.

Healthcare is a decision-intense industry and the potential impact of multiple changes on cognitive processes is a patient safety concern. Because specialists in IT, informatics, facilities, nursing practice and education, administration, quality performance, etc. are skilled in project management, change is frequently managed well within projects. Unfortunately, the management of change across projects and the direct and indirect caregivers’ capacity to adapt and incorporate multiple changes is a perspective rarely considered in the planning and scheduling of project implementations.
THE CHANGE CALENDAR

The change calendar (see Figure 3) is a tool designed to coordinate change across hospital units, departments and organizations, transforming that rushing avalanche of change into a controlled, manageable snowfall. We suggest that achieving this environment is an essential element of a culture of patient safety.

Note that the change calendar looks and operates similar to any project’s Gantt chart: projects/changes are listed along the vertical axis, the horizontal axis is the timeline. The five major differences in a change calendar are: 1.) it includes projects on unit, facility and system levels; 2.) only tasks that impact direct and indirect caregivers are listed; 3.) resources are units and departments; 4.) utilization is the percent of cognitive capacity consumed; and 5.) time to acclimate to the new workflow and cognitive processing post-implementation is always considered. Color-coding bars indicate project status: dark blue bar=scheduled dates for project; aqua bar=scheduled project but exact dates to be determined; no bar=either a potential project without dates or a project that has recently been completed.

Until we have clear timelines, the project entry starts with a single line “placeholder” with “to be determined” (TBD) start and end dates. Traditionally, the TBD eventually divides into two task components: training and go-live. From cognition and change perspectives, this two-task approach is a major failure point in creating a culture of safety because it fails to account for: A) how the caregivers initially learn and acclimate to the new workflow and cognitive processes; and B) how long it takes for the new processes to become the new norm workflow and cognitive pattern. A third component, acclimation, is critical, and a fourth, evaluation/modification, is recommended. When the implementation dates approach, they are proactively scheduled for each unit by week to produce the controlled “snowfalls” of change. The average length of the Change Calendar during the pilots was five to seven pages.
槿few healthcare changes demonstrate the need for this control more than those associated with EMR implementations, which can significantly affect the users’ usual thought patterns, workflow, physical habits/skills (e.g., computer use vs. handwriting), attitudes and subsequent impact on patient care. McCarthy and Eastman address this significant component of change with three comments:

Stabilization is the time when the organization should pause to make sure users have a chance to digest the experience and assimilate the many changes that are taking place . . . Be aware of the struggling user drowning in work... To the extent possible eliminate distractions before, during, and just after go-live. Successful practices include putting other projects on temporary hold, reducing e-mail volume, and canceling all non-EMR related meetings. Focus the organization’s energy on the EMR deployment. (p. 61, 138, 183)

We suggest that the phase to assimilate EMR implementation is longer than a “pause” and that awareness of the users’ situation is not limited to the work tasks themselves but also to the amount of change they are trying to incorporate. For most EMR implementations, the Change Calendar entry starts out as a single line entry with a TBD date and ending with a minimum of three firm date ranges: Training, go-live and acclimate. These three tasks will suffice if the implementation is a Big Bang approach. However, if the implementation is phased across units and departments the Gantt chart will consist of task entries for three times the number of units and departments.

WHO DRIVES THE CHANGES?

Frequently, managers of system-level projects are not aware of changes initiated in a bottom-up system (for instance, at the unit level). System-level projects compete with local initiatives for the cognitive capacity of the individuals on the floor, often to the detriment of all the initiatives. We recognized that these top-down, middle-out, and bottom-up changes had the potential to accumulate with detrimental effects to the initiatives from all levels.

Top/Down. Many of our large projects were decidedly driven top/down such as electronic medical record implementation, follow-up on accreditation action items, care progression, patient flow/bed management, patient rounding, and new lab or radiology systems.

Middle/Out. The highest volume of changes was driven by “category” leaders: regulatory, policies & procedures, nursing practice, pharmacy and therapeutics, IT/informatics, materials & equipment, quality/performance improvement, research, facilities, medical executive committee.

Middle/out projects were often related to interdepartmental workflows and hand-offs such as nursing-pharmacy workflow, shift change handoffs, hourly rounding, policies and procedures (critical lab values, restraints, patient death, medication wastage, stroke rapid response, backfilling of data following planned and unplanned computer downtimes) and service lines (stroke pathways, total joint pain management, fetal monitoring).

Bottom/Up. Initiatives at the local unit level were often missed by the planners of system and category changes. Examples of bottom-up projects included mock survey action plans, annual clinical competency education, policies and procedures compliance, precepting new hires and nursing students, changes in equipment and supplies, new staffing models, and incorporating the new residents who begin annually on July 1.

If possible, planning for organization-wide projects should begin many months ahead of the desired implementation dates to allow for a global perspective of the changes’ effect on staff. Within the change calendar, projects are further delineated by hospital unit and present a monthly or a weekly view of the number and types of changes in the whole organization. When brainstorming or planning, it is best to have the most up-to-date change calendar within easy access for reference to what is already “coming down the road.”

Success of the change calendar depends on buy-in at all levels. It requires being aware of anticipated changes and projects across the system, respect for projects other than your own, respect for the impact changes have on staff, and potential risks to patients if changes are not implemented well or retained. This requires a large culture shift and active senior leadership engagement and awareness.

In our system, use of the change cal-
FOCUS: CHANGE CALENDARS

endar is still not consistent but is gaining headway. Some changes surface with little warning. In many cases the impact on caregivers is still underestimated. However, we are seeing positive movements in managing change. We expect improved employee satisfaction after the implementation of the change calendar, which will be assessed via follow-up surveys after the calendar has been consistently used for at least one year at pilot sites.

HOW CAN WE MANAGE THESE FACTORS TO CREATE A SAFER AND SANER CULTURE?

We need to transition from an organizational culture that implements changes based on the project timeline efficacy to one that pro-actively schedules based on the anticipated impact on caregivers and incorporates a global view of change across projects within the organization. Higgs and Rowland noted that “transformational change requires us to move from traditional linear thinking and top down control to thinking and behavior that involves all of the organization and many stakeholders.”(p27)

When impact to the caregiver (with potential effects on patient care and outcomes) becomes a principal factor for the timing of change, the organization has the framework to shift from top down, project-oriented paradigms to the multiple drivers of top/down, bottom/up and middle/out change. The change calendar facilitates that transformational change and pro-active scheduling to create the snowfall becomes the default prioritization mechanism.

In addition to organizational transformation, improved communication, and decreased cognitive strain, implementation of a change calendar may impact:

1. Root cause analyses (RCA). RCAs often identify distraction and inattention as the root cause of patient safety events. A root-root cause of that distraction can be the amount of change occurring at the time. The change calendar provides a reference tool for changes that were occurring on the unit at the time of the event.

2. Sustainment of change. Smoothing the amount of change can improve the probability of success of concurrent initiatives. Nesse et al. noted, “The success of the change initiative is based not on the structure of the organization but rather on the dynamics of behavior and capabilities of the group.”(p24) Too many simultaneous projects compete for a critical limited resource: the cognitive capacity of staff. The ability to absorb multiple simultaneous changes should be considered as a capability of the group (e.g. unit/department).

3. Staff satisfaction. Carefully implemented change potentially decreases the amount of cognitive strain of direct and indirect caregivers resulting in improved employee satisfaction scores.

SUMMARY

The change calendar is a bold culture transformation that takes an organization from one that schedules its changes based on project efficiencies to one that schedules the change based on cognitive impact on direct and indirect caregivers. We predict this cultural transformation will be recognized as a critical success factor in a healthcare culture increasingly focused on patient safety and staff satisfaction.

RESEARCH OPPORTUNITIES

The amount of change experienced by healthcare staff will continue to accelerate, and the money to support planning, implementation, acclimation, and sustainment of change will continue to be limited. Therefore, we have many opportunities to explore how to facilitate successful change. Questions to consider include:

- What tools can be used to accurately assess – and then predict - the cognitive impact of changes in electronic medical records on the end user?

- Does implementation of a change calendar improve effectiveness of implementation and retention of Health Information System changes?

- What type of changes in informatics or electronic medical records do staff prefer to have “batched together”, and which types do they prefer to have in a gradual “snowfall”?

- How do factors, such as “unit” culture, impact the effectiveness of the change calendar implementation?

- How can the change calendar be used to positively impact the acclimation and sustainment phases of change?

- Is there an association between uncoordinated simultaneous changes and adverse patient events?

- Does implementation of a change calendar reduce adverse patient events?

- Does staff satisfaction improve with the use of a change calendar?

REFERENCES


Passage of the HITECH Act of 2009 has resulted in an increase in the number of health information exchanges (HIE) across the United States. This trend will be accelerated now that the Office of National Coordinator (ONC) will require hospitals and physicians to have three data exchanges outside of their integrated network, or participate in an external health information exchange. Despite 10 years or so of HIE activity around the country and nearly 250 known HIEs, the common belief is that community, regional and state-level HIEs are not financially sustainable and there is no formula for sustainability.

Faced with myriad HIT/HIE initiatives in Pennsylvania, the Pennsylvania eHealth Initiative (PAeHI) took on the role of challenging these assumptions to determine if HIEs can really achieve financial sustainability. For purposes of this article, a financially sustainable HIE is operational, is not dependent on federal funding to support operations and revenue exceeds expenses. Key sustainability questions that were addressed:

- What are the core services of successful HIEs?
- What are the fee mechanisms for hospitals?
- Will physicians pay fees for an HIE?
- Will payers contribute to an HIE?
- Will other stakeholders contribute to the HIE?
- Is there a common success formula for HIE sustainability?
- What collaborations are emerging with HITECH Act partners and others?
- How are successful HIEs repositioning for the future?

The Impact of Different HIES on Financial Sustainability

- What are the characteristics of the primary types of HIEs?
- For key sustainability factors, how do the different types of HIEs compare?
- Will stakeholders financially support each type of HIE in a common region?

How Demographics Impact Financial Sustainability

- Why is understanding demographics important?
How do demographics impact HIE sustainability?
What are important demographic drivers on HIE sustainability?

This article explores these questions based on the work done by PAeHI stakeholders, leadership and the support of the consulting team. Three important activities included interviews with 11 financially sustainable or innovative HIEs around the country; interviews with 28 stakeholders in Pennsylvania, representing 13 healthcare stakeholder groups; and an assessment of the demographic factors in Pennsylvania impacting HIE sustainability. The findings were surprising, and may be useful for other states and regions facing similar issues.

INPUT FROM SUCCESSFUL HIES AROUND THE NATION

Eleven successful state-level and community/regional HIEs were interviewed in September 2010, to provide guidance on successful sustainability models. Five sustainable HIEs have been operational since 2003 or earlier. Four financially innovative HIEs were started between 2006 and 2008, and two are recently operational or are planning for implementation. Of the 11 HIEs, four are state-level HIEs and seven are community/regional HIEs. (See Table 1)

Collectively, these HIEs have been successful at obtaining multi-stakeholder participation at both the community/regional and state levels. Prior to 2010, there were nine fully functioning HIEs, and recently, Capital Area Regional Health Information Organization, Lansing, MI, became operational.

Of these 10 operational HIEs, hospitals were financial participants in nine HIEs; physicians were financial participants in eight; and payers were participants in six. In all cases, fees were based on benefits received, and in most cases, physicians were charged for services received.

Most grew their HIEs organically, with the physician leaders opening the doors to new participants. In many cases, the HIEs are diligent at demonstrating a favorable return on investment to participating organizations and did not undertake activities that could not provide that return.

The four state-level HIEs evolved into different roles. Utah Health Information Network (UHIN) serves as the state’s claims and clinical infrastructure. Vermont Information Technology Leaders (VITL) traditionally has been driven by health reform, starting with the patient-centered medical home model. Only recently has VITL become the state’s exchange and regional extension center (REC).

Minnesota HIE provides clinicians with statewide access to clinical data for 84 percent of the state’s population. Michigan Health Information Network Shared Services (MiHIN Shared Services) limits its role to moving data between its seven sub-state HIEs, which includes integrated delivery networks (IDN), community/regional HIEs, and a physician-based state-wide HIE.

ABSTRACT

Faced with myriad health information technology and exchange initiatives, the Pennsylvania eHealth Initiative conducted a research project challenging assumptions surrounding achieving financial sustainability of health information exchanges (HIE).

This research included interviews with 11 financially sustainable/innovative HIEs across the nation; in-depth interviews with stakeholders in Pennsylvania who together represent 13 healthcare groups; and an assessment of the demographic factors in Pennsylvania impacting HIE sustainability.

Insights from stakeholders reflected a compelling case that integrated delivery networks (IDN), community/regional HIEs and state-level HIEs each play unique but complementary roles. Stakeholders were willing to contribute to the funding of the HIEs in the state to the degree they received a benefit.

Successful HIEs across the country validate that community/regional and state-level HIEs can be sustainable and co-exist with IDNs. Successful HIEs can demonstrate various funding mechanisms and consensus processes to ensure success. Future activities involve several HIEs repositioning their efforts to respond to the requirements of the HITECH Act—such as meaningful use—and address the growing demand for coordinated care, workflow redesign, improved quality and value of services and incorporating new approaches such as accountable care organizations (ACO).

KEYWORDS

Health information exchange, HIE, integrated delivery network, IDN, regional health information exchange organization, RHIO, sustainability factors, financial impact, funding models, community/regional HIEs, state-level HIEs, accountable care organizations, ACO.

TYPICAL CORE SERVICES OF SUCCESSFUL HIES

With the exception of VITL, MiHIN Shared Services and Inland Northwest Health Services (INHS), in Washington, the HIEs had worked—or were working—toward some or all core HIE services: clinical messaging and inquiry. Most were working with the state public health department, reporting or access to the immunization registry. Many had—or were planning to add—e-prescribing, orders and physician workflow tools. Six HIEs had—or were obtaining—low-cost, Web-based certified EHRs to help physicians meet meaningful use requirements.

INHS is unique because it serves as the shared IT services for 38 hospitals and the majority of physicians in Washington. Even so, providers not using shared services can
still access patient data through the virtual private network and, in the future, through standardized data exchange into a provider EHR.

**STARTUP FUNDING MODELS**

Startup funding for clinical exchanges has varied widely—from $750,000 from the Franciscan Hospital, in 1998, for the Franciscan HIE; $1.4 million from the state of Michigan, in 2007, to the Capital Area RHIO; and $20 million to the Rochester RHIO from HEAL-NY grants and multi-stakeholder community matching funds. The pattern for funding source is tied to who the vested stakeholders are in the community.

For many, it was the hospitals, such as with HealthBridge that started with four health systems in Cincinnati. IHIE also benefited from grant opportunities through its relationship with Regenstrief Institute. MedVirginia had private investors. VITL was funded by the legislature. MN HIE was funded by leading hospitals, payers and state government.

**TYPICAL FEE MECHANISMS FOR HOSPITALS**

Of the 10 operational HIEs in 2010, nine charge fees to hospitals. Although fee mechanisms vary widely, most operate out of the principle that fees should reflect benefits received. Representative fee mechanisms include monthly rates for data feeds, plus startup rates; monthly subscription fees; volume-based sliding scale transaction fees for results delivery; fees tied to specific services used; formula-based fees for results delivery; and monthly subscriptions on a per physicians basis with a cap for large organizations. Several organizations spoke of the need to change the fee mechanism as the mix of services for results delivery versus inquiry changes over time.

UHIN and Rochester RHIO have gone through a negotiation process with stakeholders to determine an appropriate fee structure. To support the new clinical exchange, stakeholders in UHIN have agreed to pay fees in the following formula to cover costs: 33 percent hospitals, 33 percent physicians and 33 percent payers. Hospitals will be responsible for determining how their share will be allocated.

Rochester RHIO stakeholders have determined the following formula for covering costs; one-third hospitals and two-thirds payers. The five large urban hospitals will determine how to allocate their share (two-thirds of the hospital total) and the 10 rural hospitals will determine their allocation (one-third of the hospital total).

VITL does not yet charge significant fees to the hospitals but expects to do so in the future. MiHIN Shared Services will charge fees to sub-state HIEs, payers and the state of Michigan. The fee mechanism, which has not yet been determined, will be based on benefits received.

**PHYSICIANS FEES FOR AN HIE**

Contrary to popular opinion, physicians do pay fees for an HIE. Of the 10 operational HIEs in 2010, eight charge fees to physicians. There are four types of scenarios for physician fees.

- **No charges to physicians.** Only IHIE and VITL do not charge fees to physicians. VITL may change this in the future as more services are added.
- **Charges for some services.** Most HIEs charge for some, but not all, services. It is common for HIEs to not charge for basic clinical messaging and inquiry capabilities, but to charge for additional services. Franciscan HIE charges for Web-based EHR and e-prescribing. HealthBridge charges for PQRI, eligibility verification, e-prescribing and the registry, among other services. Rochester RHIO and MedVirginia have obtained a new certified Web-based EHR that is available for a fee. Capital Area RHIO plans to charge for Web-based EHR, e-prescribing and EHR hookups.
- **Charges for all services.** For the clinical exchange, UHIN is charging a sliding scale fee for all services whether used or not based on the size of the practice. UHIN charges its one person practice $600/year for all clinical HIE services. MN HIE charges a monthly subscription fee based on the size of the group with the lowest rates set at $60 per month, per provider.
- **Charges for shared IT services.** INHS is unique in that it offers shared IT support

---

**Table 1: Successful HIEs From Around the United States**

<table>
<thead>
<tr>
<th>Sustainable; Started Prior to 2004</th>
<th>Innovative Around Funding. Started: 2006-08</th>
<th>Planning and Early Stage Start-Up 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Franciscan HIE (WA)</td>
<td>• MedVirginia</td>
<td>• MiHIN Resource Services (state-level)</td>
</tr>
<tr>
<td>• HealthBridge (Cincinnati)</td>
<td>• Minnesota HIE (state-level)</td>
<td>• Capital Area RHIO (early-stage startup)</td>
</tr>
<tr>
<td>• Indiana Health Information Exchange</td>
<td>• Rochester HIE (New York)</td>
<td></td>
</tr>
<tr>
<td>• Inland Northwest Health Services (Washington)</td>
<td>• Vermont Technology Leaders, Inc. (state-level)</td>
<td></td>
</tr>
<tr>
<td>• Utah Health Information Network (state-level)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
services. This infrastructure service goes significantly beyond the typical exchange services of other HIEs. The average physician using INHS shared IT services pays $350 to $500 per month for a full-support model, which is lower than a full EHR when not an ASP model through INHS. This compares to the more limited exchanges that charge between $50 to $250 per month, per provider for specific services.

**PAYER CONTRIBUTIONS TO AN HIE**

Of the 10 operational HIEs, payers are participating financially in six.

- **UHIN**
  - *Administrative Exchange*—Since 1993, payers have been paying 70 percent of the revenue model for the administrative HIE on a per-click basis. This has been a big benefit to the payers since the beginning of the program. Fees have dropped 30 percent in the last six years due to increases in volume.

- **Clinical Exchange**—Each sector (hospital, physicians and payers) are responsible for 33 percent of the revenue model. For payers, this is charged on a $0.85 per-member, per-month basis, capped at 250,000 covered lives.

- **IHIE**
  - *Quality Health First*—IHIE has developed a unique, HIE-based quality and pay-for-performance program. It combines claims and clinical data from the HIE for quality reporting and pay-for-performance. Payers were originally charged $0.30 per-member per-month for participation, but this has dropped as IHIE added more payers. Five health plans and approximately 1,400 physicians participate.

- **Rochester RHIO**
  - *Allocation of Costs*—Payers, insured and self-insured, contribute $2 million annually calculated based on an add-on to each hospital discharge. The rate is set annually by the RHIO Finance Committee to meet RHIO goals. The payments by payers are made to the hospitals, which then pay the RHIO for services. This model was developed by the payers. Medicaid is not yet a participant. In 2011, payer contributions will be supplemented by a $1 million contribution from hospitals.

- **MN HIE**
  - *Sponsorship*—The initial three-year startup funding was provided equally by three hospital, two health plan sponsors, and the state. All six sponsors remain on the board. Health plans do not pay ongoing fees for services.

- **VITL**
  - *State HIT Fund and Payer Claims*—The state’s legislature has established a seven-year health IT fund to support VITL, plus other health reform activities. The state puts in .199 percent of payer claims into the fund annually. This is providing approximately $2.1 million per year for VITL from 2008-15. The health IT coordinator and the health IT fund also will provide funds available through federal matches.

- **Capital Area RHIO**
  - *Covered Lives*—Medicaid, Michigan Office of State Employees and Michigan Office of State Retirees and a health system-owned health plan have agreed to pay the RHIO $0.25 per-member, per-month for covered lives.

- **MIHIN Shared Services**
  - *Medicaid and State HIT Fund and Payer Claims*—The state played an important role in helping the Capital Area RHIO obtain funding for its RHIO. Medicaid is funding Capital Area RHIO on a pilot basis, and could expand statewide because Medicaid patients are in all regions. The Michigan Office of State Employees and Michigan Office of Retirees probably will not fund sub-state HIEs outside of the Capital Area RHIO, where most of their covered lives are located.

- **Private Payers**—MiHIN Shared Services is talking with private payers about funding either MiHIN Shared Services or one or more of the sub-state HIEs. In Michigan, there are three primary private payers: one in eastern Michigan, one in western Michigan and Michigan BCBS. Seats have been reserved for them on the MiHIN board. MiHIN will welcome payer participation anywhere in the chain.

**WHAT OTHER STAKEHOLDERS CONTRIBUTE TO THE HIE?**

- **Capital Area RHIO**
  - The RHIO assesses an annual community membership fee for board partici-

**HOW HIES ARE REPOSITIONING FOR THE FUTURE**

Given the active involvement of HIEs in the HITECH Act programs and access to funding in those programs, the exchanges are well positioned to develop future services with initial use of federal funds. Because these HIEs already are attuned to building viable business models, access to this type of grant funding is a great opportunity.

In addition, several of these HIEs, are already actively positioning themselves in new relationships and providing new services that align them with the push by payers and providers for greater quality and value in care: quality improvement programs, patient engagement, workflow redesign, patient-centered medical home,
meaningful use incentives, ACOs, telehealth, linkages to the social services safety net and so on. Some of these initiatives have the potential to change the sustainability formula.

THE IMPACT OF DIFFERENT TYPES OF HIES ON FINANCIAL SUSTAINABILITY

There are three primary types of HIEs that most states are trying to reconcile: IDNs, community/regional-level and state-level. Presumably, all three HIEs will coexist and can be financially sustainable if their unique differences and complementary roles are understood.

Integrated delivery networks (IDNs). IDNs are usually organized by one institution such as a hospital to connect its physicians and other provider partners. Examples in Pennsylvania are Pinnacle Health System HIE and Doylestown Hospital. IDNs are growing rapidly in the state as a result of the HITECH Act. Also, hospital vendors are well equipped to set up such networks, and an IDN ensures that hospitals and physicians can participate in meaningful use incentive opportunities. Usually, the bulk of the costs are absorbed by the major institution.

Community/regional HIEs. This usually describes a multi-stakeholder data exchange, organized around one or more medical referral regions with a multi-stakeholder governing body. Fees are paid by the stakeholders based on benefits received with startup funding, usually from key stakeholders or outside funding sources such as grants.

Some HIEs outsource their infrastructure to other vendors or HIEs and keep governance, outreach and training local. In Pennsylvania, Keystone Health Information Exchange, Inc. (KeyHIE) and the University of Pittsburgh Medical Center’s (UPMC) HIE, the largest HIEs in the state, are blended IDN/regional HIEs. They have the size and reach of regional HIEs, but maintain many aspects of the governance and funding models of IDNs.

State-level HIEs. This describes an HIE that is defined by the state's geographic boundaries, not by the naturally occurring referral region. There were few functioning state-level HIEs in the United States prior to the HITECH Act. Now, all states are planning and implementing them with funding and guidance from ONC with requirements to collaborate with state and federal agencies, including Medicaid and public health, along with other healthcare stakeholders in the state. In addition to building a data exchange infrastructure, state-level HIEs are responsible for addressing barriers to HIE adoption around privacy and security, standards and legal issues with bordering states.

Three known state-level HIEs are Utah Health Information Network (UHIN), Delaware Health Information Network (DHIN) and Colorado Regional Health Information Organization (CORHIO).

HOW DO HIES COMPARE?

Several fundamental factors contribute to financially sustaining HIE:

1. Delivery of care around Medical Referral Regions (MRR).
2. Speed to critical mass.
3. Physician participation.
4. Economies of scale supported via a “low fees incurred by many” model.
5. Ability to connect to disparate entities.
6. Fees based on benefits received with numerous potential fee mechanism options.

<table>
<thead>
<tr>
<th>Sustainability Factors</th>
<th>IDNs</th>
<th>Community/Regional HIEs</th>
<th>State-Level HIEs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery of care around Medical Referral Regions (MRR).</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Speed to critical mass.</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Physician participation.</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Economies of scale supported via a “low fees incurred by many” model.</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Ability to connect to disparate entities.</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Fees based on benefits received and numerous potential fee mechanism options.</td>
<td>■</td>
<td>■</td>
<td>■</td>
</tr>
</tbody>
</table>
The financial sustainability implications for each type of HIE vary, as shown in Table 2. Sustainability for IDNs is achievable due to low costs and their natural constituencies; potential for improved coordinated care, quality and efficiency; and high participant value and benefits. However, IDNs will have difficulty scaling over time for the bigger wins in quality and value that requires more data from external sources.

Community/regional HIEs have a natural constituency; multiple participating stakeholders; the opportunity for big gains in coordinated care, quality, safety, and efficiency; and clear benefits to each stakeholder, which can be the justification for fee income. Communities are also well positioned to receive grants, and they can scale to meet future quality and value needs of the community.

Community/regional HIEs can achieve sustainability with diligent planning; however, community/regional HIEs are complex to launch because of multiple participants. Planning must include a determination of the region's capacity to pay based on specific community/regional factors such as population, insurance coverage, patient demographics, size of hospitals and IDNs within the community/region, physician market (independent vs. employed physicians and specialty vs. primary care), institutional leaders and so on.

State-level HIEs are well positioned to access and distribute state and national data from such sources as Medicaid, public health, national labs, national health plans and more. They are a natural vehicle for state and federal funding and can serve as a vehicle for HIEs to connect to the NHIN for those providers not choosing to do so directly. They can provide direct HIE services to providers that are not otherwise served by IDNs and community/regional HIEs.

In addition, the state HIE plays an important policy role in reducing the barriers to exchange. Financial sustainability models can take advantage of economies of scale and spread the costs of the HIE over many stakeholder groups. The business case is difficult to make with some stakeholders, however, who are oriented toward the community, regional or national levels. This includes, among others, many of the providers and payers. As a result, financial sustainability for state-level HIEs requires the development of a more complex financial model that is reflective of the various stakeholder needs and takes into consideration the benefits that are also received by stakeholders through IDNs and community/regional HIEs.

A VIEW FROM PENNSYLVANIA:

Interviews with 28 Pennsylvania stakeholders representing 13 healthcare stakeholder groups confirm that there is a role for each of the three types of HIEs; there is the potential for all three to be sustainable; and with an open and transparent process, sustainability models can be developed that acknowledge the role that each type plays.

Several of the interviewees recognize that IDNs will continue to grow. Most interviewees see the community/regional HIEs as the natural organizing body for HIEs because of their connection to medical referral regions and many benefits received by all stakeholders. There was near unanimous opinion that it is reasonable for all stakeholders, not just a few, to be a part of the state-level revenue model if there is benefit received. Benefits need to be more clearly articulated for each stakeholder group and the perceived value from the HIEs must be greater to or equal to their financial contribution.

Several Pennsylvania interviewees questioned the value of the state-level entity providing a robust set of applications because this is the domain of IDNs and community/regional HIEs. A suggested deployment strategy for Pennsylvania that supports local, regional and state exchange is to “build from the ground up” by connecting 10 to 12 community/regional HIEs around medical referral regions in a nonproprietary way and then link across the state through a common platform. This unified infrastructure (for example, utility function) was seen as the greatest benefit of the state-level HIEs vs. being an applications provider.

There were mixed opinions as to which stakeholder groups would receive the most value/benefit in the state-level HIE and therefore, their respective contributions for HIE participation. There was a consensus among interviewees that all stakeholders must be at the table when determining the sustainability models, particularly for the state-level HIEs. Transparency to stakeholders is key.

HOW DEMOGRAPHICS IMPACT HIE SUSTAINABILITY

The impact of demographics on sustainability is reasonably easy to determine, but is frequently not considered. How many times has an HIE received a grant, implemented an HIE, and then cannot sustain it after the grant has run out because vendor and overhead costs exceed what the participants are willing to pay? While there are many reasons why this might happen, sometimes it is as simple as the demographics do not support it; the total potential fees from stakeholders (revenue capacity) is less than the costs of the HIE. Wouldn’t it be better to understand the revenue capacity of a region before the HIE is built, not afterwards?

IMPORTANT DEMOGRAPHIC DRIVERS OF HIE SUSTAINABILITY

Below is a list of easy-to-obtain demographic information that a region can use to provide guidelines on revenue potential. These four areas—general demographics, health systems, physicians and payers—tend to be drivers of sustainability. When the demographics are favorable, sustainability is easier to achieve, and when the reverse is true, changes may be required to the HIE model that compensates for the unfavorable demographics.

1. General demographics: Total population and population mix by age, urban vs. rural and income level.

2. Health systems: Number of institutions and beds (or admissions/discharges) for health systems and/or integrated delivery networks, large hospitals, medium size hospitals and small hospitals including critical access hospitals.

3. Physicians: Number of physicians and practices by primary care vs. specialty care, employed, size of practice, and adoption levels.
### Table 3: Demographic Drivers on HIE Sustainability

<table>
<thead>
<tr>
<th>Demographics</th>
<th>More Favorable Impact on HIE</th>
<th>Less Favorable Impact on HIE</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population size</td>
<td>• If large population, easier to achieve economies of scale.</td>
<td>• If small population, harder to achieve economies of scale.</td>
</tr>
<tr>
<td>Age mix</td>
<td>• If young population, favors private payers and Medicaid.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• If older population, favors funding by retirement pools and hospitals (transitions of care).</td>
<td></td>
</tr>
<tr>
<td>Urban vs. rural</td>
<td>• If urban, easier to achieve economies of scale.</td>
<td>• If rural, harder to achieve economies of scale.</td>
</tr>
<tr>
<td></td>
<td>• If rural, may have history of collaboration.</td>
<td>• If urban, may have history of complex politics.</td>
</tr>
<tr>
<td>Income level</td>
<td>• If high income, greater potential for private payer participation.</td>
<td>• If low income, greater potential for Medicaid funding.</td>
</tr>
<tr>
<td></td>
<td>• If low income, potential for provider funding by those who serve the uninsured.</td>
<td>• If low income, potential for provider funding by those who serve the uninsured.</td>
</tr>
<tr>
<td>Health Systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integrated delivery networks (IDN)</td>
<td>• Sees the need for HIE and can pay for it.</td>
<td>• IDN perceived to serve need; may contribute less to other HIEs.</td>
</tr>
<tr>
<td>Health systems</td>
<td>• Sees the need for HIE and can pay for it.</td>
<td>• May choose to establish IDN and contribute less to other HIEs.</td>
</tr>
<tr>
<td>Large hospitals</td>
<td>• Sees the need for HIE and can pay for it.</td>
<td>• Politics and competition may be a barrier.</td>
</tr>
<tr>
<td>Medium-sized hospitals</td>
<td>• May see need for HIE, has some resources to pay.</td>
<td>• Politics and competition may be a barrier.</td>
</tr>
<tr>
<td>Small hospitals</td>
<td>• Has a high need for an HIE.</td>
<td>• Doesn’t have resources to pay a high fee.</td>
</tr>
<tr>
<td>Number of hospitals in a region</td>
<td>• High number of hospitals—can achieve economies of scale.</td>
<td>• Low number of hospitals—lacks economies of scale.</td>
</tr>
<tr>
<td>Physicians</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary care vs. specialists</td>
<td>• Specialists more likely to have an EHR and see need for HIE.</td>
<td>• Primary care has high need, but may not be ready for adoption.</td>
</tr>
<tr>
<td>Employed</td>
<td>• Will probably participate through hospitals.</td>
<td>• Hospitals may not want to pay both hospital share and employed physician share.</td>
</tr>
<tr>
<td>Size of practice</td>
<td>• Large practices more likely to have EHR &amp; see need for HIE.</td>
<td>• Small practices have need for HIE, but adoption is a barrier.</td>
</tr>
<tr>
<td>Adoption levels</td>
<td>• High EHR adopters more likely to be aware of need for HIE.</td>
<td>• Low level EHR adopters may not understand value of HIE.</td>
</tr>
<tr>
<td>Payers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medicaid</td>
<td>• Will invest in HIE where Medicaid patients are located.</td>
<td>• Politics may be a barrier.</td>
</tr>
<tr>
<td>Uninsured</td>
<td>• Hospitals that serve uninsured have very high interest in HIE.</td>
<td></td>
</tr>
<tr>
<td>Private–Fully insured</td>
<td>• Will invest if payer has high levels of “covered lives.”</td>
<td>• May not invest if payer has low level of “covered lives.”</td>
</tr>
<tr>
<td></td>
<td>• Will invest if payer has a regional orientation.</td>
<td>• May not invest if payer has a national/international orientation.</td>
</tr>
<tr>
<td>Private–Self-insured employers</td>
<td>• May invest if there is a large local employee population.</td>
<td>• Not likely to invest if there are few employees in a region.</td>
</tr>
<tr>
<td></td>
<td>• May invest if company has a regional focus.</td>
<td>• Not likely to invest if there is a national or international focus.</td>
</tr>
</tbody>
</table>
4. **Payers**: Number of covered lives for Medicaid, fully insured private pay, self-insured employers private pay.

Table 3 lists each of the demographic categories and summarizes the impact on HIE sustainability in broad terms. While there are many exceptions, this table serves as a general guide on what to expect in a region. For example, a region with a high level of small-physician practices cannot expect the same level of physician financial participation in the HIE as several large-physician practices. This demographic impacts the total cost of the HIE, the services provided, the individual fees that can be charged, and the roll out of the HIE.

Many rural areas have one to two medium-sized hospitals and many small hospitals. While the need is great for HIE among all of these hospitals, medium-sized hospitals may have the ability to pay their fair share for an HIE, but not so with small hospitals. This means these rural areas must be creative to achieve sustainability—join another region, expand the geographic reach of the HIE to include more hospitals, outsource the IT infrastructure to a large HIE or establish a very low-cost, simple HIE solution.

Another example is a region with a high uninsured population served by multiple hospitals and physicians. These providers have a high vested interest in controlling costs across providers. Improved care coordination aligns with the goals of payers. This brings hospitals, physicians and payers together to solve common problems using HIE as a core tool. Probably, there will be no shortage of entities willing to establish and pay for an HIE in this situation.

The final example is a region with a large number of self-insured employers compared to fully insured payers. The self-insured employers may even use health plans as their third party administrators. Yet, if there are many smaller self-insured employers or employers with a national or international focus, the HIE may have a difficult time even gaining the attention of the self-insured employers without extensive outreach efforts by the HIE.

---

**LESSONS LEARNED FROM PENNSYLVANIA: HOW DO DEMOGRAPHICS IMPACT HIE SUSTAINABILITY?**

Many of the state demographics of Pennsylvania support the formation and sustainability of HIEs. Pennsylvania has a relatively prosperous population compared to other states, enabling HIEs to more easily achieve economies of scale. Pennsylvania has many medium- to large-sized health systems, several with national reputations that have already achieved electronic adoption. This positions them well for data exchange.

Multiple private health insurers and Medicaid cover 78 percent of the population, with Medicaid representing 16 percent of the population. Medicaid and several of the state-oriented health plans have already demonstrated strong leadership in transforming healthcare through health IT and exchange. This suggests several funding sources for HIEs in the state.

Other factors are more complex. There are many small hospitals in Pennsylvania, with 84 percent of total hospitals having less than 300 beds, and 47 percent having less than 100 beds. Although small hospitals have fewer resources to become electronic and connect to an HIE, their need for HIEs with low-cost, easy-to-use solutions is significant. This also is true of the estimated 3,000 physicians in small, one- to two-physician, independent practices, and approximately 2,300 physicians in rural areas. Geographies with a high percentage of small practices and rural areas typically are more challenged with initiating health information exchanges.

Despite the large, private insurer base in the state, the majority of the privately insured covered lives are self-insured large corporations. Many of these have a national or international orientation and may not as readily see the value in HIE. The insurers of fully insured plans serve specific regions of the state, so there may be as much interest in funding local, community and regional HIEs as in funding statewide initiatives.
INTERVIEW SOURCE LIST
- Capital Area RHIO
- Francisca HIE
- HIE
- INHS
- MED
- MEdV
- MIHIN
- MN HIE
- Rochester RHIO (GRHIO)
- UHIN
- VTIL
Implementing BCMA

Workaround Avoidance in Barcode Medication Administration Systems

By Charles Still, MBA; Avis Hayden, PhD; and Edward Lanoue, RPh

ABSTRACT

Failure to anticipate common workarounds to barcode medication administration (BCMA) systems will result in their realization. Workarounds to BCMA systems can drastically reduce the effectiveness of the technology in reducing patient medication errors. Numerous studies have outlined how nursing workarounds can reduce the safety-enhancing features provided by BCMA.

Awarded a grant from the Agency for Research and Health Care Quality, Southwestern Vermont Medical Center (SVMC) implemented their BCMA system aggressively, addressing the occurrence, reasons and solutions to workarounds of best practices. SVMC nurses achieved an inpatient barcode scanning rate in excess of 99 percent and a medication scan rate in excess of 97 percent.

This article will review the processes SVMC used to implement BCMA, which included incorporating 2-D data matrix barcodes, creating tools to measure scan rates, and identifying and mitigating workarounds. These process enhancements may be rapidly adopted by other organizations to improve medication safety.

KEYWORDS

Barcode medication administration, BCMA, safety, workarounds, data matrix barcode, scan rates.
IMPLEMENTING BCMA

When a medication is scanned that is not on the patient medication profile, an alert notifies the caregiver to review the discrepancy.

Medication Delivery. The caregiver physically administers the medications and confirms the medication was given and documented on the eMAR. However, the safety benefits of BCMA can be significantly reduced by human factors. Several studies have highlighted how workarounds can undermine the safety net provided by the technology. In addition, many organizations are struggling with consistent use of the technology, and only achieving scanning compliance rates in the range of 85 percent to 90 percent. The one out of 10 medications not being verified by scanning sets up a potential for a tragic error.

CASE STUDY

With funding from the Agency for Healthcare and Research Quality (AHRQ), Southwestern Vermont Medical Center (SVMC) implemented its BCMA system, going live with their ICU in 2007. Since that time SVMC nurses and other caregivers have delivered and scanned over one million doses of medication.

The BCMA system implementation was actively supported by hospital leadership. A multidisciplinary team comprised of members from pharmacy, nursing, education, patient safety and information systems championed the implementation. This team became known as the eMAR Task Force. The governing principle of this task force was to design a system that made it easier for caregivers to do the right thing.

Including nurses on the task force was a crucial factor in overcoming the challenges of using technology at the patient bedside. Five nurses were designated as the Clinical Application Support Team (CAST) and received special training to learn the BCMA software. Their role was to assist with implementation and to troubleshoot issues, including workarounds, in the clinical environment.

This interdisciplinary approach to designing and refining the BCMA system was highly effective due to three important strategies. SVMC nurses have been able to achieve an average medication scan rate of 97.7 percent and a positive patient identification scan rate in excess of 99 percent.

Figure 1 shows the improvement of medication scan rates at SVMC and how it has become more reliable over time.

Specifically these strategies included incorporating 2-D data matrix barcodes on patient armbands and medications, developing tools to measure scan rates by user and unit; and identifying workarounds and methods to mitigate them.

INTEGRATING 2-D DATA MATRIX BARCODES

From the time our project began to the present, the common standard in use in many healthcare environments was a linear code 128 barcode. When printed horizontally across the patient armband, linear barcodes can become curved, which de-formats the barcode, making it difficult to scan.

To scan it properly, the nurse or caregiver must manually manipulate the armband before performing a patient identification scan. This extra step creates the opportunity for a distraction and the incentive to create a workaround. Such distractions to the medication administration process were labeled as a cause for medication errors by the Institute for Safe Medication Practices, which stated: "Efforts should center on increasing conspicuity of critical information, and decreasing diversions of attention and secondary tasks when carrying out complex tasks." A 2010 study documented further limitations of the use of linear barcodes in the patient care environment. The study specifically identified errors caused by mis-reads of code 128 barcodes from patient armbands that could have resulted in glucose results being transmitted to the wrong patient’s medical record. It was noted that an inability to easily identify a patient from an armband scan would encourage nurse users to find more efficient methods of identifying the patient or not scan the armband at all.

A 2010 study documented further limitations of the use of linear barcodes in the patient care environment. The study specifically identified errors caused by mis-reads of code 128 barcodes from patient armbands that could have resulted in glucose results being transmitted to the wrong patient's medical record. It was noted that an inability to easily identify a patient from an armband scan would encourage nurse users to find more efficient methods of identifying the patient or not scan the armband at all.

To address this incentive to create a workaround, the information technology analysts choose to develop an innovative armband that utilized two-dimensional barcodes and repeated them around the surface of the armband. The data matrix barcode format offers much greater error-checking capabilities than code 128. Mis-reads of 2-D barcodes are significantly less...
likely than when utilizing code 128.9

This innovation was a critical success factor to high positive patient scan rate compliance at SVMC (see Figure 2). The armband contains a traditional linear code 128 barcodes for the legacy point of care blood glucose monitors and data matrix barcodes printed repeatedly around the surface of the armband. As long as one of the 2D barcodes is visible (not covered by another armband or clothing) the nurse can immediately scan and positively identify the patient to the BCMA system without first having to manually manipulate the band.

The organization chose to utilize a data matrix format for their 2-D barcode symbology in line with the proposed GS1 Standards for Health Care. The thermal armband printers have internal processors capable of printing the necessary 2-D symbologies independent from the BCMA or main hospital HIS System. This is a key point as any hospital can rapidly adopt 2-D technology for improved patient identification without waiting for functionality form their software provider. The intelligence for creating a two dimensional barcode is inherent in the BIOS of the printer.

CREATING TOOLS TO MEASURE SCAN RATE BY USER AND UNIT

One significant role for the team after go-live was to actively monitor BCMA system compliance. Data was collected and reviewed monthly using a detailed reporting system. This review analyzed transactional history of every medication that had been administered, whether it was scanned or not, and whether the patient’s armband was scanned as part of the medication pass.

Scanning rate percentages were calculated for each unit and then a standard deviation analysis was calculated to make it possible to compare a nurse’s individual scanning compliance rate to their unit’s average. This methodology was key to SVMC’s high scanning compliance rates. With a schedule of regular monthly meetings, it was possible to review trends in performance over time and identify barriers in the environment.

Over time, the team continued this process of rapid improvement cycles. Each month, team leaders would review the scan data for each nurse and each medication. If a specific medication was not scanning properly, the pharmacists worked to mitigate these failures. If a nurse had a lower rate than his/her peers, the leaders would engage in a “no blame” conversation to identify and understand the barriers to scanning.

IDENTIFYING WORKAROUNDS AND METHODS TO MITIGATE THEM

SVMC actively pursued and confirmed instances where the standardized process of performing the BCMA medication pass was not followed. It should be noted that while the occurrence of these workarounds were not endemic throughout the organization, the utilization of workarounds in even some instances directly reduces the effectiveness of the safety net provided by the BCMA system.

In the project, SVMC encountered four types of workarounds. Figure 3 outlines the four types found.

The BCMA system allows for patient identification to occur either manually or via a barcode scan. The organization determined this functionality was necessary in the event that the patient’s armband was unable to be scanned for some reason. The team monitored barcode armband scanning compliance percentages, and provided feedback via the reporting system to nurses and nursing leadership. A high level of patient identifying barcode scanning compliance was readily apparent. Initial review several months after going live indicated a 98 percent positive patient armband barcode scanning rate.

Observational studies of the medication process returned concerning information. Despite the utilization of 2-D barcodes, scattered reports of workarounds in the process of positive patient identification scanning were reported. Patient labels containing a barcode printed at the time of admission that were legitimately utilized for charge capture of consumables and scanning and archiving of paper notes contained the patient account number. Some percentage of times rather than identifying the patient by barcode scanning the patient armband, these other barcodes were scanned to identify the patient to the system. The BCMA system had no mechanism for identifying whether the barcode scanned to identify the patient was the actual armband, or another identifying barcode.

The task force initially decided to resolve the workaround of nurses not scanning the armband with policy and education. After a number of months, the team observed that the problem was still occurring, despite education and policy review. A technical resolution was deemed to be needed.

The team noted that the BCMA system in use did not have the capability to differentiate an armband from another label. To resolve the issue and other identifying patient labels unrecognizable to the BCMA system a check digit was added to all barcoded patient identifying labels. This check digit also made the labels
unrecognizable to the blood glucose monitors in use at the hospital.

Provisions were made to accommodate the use of the check digit on the patient labels in the hospital's document archiving, charge capture, imaging systems and to specific barcode scanners in the lab where patient labels are utilized as part of the specimen collection process. The supporting systems that utilized the inpatient labels were all reprogrammed to accommodate the use of the check digit. This one change immediately made all labels readable for supporting positive patient identification. To enable this process, barcode armband printers were placed on the nursing floors to quickly replace damaged patient armbands. In the months following the label changeover, unconfirmed reports of additional armbands being printed by staff were reported. The situation came to a head when several armbands that had been taped to a clipboard were retrieved from a secure shred recycling bin at the facility. Additional armbands were being printed, but left unattached from the patient because caregivers perceived this would improve efficiency and save time.

A review of the audit trail of printed armbands returned inconclusive results due to reporting limitations of the BCMA system. While this particular workaround did not seem to be widely replicated throughout the whole organization its occurrence in even some rare instances was an area for concern. As studies have indicated positive patient identification done incorrectly can lead to wrong dose, wrong patient, and wrong medication errors and completely undermine the safety enhancing features provided by the BCMA system.3,4

Following the task force's primary principle of making it easier for caregivers to do the right thing (scan the armband attached to the patient at the time of medication administration), then the wrong thing (scan a preprinted armband not attached to the patient), the implementation team addressed the issue with both education and technological changes to the BCMA process. Education regarding the appropriate use of patient identifying armbands was developed and communicated. Concurrently, technological changes to the armband auditing report were enacted.

A special nursing armband was created in the system so the audit report would only see reprints done on nursing floors as opposed to all armband printing from other sources, such as normal patient admissions. The armband format itself was also further modified to include the name of who printed the armband on the armband itself, along with the date and time to the armband itself. Education regarding the appropriate use of patient identifying armbands was developed and communicated. Concurrently, technological changes to the armband auditing report were enacted.

In one case, an omission was made on a sheet of 32 labels leaving two of the labels on the printed page recognizable to the BCMA system. Existant labels in the environment were filtered out of the organization through the normal course of patient discharge.

An additional workaround described in literature cropped up around this time in reaction to the change of labels. The implementation team had agreed early in the process to have a patient armband readily replaceable for supporting positive patient identification. To enable this process, barcode armband printers were placed on the nursing floors to quickly replace damaged patient armbands. In the months following the label changeover, unconfirmed reports of additional armbands being printed by staff were reported. The situation came to a head when several armbands that had been taped to a clipboard were retrieved from a secure shred recycling bin at the facility. Additional armbands were being printed, but left unattached from the patient because caregivers perceived this would improve efficiency and save time.

A review of the audit trail of printed armbands returned inconclusive results due to reporting limitations of the BCMA system. While this particular workaround did not seem to be widely replicated throughout the whole organization its occurrence in even some rare instances was an area for concern. As studies have indicated positive patient identification done incorrectly can lead to wrong dose, wrong patient, and wrong medication errors and completely undermine the safety enhancing features provided by the BCMA system.3,4

Following the task force's primary principle of making it easier for caregivers to do the right thing (scan the armband attached to the patient at the time of medication administration), then the wrong thing (scan a preprinted armband not attached to the patient), the implementation team addressed the issue with both education and technological changes to the BCMA process. Education regarding the appropriate use of patient identifying armbands was developed and communicated. Concurrently, technological changes to the armband auditing report were enacted.

A special nursing armband was created in the system so the audit report would only see reprints done on nursing floors as opposed to all armband printing from other sources, such as normal patient admissions. The armband format itself was also further modified to include the name of who printed the armband on the armband itself, along with the date and time of its printing. Moving forward it would be immediately possible to identify who printed an armband if it were found disconnected from the patient.

Four years after going live with the BCMA system the eMAR Task Force continues to meet on a monthly basis to identify challenges and solutions for safe and effective system use.

### Figure 3: Workarounds: Types, Discovery and Solutions

<table>
<thead>
<tr>
<th>Work Around Type</th>
<th>Discovery</th>
<th>Solutions</th>
</tr>
</thead>
</table>
| Caregiver Does Not Scan Patient Armband | For given date range reviewed armband scan rate is lower than medication scan rate to a degree greater than 5% | • Education on Workflow Requirements  
• Continued Monitoring  
• Use of 2D Barcodes to make it easier to scan the armband  
• Setup workflow to have the armband scanned before medications are scanned. |
| Caregiver Scans Proxy Barcode           | If there are Proxy Barcodes available to be scanned, they will at some point be scanned. | • Disable the capability of proxy barcodes to be scanned.                                           |
| Caregiver Prints Additional Armbands to act as Proxy barcodes | Audit Trail of armband printing in nursing units | • Add name of person printing and date and time to the armband itself.  
• Education                                                                                   |
| Caregiver Does Not Scan Medications     | Low Medication Scan Rate                                                 | Identify Medications that do not have scanable barcodes upstream from the bedside medication delivery process  
• Provide Scanable Barcodes                                                                  |
Observational Studies of the medication process returned concerning information. Despite the utilization of 2-D barcodes, scattered reports of workarounds in the process of positive patient identification scanning were reported.

Conclusions
Straightforward changes to practices and processes in a hospital environment can readily increase the effectiveness of BCMA systems. The use of 2-D barcodes to enhance the patient armband for positive patient identification is BCMA system-independent and can rapidly be adopted by any healthcare system. Using 2-D barcodes increases the reliability of positive patient identification process and reduces error-causing distractions to the caregiver's activities at the bedside.

Older linear style barcode scanners do not provide the necessary functionality to enhance patient safety at the bedside. All hospitals upgrading or purchasing new equipment should invest in imaging scanners to take advantage of 2-D barcode symbologies. An open call is made to all blood glucose point of care device manufacturers to enhance their products by incorporating newer imaging technologies. The laser-style barcode scanners currently in place in the majority of glucose readers are not sufficiently robust for the healthcare environment.

Ongoing measuring, monitoring and detailed reporting of patient and medication scan rates is a critical component of BCMA systems safety effectiveness. Scanning performance should be reviewed over time and statistically analyzed. A caregiver's performance measured via standard deviation against a unit's average performance over time reveals crucial information. If the entire unit experiences a decrease in scanning accuracy, a systemic issue can be flagged for further study and action. Nurses are often too busy in their clinical roles to perform detailed troubleshooting tasks, or even sometimes call the Help Desk when there is a problem.

The only acceptable patient-identifying barcode for the BCMA system is the patient armband. The use of other barcoded labels in the environment that can act as proxies for barcoded identification is not viable. If the BCMA system in use does not support this functionality, strategies utilizing check digits or other techniques must be used to ensure that the patient armband, and only the patient armband, is recognizable to the system. Any other barcodes in the hospital environment that can be scanned will at some point be utilized as a workaround to the bedside medication process.

Acknowledgements
The authors want to thank Elizabeth Dillard, MBA and Barbara Richardson, RN, MSN for their contribution to the content of the article and its completion. The authors wish to acknowledge the funding support from AHRQ that made this project possible. JHIM

Avis C. Hayden, PhD, is a Patient Safety and Quality Specialist at Southwestern Vermont Medical Center, Bennington, VT.

Edward T. Lanoue, BPharm, RPh., is an Informatics Pharmacist at Southwestern Vermont Medical Center, Bennington, VT.

Charles J. Still, MBA, is a Project Manager, Information Systems, at Southwestern Vermont Medical Center.

References
1. Neuenschwander M. I've been thinking. 2010, 1.1.
Virtual Integration
The Role of the Electronic Health Record
By Bert Reese; Elise Spoto; and Colin Konschak, FHIMSS

ABSTRACT
In today’s healthcare environment, physician-hospital integration is an important strategy for delivering efficient, affordable healthcare and improving health outcomes. Virtual integration utilizing electronic health records (EHR) has the potential to create solid alignment between hospitals and physicians that strengthens their relationship and allows for improved patient care.

Relaxation of the Stark regulations, which allows hospitals to donate up to 85 percent of EHR-related software and services, paves the way for utilizing EHR technology and implementation to integrate with community physicians. However, hospitals need to understand the benefits and risks before undertaking virtual integration. The approach employed by an integrated delivery system provides an example of the financial, legal and technological considerations that can help hospitals avoid costly mistakes and maintain positive relationships with physicians. By planning carefully, hospitals can utilize virtual integration with EHRs to partner with physicians and promote efficient management of patient care.

KEYWORDS
EHR, physician integration, STARK, primary care providers, stimulus funding, virtual integration, community physicians.

WHY THE TIME IS RIPE FOR INTEGRATION
Hospitals and physicians have always been integrated at some level, co-existing in a symbiotic relationship that is mostly mutually beneficial. However, in today’s changing healthcare landscape in which patients are beginning to expect an increasingly higher level of care and providers are faced with tightening regulatory guidelines and more stringent reporting requirements, a virtual integration strategy that utilizes technology as a platform may make the most sense.

The increasing adoption of electronic health records (EHR), the relaxation of the Stark Regulations and stimulus funding have created an opportunity for tighter alignment between hospitals and physicians that has the potential to increase physician satisfaction, boost efficiency and revenues for hospitals and ultimately improve health outcomes.

This article discusses the factors that drive physician-hospital integration and the financial, legal and technological considerations involved in a virtual integration strategy developed by Sentera Healthcare, a non-profit integrated delivery system comprised of multiple hospitals, managed care, home health, skilled nursing facilities and physician practices. The benefits of such a strategy include improved patient safety and quality of care, improved patient satisfaction, increased continuity of care, and more efficient management of patient care.

However, there are also pitfalls that include the high cost of implementing such a system and the necessity of competing with vendors that don't face the same limitations as healthcare providers. Hospitals that approach the task of integrating physicians with the help of technology need to be aware of both the risks and rewards of such a strategy in order to successfully execute it.
notion of containing costs and protecting market share, hospitals and physician practice management companies began purchasing physician practices. The goals of integration were seldom reached in this environment, because hospitals, in a frenzy of competition with one another, overpaid for physician groups. What’s more, they had no idea how to manage physician practices and obtained only a superficial level of clinical integration. In theory, physician employment as a means of achieving structural integration was promising, but in reality, it didn’t work.1

Over the last two decades, there has been a trend to lower the cost and increase the convenience of healthcare. This has led to an increasing number of outpatient service centers such as imaging, surgery and cancer centers that have shifted revenue away from hospitals. This disaggregation of services from the inpatient to the ambulatory setting has put hospitals at an increasing disadvantage. Many services have the potential to be disaggregated and in some markets, hospitals are struggling to maintain the volume of their most profitable services.3

Current market trends are favoring the need for strong hospital and physician integration. Providers must find a way to lower healthcare costs due to an aging population and a failure of the managed care paradigm that has led to unsustainable cost increases. Technological advances in medical devices and drug delivery are leading to an increasing use of ambulatory services and both the government and commercial payers are moving toward value-based reimbursement.

Shifts in healthcare provider demographics, such as the nursing shortage and the increasing desire by younger physicians to have a higher quality of life, have necessitated finding ways of increasing the efficiency of delivering care. Furthermore, there is a trend toward consumerism that has led to patients who shop around for the most affordable care, leading to better care decisions, better quality and increased leverage for managed care contracting. It also provides more input on the community standard of care, leading to better evidence based medicine. It further improves care by enabling easier communications with healthcare providers such as physician offices, home health agencies and labs.

Competition plays an important role in driving integration. Physician integration provides a vehicle for hospitals to acquire and retain ambulatory patients, closing the distribution system in a manner not unlike the retail giant Walmart. In an environment that is relying increasingly on the satisfaction of consumers, assisting physicians with EHR implementation and/or maintenance helps hospitals remain competitive. It is much less expensive to utilize a virtual integration strategy rather than purchase physician practices outright. Also, since the cost of switching vendors is high, physicians are likely to remain linked to the hospital over the long term. Hospitals need to consider what is being offered by the competition in their market when considering virtual integration strategies and weigh the cost of doing nothing vs. the costs and rewards of integration over time.

It’s not just hospitals that stand to gain through integration; physician incentives also play a major role. Under the HITECH Act within ARRA, eligible physicians who implement an EHR can receive up to $44,000 in Medicare incentives over five years or up to $63,750 in Medicaid incentives over six years depending on the percentage of their practice comprised of Medicare and Medicaid patients. But considering that EHR capital costs alone for a physician practice are estimated at $54,000, physicians might be looking to hospitals for help in covering the costs.4

Also, in order to receive incentive payments, physicians must demonstrate meaningful use of certified EHR technology, connect the technology in a manner that provides for the electronic exchange of health information and care coordination (a requirement that is expected to come into play with subsequent phases of meaningful use implementation)5 and submit information on quality measures, all of which would be supported by integrating with a hospital.

Perhaps more importantly, those who are unable to demonstrate meaningful use by 2015 will be penalized in the form of reductions in Medicare payments. Providers who utilize a hospital-linked EHR are also in a better position to improve quality of care in the pay for performance model used by insurance companies due to opportunities inherent in a fully longitudinal record. The looming deadline of EHR adoption - along with the attendant incentives and penalties - has created a sense of urgency that hospitals can capitalize on to join forces with physicians.

WHAT INTEGRATION CAN ACHIEVE

The most far-reaching goal of integration is to improve the quality and safety of care and it’s not difficult to imagine how this would be enhanced through virtual integration. Access to a patient’s complete longitudinal medical record comprising a complete history from a physician’s office or hospital in the event of an emergency is the optimal scenario, but such access is beneficial even for more routine medical treatment.

“By having a more complete data set, physicians, nurses and pharmacists will make better decisions,” said David Levin,
IMPLEMENTING A LONGITUDINAL EHR in order to achieve virtual integration between hospitals and community providers can be a risky undertaking. However, if hospitals plan carefully, the rewards far outweigh the risks.

MD, Vice President of Medical Informatics for Sentara Healthcare. These benefits cannot be realized with the implementation of an EHR that is not integrated, a situation that creates data islands in which hospitals and physicians can’t easily communicate with one another.

At the same time, hospitals that are integrated with community physicians have increased contracting power and a competitive edge over hospitals that don’t have these relationships, two important goals of integration.

“It can be a market differentiator with patients,” said Levin. By eliminating the need to continually ask patients to furnish the same information, they are also able to increase patient satisfaction in an environment in which consumerism is playing an increasingly important role. “An integrated EHR gives us a common platform for our patients to engage with us regardless of what provider they’re talking to,” Levin continued. “They get a complete sense of what they need to do to keep themselves well and the provider community acts as a safety net underneath those patients.”

Utilizing integration as the backbone of a data analytics strategy is another typical goal, one that lends itself particularly well to virtual integration. Hospitals are only now beginning to be able to analyze the myriad data they collect; with input from community physicians they would be able to do so at a broader level, anticipating for example an impending flu outbreak in a manner that would allow them to reallocate resources or contract with more temporary nurses.

“The more we can pool data, the better we’ll do in terms of analytics and clinical decision support,” said Levin. “It will give us a boost in the way we study what’s effective and what’s not.”

Another major consideration is that clinical integration provides the tools to generate quality and outcomes tracking and reporting required by insurance companies and the federal government, thus improving the quality of care and potentially increasing reimbursement.

According to Levin, virtual integration will prepare healthcare systems and providers for the next round of payment reform, which is likely to involve value-based reimbursement such as bundled payments or the move towards accountable care organizations (ACO). “It’s hard to see how you would run a model like that or adjudicate how you would divide up the fees without a fairly tight electronic interconnection,” said Levin.

It also creates the opportunity for timely and seamless information sharing, thereby improving continuity and reducing the risk of medical errors. “By handling routine reminders and guidance, it allows care givers an increased opportunity to use their critical thinking skills,” said Levin.

Data generated from virtual integration allows for cost management at the patient level rather than the encounter level, reducing overall expenditures, but it also helps fill in the bigger picture, providing information that can be utilized for disease management at the population level.

FIRST THINGS FIRST

The 2006 enactment of the “Safe Harbor” policy under the Stark regulations allowing hospitals to donate up to 85 percent of EHR-related software, internet connectivity and training/support services to physicians is an enticing proposition. According to a 2007 survey by the College of Healthcare Information Management Executives (CHIME), 35 percent to 40 percent of hospitals surveyed were actively considering assisting physicians with EHRs or were already organizing physician EHR programs. But before plunging ahead, hospitals should carefully consider what such an undertaking entails and make sure they have the resources and backing to proceed.

Perhaps the most crucial step in subsidizing a virtual integration strategy is to obtain executive alignment. Executives should view this strategy as a tool to assist with physician integration and alignment without having to acquire physician practices. While it should be less expensive than acquisition, they need to understand the total cost of operating such a system.

Hospitals are permitted to subsidize physician EHR costs but unlike physicians, they are not receiving economic incentives to do this directly. The complexities and demands of implementing and maintaining such a system are quite different from operating a health system. Hospitals need to continue to build strong relationships with providers and remain competitive in a market where independent vendors, who are not restricted by guidelines about
what they can offer, may be willing to take an initial loss in order to build a long-term relationship.

It is also critical to have an understanding of what the Stark guidelines, which expire at the end of 2013, do and don’t allow. The broad strokes are that up to 85 percent of the cost of technology used to create, maintain, transmit or receive EHRs may be donated. Donations may include software, related technology, and training but may not include hardware in the physician practice, provision of staff to the office, software above and beyond the clinical and business purpose of the practice, or recipients for whom the donations would duplicate existing technology. EHRs must include e-prescribing, they must be interoperable and they must be certified. Donations may take into account factors such as the size of a practice but not the volume or value of referrals and there must be a written agreement between the hospital and provider.

Besides being fully informed of all allowances and exclusions related to the Stark Guidelines before embarking on subsidizing EHRs for physicians, hospitals need to determine what business model they plan on following.

For example, hospitals may choose to outsource the data center or ask a third party to host the applied service provider (ASP). Sentara opted to host the ASP in-house, which necessitated examining a number of factors, one of which was cost. Assuming the full 85 percent subsidy, implementing 100 providers could cost between $4 million and $6 million up front and $1 million to $2 million annually.

Sentara examined whether it had the resources to become a vendor, which involves finding the right balance between running a business, managing costs and maintaining relationships. The company also had to determine whether it had the credibility to sell the concept to community service providers (a consideration that applies to any business model) and assess the need for legal counsel, an important consideration in light of the fact that the Stark Guidelines are both complicated and at times unclear.

THE TOTAL COST OF OWNERSHIP

When determining the costs of planning and implementing an integrated EHR, hospitals need to consider both upfront and ongoing costs. The major categories of upfront costs are centralized hardware, licensing, training, and implementation services. These are one-time costs but there are also ongoing costs such as maintenance of hardware, software, licensing fees and support services. It is important to identify early on what services the hospital will provide. Will the help desk service staff as well as physicians? Will it be open 24/7? Will support be provided on site? Will an account manager be hired to touch base with community providers on a regular basis?

Community service providers will want as much support as possible, but hospitals need to determine the level of support they can afford to provide while at the same time providing an ongoing cost structure that is affordable for community physicians. They also need to be prepared to fully document and identify all costs, which creates the foundation for determining the pricing model. Potential pricing models include per provider, per site, and per office visit.

Hospitals should establish a pricing model that is simple to understand so that it can be easily managed down the road. Currently there is no policy established regarding how the Office of Inspector General (OIG) will review and audit costs, but in all likelihood this will be required at some point, in which case appropriate documentation is essential.

Establishing a pricing model requires long term planning to ensure that the EHR remains affordable. Keep in mind that the subsidy currently remains in effect only through 2013, which means that community providers may eventually need to take over the subsidized portion of the costs of maintaining the system offered by hospitals. If hospitals expect to maintain the relationships with physicians they have spent years developing, they need to ensure that they offer an affordable solution over the long haul.

Hospitals may need to conduct a market analysis to determine their market’s price point in order to be competitive. Independent vendors are not subject to Stark Guidelines and therefore may initially be able to offer lower prices. Hospitals need to consider whether even an 85 percent subsidy will allow them to be competitive and whether they can subsidize upfront and/or ongoing costs and still meet their financial goals.

Instituting an integrated EHR system offers benefits in terms of both return on investment (ROI) and value on investment (VOI). The ROI is similar to a standalone EHR: e.g., the elimination of transcription costs and reduction of supply costs, improved revenue through better documentation and improved positioning for pay-for-performance initiatives. The VOI of an integrated EHR is worth noting: improved communication between primary care providers, specialists and hospitals, quick and easy access to shared patient data and improved workflow.

BECOMING A VENDOR

When a hospital subsidizes an integrated EHR, it becomes in effect, a vendor, but one whose bottom line is tied to community physicians through pre-existing and future relationships rather than profit. Hospitals don’t normally view themselves as vendors, but will quickly discover what this entails. Poorly managing this type of project can adversely affect relationships and have a detrimental effect on the hospital’s long-term success.

“Most hospitals are not prepared for the culture of creating and selling health IT services,” said Jeffrey Daigrepont, an advisor for Divurgent, a healthcare consulting firm. Becoming a vendor requires hospitals to manage costs and establish a pricing model in which they do not have to continually go back and ask providers for additional money as the need arises. They must deliver what they promise and support it well. It is a huge undertaking that requires hospitals to operate much like any for-profit business and consider ways to address each of the following:

- Contract development.
- Legal considerations.
- Marketing plans.
Hospitals and Physicians have always been integrated at some level... however, in today’s changing healthcare landscape ...a virtual integration strategy that utilizes technology as a platform may make the most sense.

Sales expertise.
Account management.
Technical expertise.
Workforce management.
Help desk.
Support.
Tailored products and services.

“A gold plated EHR will be disappointing if it’s not implemented correctly,” said Daigrepont. Implementation is challenging because the hospital will be attempting to change the behavior of its medical staff in ways that will be difficult, especially at the beginning. “Ensuring the medical staff has input on the implementation and even works as a team member to help design the system is critical to its success,” he said.

A well-designed infrastructure that includes good connectivity, up-to-date equipment and end user policies and procedures is also essential. Furthermore, a poorly designed system can create unwanted liabilities for the hospital such as data integrity issues or security breaches. Community physicians must be willing to conform to standards established by hospitals and to accept and follow system policies. “One mistake in this area could have devastating consequences,” said Daigrepont.

As with any vendor, there must be a contract or service level agreement between the hospital and physician practices using the shared system. The contract will establish boundaries, set expectations and describe how to terminate if it becomes necessary. It should also cover obligations, limits of liabilities and mutual obligations.

Required under the Stark Guidelines but in any case a necessity, contract development is a new concept to the medical community. In all likelihood, hospitals will need to hire outside legal counsel familiar with the guidelines. This can be expensive but can prevent many headaches down the road. In addition to outside counsel, in-house counsel, physicians, EHR vendors, hardware vendors, interface vendors and support vendors should all participate in developing a contract. The final product should be physician-friendly and non-negotiable, although customized pricing components and timelines can be accommodated in attached schedules.

From the beginning, it is important that the medical staff is aligned with the hospital, and this means more than just a willingness to embrace the technology. “There has to be a culture of trust and willingness to compromise on both sides,” said Daigrepont. This can be more easily accomplished if physicians promote the concept on behalf of the hospital, which transforms it into a peer-to-peer interaction. Hospitals can incorporate physician input in the design, set up and configuration of the system, set up community physician work groups, establish provider forums for input and feedback among users, and create mini user conferences where they can obtain input and feedback.

A marketing and sales plan is also a necessity to build interest in the project from the outset and ensure its success. Hospitals need to determine what physicians are looking for, e.g. access to a referral network, improved efficiencies, or implementing an EHR in time for federal stimulus incentives. They also need to establish what physicians are willing to pay and what other vendors are offering in terms of price and services.

Sentara hosted community dinners with physicians to discuss the benefits and pricing of their offer and the value of becoming part of an integrated network. It also hired an independent consultant who had worked with many of the practices to help community providers review other offers and understand what each did and didn’t include. Keeping physicians in the loop through posters, flyers and learning sessions were other methods used to keep them up to date. A physician advisory group met regularly to work through developments, and was able to keep their finger on the pulse of community providers’ concerns and help spread Sentara’s message.

Hospitals can strengthen their marketing strategies by leveraging any existing sales teams, as was the case with Sentara’s Physician Liaison Team, or medical staff meetings. Sentara also developed a five-year ‘Total Cost of Ownership tool that let physicians input upfront costs such as monthly fees, hardware costs, potential stimulus reimbursements and other items to calculate total long-term costs and compare offers. Hospitals should emphasize their unique selling points: they are local, they offer the opportunity for physicians to become part of a network, and they have a vested interest in maintaining relationships with affiliated physicians by ensuring that they are satisfied.

Legal and data considerations
The first priority for hospitals implementing an integrated EHR strategy is to ensure that they are not violating the Stark Guidelines. Because these are
complex and relatively new, there are no precedents in this area. Sentara spent two years and worked with several attorneys, both in-house and outside counsel, to develop a contract. In addition to identifying the terms under the Stark Guidelines, it is important to include methods to resolve security breaches and disputes.

One method of handling these issues is to set up committees to handle problems as they arise. Pricing and subsidy terms should also be clearly spelled out in the contract. Sentara began with a typical IT vendor contract as a starting point for items such as the terms of the initial agreement, renewal periods, payment increases, and language related to code ownership and licensing.

It is important to define data ownership in the contract, but this is a grey area that is still being debated. One point of view is that the patient owns the data and the hospital is the trustee. However, many physicians are of the opinion that they are the owners of data entered into the medical record from their practice and are uncomfortable with the hospital having unfettered access to this information.

“Physicians often fear being held hostage by their hospital or they are skeptical that the hospital will somehow use the EHR to gain access to their data and will try to drive ancillary services away from the practice,” said Daigrepont. “This can be overcome through transparency and by having a culture of doing whatever is necessary to help the physician succeed.”

Security, an issue even with paper charts, is of the utmost concern. Hospitals need to define their data strategy, considering questions such as how they will identify what data belongs to whom, what they will do in the event that a physician is no longer participating in the integrated EHR, and how profits will be distributed from the sale of data.

Sentara explored this issue at length with community providers. The resulting contract states that Sentara will be transparent in how the data is used but not subject to any predefined limits on that use. Since utilizing an integrated EHR offers the benefit of being able to use data to trend, track, report, determine best protocols, and deliver the best outcomes, it is difficult to predict at the outset exactly how the data will be used.

However, the contract states that a physician advisory group that includes representatives from community providers will be created to provide advice and assistance in developing policies, procedures and reporting capabilities regarding data.

CONCLUSIONS

Implementing a longitudinal EHR in order to achieve virtual integration between hospitals and community providers can be a risky undertaking. It can be expensive, hard to sell to physicians, difficult to compete with other vendors, and can ultimately adversely affect relationships if implementation and support do not go smoothly. However, if hospitals plan carefully, the rewards far outweigh the risks.

An integrated EHR provides continuity of care between primary care providers, specialists, and inpatient environments, and can simplify transactions between hospitals and physicians, improving their relationships. The result is improved quality and safety, improved communication, improved patient satisfaction and increased physician satisfaction. On a broader scale, the accurate and timely information provided by such a strategy allows hospitals to partner with physicians to improve technologies and integrate ambulatory care, promotes efficient management of patient care, allows hospitals to partner with physicians to design the future delivery of care based on patients’ needs, leads to improved care management and patient outcomes, and can have an influence on the evolution of health information for the entire community.

In conclusion, hospitals should consider the following to minimize the risks and maximize the benefits of an integrated EHR:

- Understand the Stark guidelines.
- Choose a business model.
- Complete a thorough financial analysis.
- Develop a framework for a contract.
- Consider the legal issues from both the health system and provider’s point of view.
- Identify the owners of the data.
- Determine a sales and marketing approach.
- Document baseline benefits in order to be able to measure success.

Bert Reese is Senior Vice President and Chief Information Officer of Sentara Healthcare. Sentara is a HIMSS Analytics Stage 7 health system and 2010 Davies Award winner.

Elise Spoto is the Director of Information Technology, Physician Practice Solutions at Sentara Healthcare.

Colin Konschak, FHIIMSS, is the Managing Partner of DIVURGENT, a national information technology management consulting firm. Colin lead’s DIVURGENT’s Advisory Services Practice.

REFERENCES
4. Final Rule on Meaningful Use, Centers for Medicare and Medicaid Services
**Workforce Challenges**

Leveraging Technology to Educate New Health IT Leaders

By Roger Kropf, PhD

**ABSTRACT**

The increasing need to educate health IT leaders will require the use of other educational methods in addition to classroom instruction, seminars at conferences and Webinars. The author has 12 years experience offering a “blended” course on health IT for managers and clinicians in an MBA program. The course combines face-to-face classroom instruction with online discussion. This reduces the time away from work and the travel required. But it has far greater benefits, including the development of a capacity to analyze situations and develop and defend solutions. Participants share knowledge and begin to grasp the differences in their environments that require attention. This method is compared with other teaching methods and its advantages are explained. The syllabus is available online.

**KEYWORDS**

Health IT, distance learning, online instruction, HITECH.

---

**FEATURE**

**Education**

The HITECH Act is expected to increase the demand for experienced IT workers. Some of them will be new graduates of technology and computer science programs in colleges and universities, especially when the skills involved are common across industries, such as networking. More experienced staff will come from other sectors, including financial services. These individuals will have experience in project management, hardware procurement and systems implementation.

The gap that is likely to remain is a shortage of staff with experience in healthcare management and clinical care to oversee the work of those being brought in as new graduates or from other industries. They are needed to guide implementation in environments that differ significantly from other sectors, especially in regard to the needs and expectations of physicians and other clinicians.

Healthcare managers and clinicians will not be ready to occupy part-time or full-time leadership roles in health IT unless they understand the technology, are aware of the challenges in implementation and how to deal with them, and are capable of developing with others a vision and strategy for IT that is tied to both the business and clinical objectives of the organization.

Educating them about the technology can be accomplished by on-site sessions by existing vendors, Web sites, Webinars and attendance at conferences. The other needs just listed are more difficult to meet. Many current educational opportunities offer rich content but have significant limitations. One to two-hour conference sessions and Webinars are too brief to explore the complex situations faced, and offer too little opportunity for two-way dialogue with all participants. Overcoming these problems by spending more time together and reducing audience size is difficult. Faculty and participant time away from work is limited and expensive. A few intensive courses with experienced faculty and smaller number of participants are available, but expensive both in terms of tuition and lost work or personal time. They can’t “scale up” to cover the large number of people who need the experience.

**BLENDED LEARNING**

Since 1997, I have taught a course in the Executive MBA in Health Administration, which utilizes faculty from 17 accredited health administration programs that are part of the Network for Healthcare Management. The University of Colorado at Denver grants the degree and provides administrative services and classrooms. The program consists of intensive on-campus sessions held for one week every July and January on the Denver campus of the University of Colorado and computer-based instruction during the off-campus sessions.

I teach a course in Healthcare Management Information Systems for managers from across the U.S. and Canada. I work with students for three half-day sessions in Denver in January and then online for nine weeks beginning in early April. The combination of online and in-person education
HEALTHCARE MANAGERS AND CLINICIANS will not be ready to occupy leadership roles in health IT unless they understand the technology, are aware of the challenges in implementation and how to deal with them, and are capable of developing with others a vision and strategy for IT that is tied to both the business and clinical objectives of the organization.

is referred to as “blended learning.” The three half-day sessions are used to provide an introduction to the subject of health IT but more importantly to begin a dialogue on the challenges and solutions available. Students work on group exercises and listen to guest speakers.

For example, they participate in a simulation of an IT capital budget prioritization meeting of hospital leaders. In recent years, a CMIO and CIO have visited to talk about the challenges in their hospitals. Nightly reading assignments prepare students for discussions on topics such as Information and Technology as Strategic Resources, Selecting Systems and Implementation Strategies.

This may sound like the usual short-term conference format. The difference comes in the online interaction that follows. During the nine weeks of online work (referred to as conferencing), students work in groups of four to six people. Each work group is assigned a weekly question on Friday and posts a response by Monday evening for discussion by the entire class. Work groups are multi-disciplinary and include managers working in clinical care and administrative departments. Some have clinical degrees in medicine, nursing and allied professions. All students admitted to the program work in a healthcare organization or pharmaceutical company in mid-level positions. Here is a sample of the questions discussed:

- “Best-of-breed” or “single-vendor” is an important strategic choice for any healthcare organization. How would you go about making the choice? By type of organization? On the basis of its strategy in other areas, e.g., marketing?
- On behalf of the CEO, prepare a memo to the hospital’s Board of Directors in favor of financial support for a RHIO being developed in the community instead of funding a physician portal.
- Would you agree or disagree with the following statement? Why? “The major challenge faced by healthcare organization in protecting their data from unauthorized use is to change how their employees, contractors and clinicians behave. It is not acquiring and using security technology such as encryption and firewalls.”
- Attached is a methodology for determining the dollar savings of an automated appointment reminder system. Would you accept the result as an accurate estimate? Can you suggest any improvements to the methodology?
- A proposal has been made to proceed to purchase a document imaging system. Immediately, a number of physicians and hospital trustees objected, saying that this was unacceptable and that the hospital should develop a 12-month plan to implement an EMR. Create a table showing the “pros” and “cons” of both options.
- Many hospitals, including major medical centers, do not have a PMO (Project Management Office). One objection is the cost, which is viewed as an add-on to current administrative costs. Prepare a short position paper arguing in favor of the establishment of a PMO in a 300-bed hospital. What type should it be (e.g., “lite” or repository model)? Provide a rationale for your choice.
- Do you believe that a physician should have a formal paid position in the information systems organization? If so, which position should the physician have? Why? If not, what role should physicians play in IT governance?

All of these topics could be discussed by experts at a conference or in a Webinar. But in this course, students get to discuss how it might work in their organization after completing readings that address the topics. They talk with each other about the specific situations they face. I act largely as a moderator helping them to focus on the issues, compare and contrast different solutions proposed, and move the conversation to related issues. The result is a more complex consideration of how a potential solution might actually work.

This is certainly not the only online health IT or informatics course available.
Online certificate (e.g., University of California at Davis) and masters programs (e.g., Northeastern University) have emerged.

**TECHNOLOGY CHOICES**

The technologies available for online learning all have advantages and disadvantages. They can be divided into “synchronous” (at the same or real-time) and “asynchronous” (each participant works at a different time) technologies. Video conferencing, live Webinars and chat/instant messaging are synchronous technologies. Bulletin boards and email are asynchronous.

It would be easy to assume that synchronous technologies are superior. They are closer to the real-time conversations we have in the classroom and office. But they have significant disadvantages. Participants must work together, and they have limited time to think and frame questions and responses. It’s difficult to bring together participants working in several time zones. While archiving the Webinar or videoconferencing offers access, it removes the interactions between participants and instructors.

Asynchronous technologies deserve serious consideration. A “conversation” or “thread” in an online bulletin board allows people to participate over a greater range of time. They can read, think and respond rather than responding immediately. Instructors can also sit back and view a conversation as it develops and guide it. More people can participate because the time available is greatly expanded.

In my course, students participate at 7 a.m., 12 p.m., after 5 p.m. and after midnight. They have come from California, Alaska, New York and other states across the United States. A few have come from Canada, Russia and China. Getting them to meet online after work would be difficult even for the United States and Canadian students. A 6 p.m. to 7 p.m. meeting for California students would be a 9 p.m. to 10 p.m. meeting for New York students.

The number of people actually participating is higher in asynchronous conferencing than in my classroom at NYU. The “classroom” is available 24/7 to accommo-
date the schedules of working students. There is no need to ask permission to contribute. Participants talk to each other, not just to me. Those who prefer to wait and see how the conversation develops can do so and still contribute.

**THE ‘CLASSROOM’**

There are a number of good products on the market for online learning. They include Blackboard, WebCT and Sakai. To help those unfamiliar with the technology, I will explain how I use FirstClass in teaching.

Figure 1 shows the desktop my students see after logging on to my course. Folders are available for each week. Other folders are added to give students a place to discuss topics not directly related to the syllabus. This includes discussion of vendors and products, MIS News, ARRA, conferences not directed by the instructor. The student can ask general questions related to a particular week and students can ask general questions.

In the discussion space at the bottom of the screen I post additional readings not in the syllabus, (e.g., a newsletter article that recently appeared) or comments on how that week’s topic fits into the course.

The most difficult component to show is the conversation or “thread” that develops for a particular topic. FirstClass allows the user to select text from a message and when Reply is selected that text and the name of the author is moved to a new message screen. This allows for a dialogue to develop which is easy to read because it is very clear what the student is commenting on. As reply leads to reply a conversation develops about a topic which can be re-read to better understand the points each person is making. Figure 3 shows an example (last names have been deleted.)

**ROLE OF FACULTY**

Technology can be used to provide the equivalent of a lecture or Webinar by videotaping the instructor or saving the whiteboard used to post slides along with the speaker’s voice. This can be very useful to introduce a topic or explain complex topics. Lectures or their equivalent aren’t sufficient to develop analytical and decision-making skills. Participants must express their own thoughts and engage in dialogue with each other and the instructor. Their ideas must be challenged or supported. To encourage that type of learning, faculty need to move from being a content expert to an effective moderator. As Collision and his colleagues put it, from being a “sage on the stage” to a “guide on the side.”

The goals of a skilled moderator are to “focus and deepen the thinking of participants, individually or in a group, without shutting down the inquiry. Faculty need to move to a place of facilitating the inquiry, whether it is through questions, offers for a particular topic or by commenting and encouraging participants to clarify their reasoning and explore assumptions. So there are at least two roles in this type of learning. There are content experts (e.g., CIO, CMIO) who present what they have learned through experience. The moderator has the goal of developing the skills of participants. The same person can adopt both roles but the number of individuals with the skills and knowledge is very limited. As I will discuss later, there is an advantage to seeing these roles as separate if we are to train large numbers of managers and clinicians in a short period of time.

**DEVELOPING SKILLS IN ANALYSIS AND PROBLEM SOLVING**

More managers, clinicians and IT professionals are needed who have the ability to analyze complex problems and define
workable solutions. As rewarding and enlightening as they may be, conference seminars and online Webinars are largely experiences where information flows in one direction and the abilities of those in the audience remain untested.

In an online course over a period of time of active dialogue with peers and experts, professionals can develop analytical capabilities. Ideas are exposed and debated. Participants present their experiences and the situation in their organizations.

Contributions by an expert in the field and a skilled moderator (which could be the same person) are essential. Participants can and do digress into unproductive conversations. It is easy for the expert to “take the stage” and make it difficult for participants to develop their own skills and knowledge.

‘SCALING UP’ TO MEET A GROWING NEED

Meeting the need to educate health IT leaders will require that educational opportunities “scale up” quickly while at the same time offering rich opportunities for learning not possible in conferences and Webinars.

One of the advantages of a “blended” model is it offers the same advantages to faculty that it offers to students—limited time away from home and their jobs and considerable flexibility in where and when interaction with students occurs.

This can open opportunities for CIOs, CMIOs and other experienced health IT leaders to serve as faculty. But it would be naive to believe that they can meet all of the demand given their other responsibilities. Nor are there sufficient university faculty with the needed knowledge and experience.

One of the major advantages of a course that relies on asynchronous discussion is that a skilled moderator can lead that discussion for a larger group of students. It isn’t necessary or desirable for faculty to respond to every message posted by participants. What they need to do is guide the conversation in a way that helps the group think through problems and situations in more complex ways.

This opens up the option of using both experienced IT leaders, including CIOs or CMIOs, and experienced moderators. They can share the work of reading and responding to the “thread” of posts that appear daily. The moderator can ask the CIO/CMIO to comment on a topic or ask for advice on how to direct the group.

After offering several courses, moderators should be able to work more independently and experienced IT leaders can move to making guest appearances or participating via recorded media, including Webinars and podcasts. Alumni of previous courses can be asked to participate in discussions and reflect on how the recent experience compares with what they learned and discussed in the course.

Such courses will need a home and professional associations and universities are obvious choices. Professional associations can offer to their members the opportunity to participate in a course that prepares them to take a leadership role in health IT in their organizations. Universities can take advantage of existing structures for offering executive education to provide such courses. To create a large group of managers and clinicians capable of leadership in health IT will require supplementing content-rich conferences and Webinars with the in-depth, online courses described in this article.

Roger Kropf teaches at NYU’s Wagner Graduate School. His most recent book (with Guy Scalzi) is Making Information Technology Work: Maximizing the Benefits for Health Care Organizations (AHA Press, 2007).

REFERENCES
5. Northeastern University. Master of Science in Health Informatics.
Congratulations to the following individuals who have recently achieved the Certified Professional in Healthcare Information and Management Systems (CPHIMS) credential from January 16 through April 15, 2011. CPHIMS is dedicated to enhancing and promoting the healthcare information and management systems profession by providing the premier credential in the industry. CPHIMS accomplishes this mission by establishing standards for professional practice; creating a fair, valid, and reliable examination process by which professionals can demonstrate their knowledge and skill; granting certification to those who meet the program’s standards; and communicating the value of the credential to consumers and other key constituencies.

Join this elite group. Visit www.CPHIMS.org to find out more and to see the full list of CPHIMS.

- Joseph Abate, CPHIMS – Mount Kisco Medical Group – Mount Kisco, N.Y.
- Mojadudin Hoque Abul Hasarat, CPHIMS – Therap Services – Waterbury, Conn.
- Susan Adams, RN, MS, CPHIMS – Life Care Services – Ankeny, Iowa
- Amitash P. Acharya, CPHIMS – Centers for Disease Control & Prevention – Seattle, Wash.
- Paul Akin, MBA, CPHIMS – Gentiva – Plano, Texas
- Lavondita Alexander, RN, MS, CPHIMS – U.S. Navy – Laurel, Md.
- Ann G. Allan, PhD, CPHIMS – Nemours – Wilmington, Del.
- Aly Ammar, CPHIMS-CA – Provincial Health Services Authority – Vancouver, British Columbia, Canada
- Harry I. Ask, CPHIMS – South Windsor, Conn.
- Bobbi Beaty, CPHIMS – Clarksville, Tenn.
- Lynda Bennett, CPHIMS – University of Kentucky – Georgetown, Ky.
- Therese Y. Berner, CPHIMS – Toronto, Ontario, Canada
- Daniel J. Blick, PhD, CPHIMS – American Nurses Association – Silver, Md.
- Brian Birrer, CPHIMS – Wyckoff, N.J.
- Charles M. Boocy, RN, BC, MSc, CPHIMS – University of California, Irvine – Orange, Calif.
- Christopher Boone, MBA, CPHIMS – Cook Children’s Health System – Fort Worth, Texas
- Mary Branagen, RN, CPHIMS – Johns Hopkins HealthCare – Severna Park, Md.
- Christopher Brandt, MBA, CPHIMS – Audacious Inquiry – Catonsville, Md.
- Margaret Brashier, MS, CPHIMS – University of Louisville – Louisville, Ky.
- Steven Brodson, CPHIMS – Structured – Vernon Hills, Ill.
- Karmir Bulaj, CPHIMS – LogicMotion – Spanish Fork, Ut.
- Thomas Bursky, DCL, CPHIMS – Walter Reed Army Medical Center – Washington, D.C.
- Maureen Case, CPHIMS – University of Pennsylvania Health System – Deptford, N.J.
- Joannita Corneres, PhD, CPHIMS – Baylor Health Care System – Dallas, Texas
- Regine Coia, RN, BC, MS, CPHIMS – Georgia State University – Atlanta, Ga.
- Dustin Colvard, CPHIMS – Tehachapi Valley Healthcare District – Tehachapi, Calif.
- Anthony Crane, CPHIMS – Maxwell Air Force Base – Bessemer, Ala.
- Ngaii Crook, CPHIMS – Health Intelligence – New Plymouth, New Zealand
- Martin Dahman, CPHIMS – U.S. Army Institute of Surgical Research – Fort Sam Houston, Texas
- John Dainty, MA, CPHIMS – LSU Health Sciences Center – Shreveport, La.
- Philip Detelich, CPHIMS – Adirondack Medical Center – Saranac Lake, N.Y.
- Jeffrey Michael Derin, CPHIMS – CamFusion – San Diego, Calif.
- Delano Doelitzch, CPHIMS – Concord, Calif.
- Mark Door, CPHIMS – Silver Spring, Md.
- Daren Douglass, CPHIMS – Health Intelligence – Wellington, New Zealand
- Albert T. Edwards, CPHIMS – Cleveland Clinic – Cleveland, Ohio
- Thomas E. Esch, PhD, MS, CPHIMS – Trinity University – Naples, Fla.
- Elizabeth Evans, RN, BC, CPHIMS – Aetna – Cranberry Township, Pa.
- Stewart Ferguson, PhD, CPHIMS – Alaska Native Tribal Health Consortium – Anchorage, Alaska
- David Alan Foster, CPHIMS – Oracle – Jacksonville, Fla.
- Sue Fox, CPHIMS – Victoria, British Columbia, Canada
- Benjamin Freitas, CPHIMS – University of California, Irvine – Orange, Calif.
- Jennifer Greenbank, CPHIMS – Cambridge University – Cambridge, England, UK
- James Ryan McNulty, CPHIMS – Children’s Hospital & Research Center Oakland – Richmond, Calif.
- David Parker, CPHIMS – Evolent Technologies – Henderson, Nev.
- John P. Parker, CPHIMS – UHS- Eastern Maine Medical Center – Bangor, Maine
- Sazzad Rafique, CPHIMS – Therap Services – Woodbridge, Conn.
- Randy Smith, CPHIMS – West Georgia Health – LaGrange, Ga.
- Alexander Stokic, CPHIMS – University of Cincinnati – Cincinnati, Ohio
- Adam Stinson, CPHIMS – Vancouver, British Columbia, Canada
- Michael D. Stewart, MBA, CPHIMS – L-3 Communications – Huntsville, Ala.
- Barbara Southern, CPHIMS – Palmetto Health – Columbia, S.C.
- Dona D. Lear, CPHIMS – NYSDEC – Albany, N.Y.
- John R. Ruedell II, CPHIMS – Jo-Jo – Lake Oswego, Ore.
- Karen Sannos, CPHIMS – Western Kentucky University – Bowling Green, Ky.
- Patricia Saulsbury, CPHIMS – Bon Secours System – Marriottsville, Md.
- Amanda Scarton, CPHIMS-CA – Vanderbilt, British Columbia, Canada
- Mark J. Selin, MD, CPHIMS – Sutter Health – Alamo, Calif.
- Peggy Simonette, RN, BSN, CPHIMS – Yale New Haven Health System – New Haven, Conn.
- Carin Slader, CPHIMS – Medical Data Services – Greenville, S.C.
- Marlene Elizabeth Smith, CPHIMS – Caltech-Keck – Pasadena, Calif.
- Barbara Stratton, CPHIMS – Palmetto Health – Columbia, S.C.
- Marie Stange, MBA, CPHIMS – Columbia St. Mary’s – Maplewood, Wis.
- Michael D. Stewart, CPHIMS – L-3 Communications – Huntsville, Ala.
- Adam Stinson, CPHIMS – Vancouver, British Columbia, Canada
- Elii Tarlow, CPHIMS – Continuum Health Partners – New York, N.Y.
- Allison R. Thorgren, CPHIMS – Lawrence & Memorial Hospital – Waterford, Conn.
- Joan Marie Tulk, CPHIMS – Dartmouth-Hitchcock Medical Center – Goffstown, N.H.
- Erin Walsh, CPHIMS – Victoria, British Columbia, Canada
- Peter Warchol, CPHIMS – Levittown, Pa.
- Eric Weaver, MBA, CPHIMS – Austin Sports Medicine – Austin, Texas
- Donna Weis, MBA, CPHIMS – Nebraska Medical Center – Omaha, Neb.
- Cindy Wender, MS, CPHIMS – Fairmont – Minot, N.D.
- Richard White, CPHIMS – Falls Church, Va.
- Anne M. Wickham, CPHIMS – Venture Behavioral Health – Battle Creek, Mich.
- Johnny Yuan, MBA, CPHIMS – wmsolutions – Cary, N.C.
Population Health

Beyond Frameworks, Websites and Report Cards

Evolving an Analytical Culture for Population Health Improvement

By James Studnicki, ScD; John W. Fisher, PhD; Christopher Eichelberger, MS; Colleen Bridger, PhD; Kim Angelon-Gaetz, MSPH; and Debi Nelson, MA

ABSTRACT

Health status differences between U.S. communities and subpopulations are an intractable, long-standing national problem. A landmark 1988 Institute of Medicine (IOM) report described a data-driven continuous quality improvement process for community health status which has yet to demonstrate its effectiveness.

Thirty years before the IOM report, IBM analyst Hans Peter Luhn described a similar process for commercial enterprises he termed business intelligence. Accelerated by the dramatic advances in information technology and software development, Luhn’s vision of decision support systems can be seen operating in commercial firms around the world.

For context, the history of public health measurement frameworks and report cards is traced and the state of the art of Web-based query systems is assessed. Five elements of successful decision support systems are identified which are largely absent from efforts to improve population health: multidimensional, event level data; analytical capability; trained users; learning communities; and a cohesive evidence-based framework.

Community health status will not be advanced by static frameworks or scorecards alone, but rather by providing granular data and empowering local communities with a flexible and powerful analytic capability to explore and identify their own unique determinant-outcome relationships and practice priorities.

KEYWORDS

Community health assessment, population health, health status report cards, business intelligence.
1958 article by IBM researcher Hans Peter Luhn, coined the term business intelligence (BI) which he defined as “the ability to apprehend the interrelationships of presented facts in such a way as to guide action towards a desired goal.”

Luhn further stated that the objective of a BI system “is to supply suitable information to support specific activities carried out by individuals, groups, departments, divisions or even larger units. To this end, the system concerns itself with the admission or acquisition of new information, its dissemination, storage, retrieval and transmittal to the action points it serves.” Note the similarity in the concepts expressed by Luhn’s prescient vision of BI and the IOM report. Both describe a form of continuous quality improvement driven by information: one applied to a commercial enterprise, the other applied to community health status.

At the time of Luhn’s paper, the technology to support a BI system was not available. In the 50 years since, however, relational databases, hypercube data warehouses and data mining technologies have moved from fiction to the desktop. Howard Dresner, in 1989, is credited with proposing that BI also be used as an umbrella term to describe “concepts and methods to improve business decision making by using fact-based support systems.”

Today BI software, often referred to as decision support systems, are available for every conceivable enterprise function including financial analytics, supply chain analysis, sales, marketing, operations, strategic planning, document engineering, predictive analytics and many others. Included in these applications are the vast array of developing methods and technologies for handling information: data warehousing and data mining, online analytic processing, visualization technologies, pattern recognition methods and many others. The ability to analyze vast amounts of information from multiple sources is a prerequisite for success in a commercial enterprise. Note that it is the ability to analyze the data within a coherent framework that supports successful decision making, not simply access to the data.

**COMMUNITY HEALTH STATUS: FRAMEWORKS, WEBSITES AND REPORT CARDS**

In a business environment, the concept of profitability is the unifying focus which enables executives to make decisions across a wide range of corporate activities, products, divisions and circumstances. All decisions which impact the financial statements of the organization; i.e. assets, liabilities, revenues and expenses are translatable into their actual or predicted impact on profitability.

Community health, by contrast, is a multidimensional concept without a widely accepted single measure for summarizing the health status of a defined population. Investigators have attempted to combine social and personal attributes with morbidity and mortality in order to create a single integrated or summary measure of population health, such as health-adjusted life years, health-adjusted life expectancy, and quality-adjusted life years.

However, these summary measures can be complicated conceptually. For example, disability-adjusted life expectancy is derived from birth and death rates, age-specific prevalence of each type of disability, and disability weights assigned to various states between death and health.

Additionally, these summary indices do not allow for the assessment of individual dimensions or domains of community health and their variations which exist in any community. Thus, there is neither a current analog for profitability in community health status assessment nor a likelihood of one developing, and no such data coherence between resources, outlays and outcomes.

Essentially, we have no definition of public health operationalized as an integrated set of public health measures. Existing definitions of public health have focused on what health departments do (process) and the resources and relationships which they utilize in performing these functions (structure) but not on the impacts of these activities on the health status of the population (outcomes).

As a consequence, very little progress has been achieved in developing the methods and metrics for analyzing public health, nor has the science of understanding how it is achieved at the local community level been advanced. There have been numerous attempts to provide a unifying framework for community health status monitoring systems. Each of these efforts presented their own static rendition of community health status, accompanied by a parsimonious set of indicators which were presumably linked to determinants of health, root causes for adverse variations in health, or key intervention points related to selected health issues.

The Planned Approach to Community Health (PATCH) developed in 1985 by the Centers for Disease Control and Prevention (CDC) in 1985, the Healthy People objectives (later HP 2000, 2010 and 2020) developed by a consortium of HHS agencies beginning in 1979; the IOM community health improvement model previously referred to which proposed a set of indicators added to the Healthy People 2000 framework in 1997; the Assessment Protocol for Excellence in Public Health (APEX-PH) developed by the National Association of County and City Health Officials (NACCHO) and the CDC and many other lesser known community health assessment models developed by the hospital industry, government agencies, university research groups and collaborations of multiple partners have been widely deployed.

Many federal programs require a formal community health assessment as a prerequisite for funding, and a majority of the nations’ 2,500 local health departments have completed a health assessment within the past three years. However, there is no compelling evidence that the application of this approach for community health assessment has resulted in healthier communities and their benefit has been challenged.

These attempts to provide a framework for defining community health status were accompanied by the desire to compare states, counties and communities (as defined in various ways) against one another. The 1990s saw an explosion in the development of community health report cards variously termed as scorecards, community
health profiles, health status reports, quality of life indices and many others. These reports commonly contained indicators of physical and mental health status, educational achievement, economic prosperity, public safety, housing, transportation, physical environment, and recreational and cultural opportunities.

A UCLA study found that community health report card production was a long, resource-intensive process taking as long as 18 months and resulting in an average cost of $60,000, but ranging up to as much as $1 million. The report further suggested that these efforts are characterized by data constraints and the limited application of modern information technologies.25

Recent examples of the report card approach include the Robert Wood Johnson Foundation (RWJF) funded Mobilizing Action Toward Community Health (MATCH) initiative developed by the University of Wisconsin Population Health Institute26 and the Healthy Communities Institute county profiles.23

These systems, however, exhibit major limitations in their ability to support flexible analysis of the health status of communities. They use aggregate indicators (usually county level) drawn from often asynchronous sources of existing secondary data, and therefore, they cannot drill down into sub-populations of interest defined by race, age, gender, diagnosis or any other important dimension. Because they do not provide access to event-level data they cannot be used with available decision support software nor take advantage of modern IT applications such as visual analytics.

Their static and aggregated based approach represents a fundamental flaw. Neither the proliferation of indicators (i.e., “indicatoritis”) nor the selection of some single grouping of indicators (i.e., “the silver bullet”) will deliver the analytic capability needed by local communities to understand their health problems.24 The data system must precede indicator development, not the other way around.

A related development has been the growth in the use of internet sites which provide health and health related data for community health assessment and other purposes. The number of states reporting a web-based system had grown to 27 states by 2006.25 An evaluation of these systems funded by the CDC Epidemiology Program Office found that “state and local health departments are making a great deal of information available for community health planners.”26 There is wide variation in what datasets are available.

Most sites have some form of death, birth, low birth-weight and population counts. Maternal and child health data are available on about half the sites. Infectious disease information, when provided, is likely drawn from surveillance systems for reportable communicable diseases such as HIV/AIDS, syphilis, gonorrhea and tuberculosis. Most of the sites provide data in a static fashion in simple tables using frequencies or percentages. About a dozen states have some form of queriable data, which allows the user to segment the data on preselected variables such as age, race or gender. These pre-structured queries allow the user more flexibility to choose some variables and dimensions of interest, but the choices are necessarily limited.

These systems, however, do not have the kind of multidimensional navigation and analytical capabilities that can be made available with modern online analytical processing (OLAP) software; their queries return only data not comparisons. Therefore, when viewed from the perspective of what is really state-of-the-art given the rapid advances in computational software and web-enabled applications, currently existing systems demonstrate major limitations.

**THE MISSING ELEMENTS**

If two decades of community health status frameworks, report cards and state web-based health data query systems have not demonstrated the ability to provide the kind of information driven continuous quality improvement system for community health status envisioned by the IOM reports, what system elements absent from the current systems, are likely to move us closer to the goal?

Public health intelligence (PHI) can be defined as a continuing, iterative process in which developing, evidence-based relationships are represented in data based methods and technologies, repeatedly applied in communities of varying socio-demographic composition, with both the determinant-outcome relationships and the information technologies modified as the result of cybernetic feedback. In the following sections of the paper, PHI is viewed as the culmination endpoint of a functional hierarchy of elements in which the deployment of each element enables the development of the next level of capability (Figure 1).

That is, a multidimensional data warehouse and appropriate analytical tools must be implemented before a cadre of users can be trained and learning communities evolved. The technical infrastructure is centralized to minimize development and maintenance costs, but the system capabilities are distributed and optimized locally.

Multidimensional, Event-Level Data. BI relies heavily on near real-time transaction level data. Vast amounts of data from many different sources are similarly necessary in attempting to model population health status outcomes. However, to realize the powerful analytic capabilities of OLAP, data must be available at the lowest level of granularity so that it may be manipulated and viewed along its various dimensions. Static aggregated indicators, like those which are used to populate the various report card systems, are at best crude markers which are subject to various untestable interpretations.

A report card indicator aggregated from hospital discharge data, such as the hospitalization rate for ambulatory sensitive conditions (ASC) per 1,000 Medicare enrollees, retains limited value for interpretation. However, access to multiple years of all the event level discharge data enables the analyst to derive the full analytical benefit from the ASC construct-to understand avoidable hospitalizations for subgroups defined in multiple ways; e.g., by diagnosis, age, race, payer source, geographical location, pathway of the hospitalization (i.e., scheduled or through the ER), trends in the variables over time, and many other factors. It should be noted that collecting, staging, conforming and updating event-
level data from multiple sources is not a trivial task either technically or financially, but it is absolutely essential if the intent is to deliver the analytical power necessary to model the health status of geographically defined populations.

Driven primarily by patient privacy concerns and in response to ever-more powerful data aggregation technologies, access to event-level data is becoming increasingly difficult. The desire to use patient encounter data for wider purposes undergirds such efforts as the Agency for Health Care Research and Quality (AHRQ) Provider Based Population Health initiative and the ONC-IT Beacon Community program. The allure of gaining greater understanding of patient behaviors and the meaningful use mandate will require some accommodation of privacy concerns if the data are to be utilized in anything approaching their true potential.

Analytical Capability. Static data presentation, no matter how extensive, is of limited usefulness in understanding the complex interactive nature of community health status outcomes, their determinants and correlates. Undifferentiated, county-level Years of Productive Life Lost (YPLL), for example, is a summary measure which indicates nothing about the various contributory causes of premature death (e.g., infant mortality, homicides, automobile fatalities, chronic diseases) nor its community distribution by race, ethnicity, gender or geography.

To be able to understand these relationships, an analyst must be able to model and calculate across dimensions, through hierarchies, and across members; slice through subsets for onscreen viewing; drill down to deeper levels of data consolidation (e.g., panic/nonhispanic comparisons of age-death); or rotate to new dimensional comparisons in the viewing area (e.g., move from black/white comparisons to hispanic/nonhispanic comparisons of age-banded chronic disease mortality). This type of analytical power is available with the application of modern OLAP software operating in a conformed data warehouse environment and is widely deployed in the business environment.

Training. Despite the presumed importance attributed to the core public health function of assessment, there is evidence that local public health departments are clearly more focused on delivering personal, preventive, and environmental health services than on strategic planning, evaluation and associated data analysis activities.

In a study of expenditures of annualized manpower hours and salary and benefit expenditures, a large Florida health department expended only 1 percent of its human and financial resources on assessing the health needs of the community.27 By contrast, the provision of primary care, communicable disease and environmental program services accounted for 86 percent of the agency resources. In a more recent exploratory study of local health directors in North Carolina, it was determined that they used subjective criteria more often than data driven objective criteria when deciding on the most important health issues in their communities.

A considerable segment of the respondents, however, considered objective criteria to be more important even though subjective criteria were the dominant influence in their actual practice of priority setting, suggesting that there are barriers to the development of information driven decisions for local public health departments.28 One of those barriers is the lack of trained analysts who have both the technical computer and IT skills and knowledge of population health, epidemiology and statistical methods. It has long been acknowledged that “Training at all levels is a key ingredient in the successful application of BI systems, and that intensive training before, during, and after system implementation helps create the cultural change needed to maximize acceptance throughout the organization” (emphasis added).29

Therefore, it is unlikely that public health can be expected to evolve a vibrant analytical culture without an extensive and sustained program to train the analysts capable of informing decisions with data. This task might even require the development of a new public health professional—one that integrates the competencies of information technology related to data warehousing and large scale, secondary databases, with the public health measurement sciences of epidemiology and biostatistics.

It should be noted that there are a number of initiatives in place to train a health informatics workforce such as the American Medical Informatics Association (AMIA) to x 10 program and the various HITECH training programs funded

---

**Figure 1: Public Health Intelligence Developmental Hierarchy**

- PHI
- Learning Communities
- Trained Users
- Analytical Tools
- Multi-dimensional event level data

- Personnel Infrastructure
- Technical Infrastructure

---
by the Office of the National Coordinator (ONC) of Information Technology. Most of the emphasis to date has been on training for healthcare roles with limited focus on IT competencies related to population health.30

**Learning Communities.** Once a cadre of trained users has access to an extensive data warehouse with multiple conformer databases, the next important step along the way to improving community health status will be the development of population health learning communities. The learning communities will begin to push the development of the systems’ analytical capability through various means by improving the “upstream” availability of the required secondary data, evolving the metrics and methods used in the analysis of community health status, and developing and certifying software products utilized in the analyses.

The shared information, the developing “state-of-the-art” of knowledge about determinants and correlates of population health, as well as the implications for public health practice, will be disseminated in many ways: formal reports and publications, practice guidelines, expert consensus documents, regional and national conferences, continuing education programs, and many other modalities.

One of the best examples of an international learning community is the activities initiated by the Society of Thoracic Surgeons (STS) based upon a data warehouse and registry for adult cardiac surgery. This voluntary system has nearly 900 participating surgeons/hospitals worldwide that have entered data on over 3 million surgical procedures. An extensive data collection instrument records a standardized set of variables for every procedure including patient characteristics, risk factors, treatment detail, and multiple outcomes.31

This organized system enables participants to study the various elements in their own experience which have a measurable impact on cardiothoracic surgical outcomes, and to share their experiences with all participants. The overall goal is to continuously improve surgical outcomes. A system with the same organizational elements of the STS registry could be directed at continuously improving community health status outcomes.

**Public Health Intelligence.** Can we develop a meaningful analog for the BI methods developed in the commercial world for public and population health status improvement? Population health is multidimensional and based upon a complex interaction of determinants and correlates operating at many levels.32

There is no public health unifying index or aggregate measure likely to provide the same focusing effect that profitability serves in the for-profit, commercial enterprise. The remedy to this problem is simple conceptually, but difficult in application. Each community health outcome must be specified and, subsequently, modeled utilizing all available determinants and correlates. For example, a previous study analyzed 113 indicators of community health, organized into 11 conceptual groups (e.g., socioeconomic, resources, infectious morbidity), in an attempt to derive a uniform parsimonious model for population health status monitoring.

Using principal component analysis, nineteen principal components and 70 indicators were retained in the model. The preliminary model was able to explain 56 percent of the variation in all-cause adult mortality, but just 13 percent of the variance associated with adverse birth outcomes.33 It is important to note that this model will explain more than 56 percent of the variation in some communities and less in others. Therefore, the utility of each particular model will always depend on the specific circumstances and characteristics in each community at a specific point in time. For community health assessment purposes, model specificity is more important than generalizability and constantly in flux.

These types of analyses, utilizing various linear and non-linear methods, must be repeatedly directed at as many health status outcomes that can be identified. Over time, the accumulated knowledge represented by these efforts will evolve into specialized fields, variable constellations, or domains. For example, specialized analyses and techniques could emerge for the domain “Built Environment” which would include community descriptive variables (e.g., age of housing stock, access to parks and recreational facilities, transportation pathways and modalities), specified outcomes (e.g., violence, chronic disease morbidity/mortality), and important correlates (e.g., obesity).

Module specific software could be developed, shared and continuously improved in the same way that BI software evolves for business functions such as marketing and sales intelligence.

**CONCLUSION**

Community health status emerges from the dynamic, continuous multiple interactions between system determinants (e.g., poverty, policies) and active agents (e.g., individuals, organizations). These relationships are massively entangled because the component parts of the system and the variables describing those parts of the system are large in number and interrelated in non-linear complex ways. The current generation of population health frameworks and report cards, by contrast, are static models based upon a fixed selection of grouped indicators and a similarly static scoring algorithm which assumes a set of strong expected relationships between variables. For many public health outcomes and determinants, however, there are few well established relationships between variables which hold equally true for all communities. This suggests that, not only will static standardized reports be of limited usefulness (and occasionally misleading), but that a flexible and open approach to exploring potential relationships among all variables becomes increasingly important.

Rather than subjecting diverse local communities to a rigid, “one size fits all” set of metrics against which to compare their outcomes, communities need the capability to continuously discern their own unique determinant-outcome relationships and practice priorities.

The developmental experience of commercial BI decision support systems suggests a functional hierarchy of technical components and human resource elements.
to compose the infrastructure with which to evolve such a system.

Important recent statements from HHS seek to make the connection between quality concepts and strategies being undertaken in the health care system and their application to population health.34,35 Among the priority areas in quality improvement identified in these reports, the use of population health metrics and information technology is emphasized. In particular, the need for data to be available on population subgroups and in formats adequate for analyzing vulnerable populations of greatest need is apparent.36 These recommendations are congruent with, and may be maximally achieved by, the application of the functional hierarchy described in this paper. JHIM

James Studnicki, ScD, is the Irwin Belk Endowed Chair and Professor at the University of North Carolina, Charlotte, College of Health and Human Services, Department of Public Health Sciences.

John W. Fisher, PhD, is Assistant Research Professor at the University of North Carolina, Charlotte, College of Health and Human Services, Department of Public Health Sciences.

Christopher Eichelberger, MS, is Director of College of Computing and Informatics, Software Solutions Laboratory, Charlotte, NC.

Colleen Bridger, PhD, is Director of the Gaston County Health Department in Gastonia, NC.

Kim Angelon-Gaetz, MSPH, is Community Health Assessment Epidemiologist at North Carolina Office of Healthy Carolinians/Health Education, Raleigh, NC.

Debi Nelson, MA, is Deputy Director of the North Carolina Office of Healthy Carolinians/Health Education, Raleigh, NC.

REFERENCES
7. D.J. Power (2007-03-10). A brief history of decision support systems, version 4.0. DSSResources.COM.
17. Substance Abuse and Mental Health Services Administration, Communities that care community planning system.
22. www.healthycommunityinstitute.com
29. www.amia.org
ABOUT JHIM

The Journal of Healthcare Information Management (JHIM) is the quarterly peer-reviewed digital journal published by HIMSS, and is devoted to healthcare information and management systems.

READERSHIP AND CIRCULATION

Our circulation is about 30,000. Our primary audience includes healthcare professionals in hospitals, corporate healthcare systems, clinical practice groups, vendor organizations, healthcare consulting firms and government settings. JHIM is indexed by the American Hospital Association’s Hospital Literature Index and the National Library of Medicine’s online bibliographic database, Health.

ABSTRACT SUBMISSION GUIDELINES

Abstract proposals must include a single-spaced abstract (no more than 250 words) and a complete list of authors and contact information. Send abstracts to Matt Schlossberg, Manager (mschlossberg@himss.org).

ACCEPTABLE MANUSCRIPTS

JHIM seeks articles in the following formats:

- **Market analysis**: Articles defining the state of the field, or its various components, and identifying information and management system needs.
- **Technology overview**: Articles surveying and defining the key enabling technologies and/or business methodologies for the industry or its components, formulas for budgeting and/or needs assessment.
- **Case studies**: Articles explaining who, what, when, how and why of a problem or challenge, and how it was solved or solution proposal. These include consumer-focused case studies. “Marketing” articles are unacceptable. Products names area allotted a single mention. We strongly suggest that articles be co-authored by the provider and vendor.
- **Pilot studies and university studies**: Articles should follow the general format for a scientific article: Introduction, methods, results and comments.
- **Reviews**: In-depth reviews or surveys of a book or resource to further readers’ understanding of the field.

Send articles to Matt Schlossberg, Manager (mschlossberg@himss.org).

MANUSCRIPT SUBMISSION GUIDELINES

Length:
- Articles: 3,000-5,000 words
- Columns: 1,000-1,500 words

Format:
Single-spaced, single-column format, with ragged right body text.

Layout:
- Opening page will include title and bylines. Articles MUST include the abstract and six to 10 keywords.
- DO NOT include headers or footers in article. Do not include page breaks or numbering.
- Footnotes and references should NOT be formatted. To indicate a footnote within the body of text use a standard unformatted number inside brackets. (Exp. [1]). Use AMA style for references.
- Major headings should be in CAPITAL LETTERS, flush left within the column.
- DO NOT include any graphics, illustrations, figures or tables in the body of the article. All graphics must be submitted in separate documents.
- Author biographies are limited to 30 words and should appear at the end of text.
- Caption text for each figure and graph MUST appear at the end of the article.

Figures/Graphs/Charts:
- Articles are limited to three figures, graphs and charts.
- Do not create graphics (tables, figures, charts, graphs, illustrations) in a word processing program.
- Graphics MAY NOT be included within the text of an article. They must be submitted in native file formats.
- Graphic files must be a minimum resolution of 300 dpi and submitted in native file formats. Vector-EPS extensions are strongly preferred. Tables should be as Microsoft Excel documents. PowerPoint presentations, PDF and Web-based (.gif) extensions are UNACCEPTABLE.
- Assign a title and/or figure number to each graphic in the extension. DO NOT include title within body of graphic.
- Label x and y axis of every graph.
- Distinguish bars or pie chart sections by pattern, not color.

Style and Presentation:
- Use standard spelling, style, reference, and grammar guides such as Webster’s New Collegiate Dictionary, the American Medical Association Manual of Style and The Elements of Style.
- Use active sentences and be specific. Back up generalities with examples. Avoid jargon.
- All articles will be copy edited and, where necessary, rewritten. The process by which authors may review and approve changes is defined in the letter of agreement.

JHIM 2012

EDITORIAL CALENDAR

WINTER 2012

Preparing for ACOs: Data and IT Requirements for Clinical Integration
Abstracts Due: July 6, 2011
Manuscripts Due: August 5, 2011

SPRING 2012

Achieving Interoperability Across Care Settings
Abstracts Due: October 2011
Manuscripts Due: November 2011

SUMMER 2012

National Quality Forum Projects and Applicability to the Provider Setting
Related to Meaningful Use
Abstracts Due: January 2012
Manuscripts Due: February 2012

FALL 2012

HITECH: Privacy & Security Issues
Abstracts Due: April 2012
Manuscripts Due: May 2012
All the networking. All the education.

All the exhibits. All online. All for free:

*Qualified individuals receive complimentary registration. Non-qualified individuals can register for $119.00 HIMSS members/$139.00 non-members.

**HIMSS Virtual Conference & Expo**

November 2–3, 2011

**www.himssvirtual.org**
With the need to reform our nation’s health care system by lowering healthcare costs and improving patient care, (accountable care organization) ACO pilots are starting to take hold. ACOs address care coordination ability and mechanisms to support payer partnerships with reimbursement based on quality, efficiencies and patient satisfaction. From the medical home to the integration of systems, processes and services, these evolving programs have great promise but are not without challenge.

Join us for the first HIMSS Virtual Forum on September 13, 2011:

The Future of ACOs

SEPTEMBER 13, 2011

To attend, please register at www.himssvirtual.org