

Alliance Idea Exchange

Clinical decision intelligence: The promise, the challenge
and the impact on the future state of healthcare

Sponsored by IBM Healthcare & Life Sciences

2	Executive summary
4	Introduction
5	Why CDI, why now
5	Cultivating a higher intelligence
7	A new burden: Mining, validating and maintaining knowledge
8	This had better be done right
9	CDI's influence on the bottom line
10	What's in it for me? It depends
12	What's needed to get the campaign going
13	Taking the simple steps first
15	<i>Idea Exchange participants</i>
15	<i>Acknowledgements</i>

Executive Summary

The healthcare industry and government want to build an interoperable computer environment in which standards are employed consistently, data exchanged easily and medical information expressed uniformly. This will bring comprehensive clinical and cost information to the point of decisions, but bringing it won't be enough to truly transform care and improve patient outcomes. Healthcare must go the next step and filter the flood of information to yield actionable advice. This requires clinical decision intelligence (CDI).

In a world influenced by CDI, information is continually put through layers of agreed-upon computer logic to size up a medical situation, weigh all pros and cons, dig out problems buried within other problems, suggest scenarios for treatment and explain to doctors the most current accepted reasoning for the recommendations. Underlying the process is a systematic way to convert information into knowledge. Such computer-aided diagnosis and guidance requires real-time, on-demand access to all patient medical information wherever it is kept. It also requires a dynamic approach to creating and continually updating a knowledge base, whereby medical scholarship is validated and programmed into computerized rules.

This need for a knowledge base, on treatment of all patient conditions in every medical discipline, is a major challenge and a barrier to acceptance of CDI if not resolved. Other barriers include physician apprehension, the new layer of health IT capitalization and expense represented by CDI, and the need to clearly articulate value and return on investment.

The leap into computerized consultation—the synthesis of voluminous information into actionable advice—raises the stakes for the knowledge base fed into rules engines that manufacture clinical intelligence. The quality of the knowledge applied to a medical situation through a rule is paramount. It calls for an established and reliable procedure for creating valid rules, adjusting them for certain situations, and keeping them current. To reduce the high cost and variability of duplicative efforts, there should be a coordinated national effort to build and maintain a knowledge base in the public domain.

Doctors dealing with real patients are likely to be skeptical and apprehensive about theoretical benefits of entrusting decision-making to a computerized system unless a sound process exists for selecting, validating and re-evaluating treatment rules. Even with a sound process, the independence of physicians will pose a challenge to adoption. Ease of adoption also will be a challenge, and some doctors will worry that relying on defective rules—or deciding not to follow a CDI-anointed standard of advice—will both be causes for malpractice actions. Finally, some clinicians may feel squeezed out of the care equation, their judgment marginalized.

CDI can yield important new benefits in an era characterized by demands from payers, government and the public for safer and better care, delivered more efficiently and at less expense. Any shift to payment for quality of care, however, is handicapped by the fact that it requires a level of information-processing sophistication that is rare in healthcare delivery. CDI can help hospitals and doctor's offices capture information fully and use it adeptly in care and accountability.

The appeal of CDI and the benefits of adoption differ depending on the stakeholder. Any campaign to bring the technology to healthcare must address different issues, priorities and benefits for clinicians, hospital systems, payers and patients. Organizing such a campaign will

require another helping of leadership from the federal government and willingness to try new and aggressive approaches. Chief among challenges: creating and enforcing standards necessary to incorporate a body of knowledge into CDI deployment; developing a platform for the technology and inducing industry compliance; and reducing financial barriers to adoption.

Broad changes in the financial and organizational fabric of healthcare delivery are a ways off, but the campaign can start now. There is enough of the technology available to build a case for continued and more sophisticated use. What's needed to start things off is a short list of unarguable things to address, actions that improve healthcare delivery and medical outcomes through computerized vigilance and advice. It's also the time to get clinicians to see that the march of information technology into healthcare is as inevitable as it is nonthreatening.

Introduction

The healthcare industry and federal government, awakened to the need for an interoperable computer environment for exchanging information, have put their collective heads together to achieve it within a decade. By constructing an environment in which comprehensive clinical and cost information are routed to the point of care or the site of analysis, the campaign stands to pay off in a transformed healthcare-delivery system and a heartening improvement in patient outcomes. Or so the thinking goes.

Healthcare is long overdue for this march to computerization and integration, to a world in which standards are employed consistently, data exchanged easily, and medical information expressed uniformly. But in terms of achieving prized objectives—transforming care practices, reducing unnecessary deaths and elevating expectations for outcomes of care—this march may cover only a modest amount of ground. When you come right down to it, the result of providing a full range of information is . . . a full range of information. Then what?

The potential for care improvement is greater at higher levels of IT deployment. Consider a clinician using IT in practice. Electronically entered orders or prescriptions are legible and sent to their destinations easily and immediately. That's the first level of benefit. Getting a computer to react to that order with information about drug or allergy interactions, generic substitutions or dose calculations introduces clinical support for making the right decisions. That's the second level of sophistication. But let's go further. Instead of waiting for an order, an information system assembles all the information it has on a patient's medical situation, runs it by accepted diagnostic markers, invokes computer-generated rules from an expansive database of medical knowledge and displays a message that basically says, "This is the issue, and these are the three things we can do."

That's more than computerized order entry, more than decision support. It's clinical decision intelligence: knowledge applied to a problem to influence the quality of an outcome.

This description of clinical decision intelligence (CDI) was articulated during the course of a two-day Idea Exchange that sought to define, envision and bring a sense of urgency to the nascent technology. Two separate contingents of healthcare experts worked on successive days to uncover CDI value, identify obstacles to its adoption and suggest scenarios that might quicken the pace at which the healthcare industry embraces CDI's potential and takes steps to implement it on a wide scale. The sessions, on Sept. 7 and 8, were sponsored by the Information Based Medicine division of IBM Healthcare and Life Sciences. (See page 15 for full listing of participating organizations.)

The participants explored this new concept and how to make it successful, and the exercises resulted in some consensus around ideas. They also brought out some very different interpretations of CDI and variable plans for harnessing its power depending on the type of healthcare organization. All sectors of healthcare will have to come together with a shared vision before any drive to facilitate intelligent use of health IT can even begin. Like the campaign for health information interoperability that precedes it, the totality of CDI adoption can be daunting, so big that it can be paralyzing. When it does get rolling, the momentum likely will take over. But to avoid paralysis at the outset, the healthcare community needs to outline a specific path for all stakeholders to act on and assign ownership each step of the way.

Why CDI, why now

A basic foundation of health IT systems must first be developed before U.S. healthcare can attain the level of sophistication attendant in clinical decision intelligence, and the movement to supply that foundation is just under way.¹ But participants in the Idea Exchange concluded that preparations for CDI—from creating awareness of its potential to maintaining a national knowledge base to interpret clinical data—must start long before the basics of a health IT information network are in place.

The shortcomings that bedevil the delivery of care in the U.S.—medical errors, breaches of patient safety, wasteful duplication or overuse of medical services, fragmentation of responsibility for a patient’s well-being—can be traced to lack of information. But producing and compiling that information will accomplish only so much to enlighten decision-making and instill fail-safe practices that truly transform the ability of clinicians to provide the best care. The downside of the information explosion is already coming into view, as observed by one participant:

“The levee is already broken. We’re flooded with information but we can’t make a proper decision because we don’t know where to look for a clear screening of it.”

Another participant with many years of clinical IT development under his belt added:

“All of us are just working to try and collect data. It may be too much when we get it. We’re in the process of trying to put it in place where people can get access to it. (But) those who have done very much of that realize there are significant limits to its impact.”

Health IT must go the next step and filter the flood of information to yield actionable advice. Ideally an intelligent clinical IT network eventually would be able to anticipate rather than react to medical situations. The highest use of aggregated data extends to automatically monitoring and providing consultation to clinicians on acute and chronic conditions. This goes beyond the usual magnitude described in discussions on computerized physician order entry and clinical decision support.

Cultivating a higher intelligence

In a world influenced by CDI, the afore-mentioned full range of information is continually put through layers of scientifically validated and/or expert-agreed-upon computer logic to size up a medical situation, weigh all pros and cons, dig out problems buried within other problems, suggest scenarios for treatment and explain to doctors the most current accepted reasoning for the recommendations. In leaving no diagnostic stone unturned, the intelligence-gathering process becomes an opportunity to update clinicians on the most effective ways to troubleshoot and take action to resolve a patient’s medical problem.

There when you need it

Underlying the process is a systematic way to convert information into knowledge. This is a dynamic and continually updated pursuit whereby medical scholarship is validated and programmed into computerized rules, which are applied at appropriate times during clinical diagnosis, treatment and retrospective analysis. Backed by a wealth of observant rules, CDI considers the whole history and risk profile of a patient instead of just the few bits of information entered by a clinician during an encounter with a patient. It recognizes the underlying chronic diseases a patient might have and the immunization or prevention gaps that

exist, triggering prompts to follow diabetes guidelines or address risks for pneumonia, asthma or heart complications.

Some of this targeted interjection of alerts and prompts is already supplied by computerized physician order entry (CPOE) systems, mainly in inpatient settings. Idea Exchange participants viewed this capability as a subset of CDI focused on entering and receiving information on drugs, tests and clinical procedures during the ordering process. Ordering is an important point in the care process, but patient care is more encompassing—including processes to maintain surveillance of interventions and get feedback on the results of treatment throughout an episode of care. While CPOE can inform decision-making and intervene against medication mistakes, CDI takes extra steps to guide a physician to a diagnosis and help manage the cascade of activity associated with it. Said one physician participant:

“When we get that ideal (computer) screen that says, ‘Folks, this is the issue, and these are the things you can do with a single click—You could order heparin (for preventing blood clots) and have the lab tests, the consults, the loading dose, the maintenance dose and the follow-up all arranged’—that would be a change in practice.”

Such computer-aided diagnosis and guidance requires real-time, on-demand access to patient data across all sites of care containing that patient’s record of medical encounters. This part of the challenge is well recognized by the healthcare industry and represents a major objective in efforts to build a national health information network using common means of creating, recording, transmitting and storing clinical information.

Obstacles in the way

But healthcare stakeholders and policymakers might not yet grasp the magnitude of the additional barriers ahead, which if not resolved could make CDI too expensive and too perilous to pull off. Those barriers include:

The need for a knowledge base on treatment of all patient conditions in every medical discipline. The “intelligence” in clinical decision intelligence has to come from somewhere. Then it must be put in a form that can be loaded into computerized rules engines and triggered at the right time and the right place in the course of patient care. This is not just a gargantuan undertaking at the outset but also a sizable task going forward—to account for new medical knowledge, dynamic care guidelines and evolving order sets for all treatment regimens.

Physician/clinician apprehension. The well-publicized skepticism and resistance often experienced in efforts to get the medical community to use and trust CPOE in healthcare delivery could very well be remembered as a minor flare-up compared with getting clinicians to trust a computer to guide nearly every phase of practice. In addition, new issues ranging from malpractice to fears of marginalization spring from this sea change in the care process.

A new layer of health IT capitalization and expense. The anticipated costs of acquiring clinical IT systems for physician offices and hospital organizations already are looming as financial and political challenges of the highest order. The process of engineering industry standards for information exchange adds more cost in the short term, though it likely will reduce costs in the long run. Now add to that the expense of developing and purchasing a new class of much more sophisticated IT system, and also managing and updating an executable base of knowledge to power the decision-making and counseling features of the new CDI system.

Clear articulation of value and return on investment. Beyond the predictable sweeping statements of how CDI can revolutionize medical decision-making and transform the practice

of healthcare, the leaders of the healthcare industry and government will need something more tangible to budge them. This calls for highly creative thought as well as hard proof of significant impact.

A new burden: Mining, validating and maintaining knowledge

Not too long ago, healthcare IT systems had little to do with actual healthcare. They automated billing processes, tracked patient admissions or visits, streamlined recordkeeping in labs, pharmacies and radiology departments, and managed medical-supply ordering and inventories. But as health IT ventured into the automation of information within clinical settings, its value came to depend more and more on programming medical knowledge into IT systems to provide clinicians with pertinent information about drugs, interactions, interventions and ordering options.

The quantum leap of CDI software into computerized consultation—the synthesis of voluminous information into actionable advice—makes provision of medical knowledge the whole point of the clinical IT system, not just an adjunct to round out a roster of data-processing features and functions. This raises the stakes for the knowledge base fed into the rules engines that manufacture clinical intelligence. Idea Exchange participants agreed that figuring out how to populate and maintain a foundation of shareable knowledge is a first-tier issue to resolve.

The quality of the knowledge applied to a medical situation through a rule is paramount. It calls for an established and reliable procedure for creating valid rules, adjusting them for certain situations, editing them and making them current. That's no easy task, a physician participant observed:

“We have far too many examples of, ‘Hormone replacement therapy is good,’ ‘Hormone replacement therapy is bad,’ ‘Hormone replacement therapy may be good in some cases.’ So some of these rules are very dynamic in and of themselves, and they need to be constantly validated. ... It doesn't necessarily mean practicing out of this week's *New England Journal of Medicine*. It means making sure that these rules actually make sense and have some depth of use to them.”

The clinical knowledge deployed in decision-making, and the rules that put it into practice, will need constant re-evaluation and renewal, he added.

“In order for me to rely on that rule, I need to have some comfort in knowing that someone, if not me, is looking at these rules periodically and making sure that they continue to make sense.”

When healthcare providers buy health IT systems, they usually arrange for periodic updates in content and sophistication through a long-term software maintenance contract. But how can IT vendors continually comb through the many sources of scholarship and expertise in the medical field and keep their customers' clinical decision intelligence in tune with the latest findings?

Several healthcare organizations, mainly academic medical centers, have created prototypical CDI systems that demonstrate the magnitude of support that must be in place. Vanderbilt University Medical Center developed such a system in the 1990s that assembles and presents options for a given medical decision, the result of compiling and continually honing a mix of

patient data, medication facts, best-practice consensus and hospital rules.² Physician committees on care improvement, therapeutics and pharmacy meet periodically to reach consensus on the best way to treat an illness after considering the available medical literature and internal expertise. Updates are made at the discretion of clinical departments whenever they see fit, and in-house information specialists program the new or revised information into the routine of doctors.

The sources for this knowledge are legion, ranging from specialty-medicine guidelines and expert panels to medical trials and accrediting agencies; Idea Exchange participants compiled a page of possibles. A cottage industry of companies with names like Zynx and Clin-eguide has sprung up to supply variable permutations of clinical reference and order sets to IT systems. Either choice—to do the work in-house or hire a service—would introduce a duplicative, costly and nonstandard pattern of knowledge database development throughout U.S. healthcare. Vanderbilt now does both: In spite of its in-house heft, it recently contracted with Zynx Health for help in developing and maintaining evidence-based order sets, rules and alerts. There should be a coordinated national effort to cut through what otherwise will be the high cost and variability of doing this by health system, region or vendor, participants concluded.

This had better be done right

Look for physicians to be less than dazzled by the vision of clinical decision intelligence. Theories are one thing; doctors, on the other hand, are entrusted with real patients. Institutionalizing the wrong medical responses can cause harm, and that's why the medical community is so concerned about the methods for selecting, validating and re-evaluating treatment rules. It's really not so different now—erroneous data and misapplied medical guidelines get into medical charts and clinician practice. But as one participant emphasized, errors can exist longer and do wider damage in a CDI era. The same goes for building order sets in current CPOE systems: Bad orders and outdated treatment modalities can harm people over and over. A safeguard capacity may have to be part of a CDI system to detect and stop such errors sooner rather than later. Today's high-end clinical IT systems are much more than strings of code and computer instructions.

Even with a sound process for expertly compiling and vetting a knowledge base, the fierce independence of physicians will test the ability of healthcare governance structures to gain agreement among clinicians on guidelines, best practices and rules. If a hospital has a "tribal mentality" separating doctors and administrators, it will be difficult to secure the trust necessary to gain physician buy-in. Administrators may be part of the problem, too—for example, rejecting a clinically sound but "expensive" rule. Despite the emergence of national-consensus care guidelines endorsed by medical leaders, adoption still depends on decisions made by individual administrators, hospital staffs or physician groups.

In addition to matters of content, CDI acceptance will depend on its ease of use and impact on clinician workflow—the same issues complicating CPOE adoption, only in spades. The disparity in technical comfort and aptitude, the adequacy of the technology and costs of training and retraining medical professionals loom large. Some participants said the ratio of trainers to doctors would have to be 1 to 1. Workflow issues once again take center stage. For doctors, will it consume extra time and affect their revenue? For nurses, will it cut into the time they can spend at patient bedsides?

Malpractice concerns also come into play. Despite the premise that CDI reduces errors and safeguards patients, Idea Exchange participants warned that it had the potential to expose doctors to additional liability. They could be prompted to rely on defective rules and wrong advice. On the other hand, they could get in trouble by electing not to follow a standard of advice. Cries of “cookbook medicine” that rang through the medical profession at the outset of the practice guidelines movement a decade ago could come back as a loud echo.

A more insidious side effect could strike at the heart of the medical professional: the threat of marginalization. With so much of the diagnosis and treatment process conducted by intelligent computers, some clinicians may feel they’re being squeezed out of the care equation, that their judgment and years of experience are devalued. They may be exposed as not having all the answers after all. Companion issues: loss of autonomy, less ownership of the care process; fears about what the data will disclose about them.

As promising as it plays out in theory, clinical decision intelligence won’t simply come to pass any more than health IT standards and interoperability will materialize unaided. A determined collaboration of industry leadership is required to chronicle benefits, build some excitement and begin to communicate what’s to be gained. At the same time, the movement must address the legitimate concerns of physicians and other clinicians about how this is going to work, while also counteracting knee-jerk reactions based on fear and a rush to judgment. It will be tricky to first labor to light a fire and then make sure it doesn’t burn destructively. The Idea Exchange brainstormed at length on definable benefits and worked to identify fruitful steps to merge CDI into the healthcare industry. Ideas included:

- Leveraging motivation for clinical intelligence by linking it to pay-for-performance, quality-based reimbursement and other compensation incentives and penalties under development.
- Developing different messages and benefits for the principal classes of stakeholders: hospitals, clinicians, payers, patients.
- Determining how to get government and private sectors involved in organizing a CDI structure, and what that structure might include.

CDI’s influence on the bottom line

A seismic shift in the reimbursement landscape is about to take place, barely perceptible at this stage but not to be ignored. The shift is to payment for quality of care, instead of merely for sheer volume. Healthcare providers, long rewarded by the amount of care they provide rather than the quality and results, will have to reorient their approach to the business side of operations to foster improvement in the clinical side—and then be able to capture evidence of that improvement for reimbursement purposes. By meeting requirements for managing medical conditions well, hospitals and clinicians qualify for extra payment up front or in return for proof of patient improvement. If they’re not on top of the situation and can’t demonstrate improvement, they have part of their payment withheld.

This management of patient conditions according to reimbursement protocols calls for a level of information-processing sophistication that is rare in healthcare delivery. On the back end, providers’ capacity to collect data related to quality-based reimbursement is not where it should be to support the new payment model efficiently and effectively. Most quality-related data comes not from clinical reporting but from the administrative process, during which acts of healthcare delivery are converted to billing codes to support payment—often by nonclinical

staff. These data are then aggregated, analyzed and used as the best approximation of clinical performance available. Is this what we want to serve as the standard for quality-related data, or should we want to do better?

Under the current norm of clinical fact-gathering, there's often misalignment between what a doctor documents in a patient chart and what ends up in an administrative database. Without a way to easily document and report clinical activity, as well as decision-making and output, providers risk losing credit for good work not fully captured by administrative record-keeping. But that assumes there's credit to be captured. Without being able to know everything about a patient and what best to do in a medical situation, a doctor may not lift quality-indicator adherence to levels required for extra payment.

Additionally, government officials and lawmakers in Washington and elsewhere are making decisions based on this administrative data, which can affect the assumptions and conclusions reached about healthcare issues and the fairness of regulations on reimbursement. With CDI, good analysis based on good evidence will drive good public policy. In sum, the healthcare industry's ability to capture information fully and use it adeptly in care and accountability will be crucial in influencing, complying with and profiting from performance-based payment formulas.

What's in it for me? It depends

CDI for both individual care decisions and broad-based care surveillance can benefit providers, payers and patients alike, and the extent to which one sector embraces it will affect the ability of others to reap its potential. But the appeal to each is somewhat different. Idea Exchange participants saw impact not only in care but also in areas such as access to expertise and malpractice reform.

For clinicians and the care team

Physicians and nurses get an up-to-date and filtered data picture of the patients under their care, and the power of the technology allows them not only to make informed choices on what's in front of them but additionally to anticipate clinical problems before they're full-blown. Incorporating best practices and current medical knowledge leads to improved care. Merging this knowledge with accessible patient history and recent test results leads to more personalized care. The benefits in increased patient safety, thoroughness of caregiving and patient satisfaction are self-evident. With clinical outcomes captured automatically for use in reporting performance-indicator adherence, measurable financial outcomes are tied directly to CDI intervention.

The ability of CDI to base advice on current medical thinking makes a teaching moment out of each episode of contact with a doctor or other health professional. It's like having a critical mass of learned peers in the room giving advice and consultation. This improves the lifelong learning of clinicians and succeeds on a practical level, putting medical education into immediate practice instead of being mere words in a book or journal. Done right, the conversion of expert knowledge into executable rules spreads the expertise rapidly. As one Idea Exchange participant noted, the knowledge in the heads of the top 5% of clinicians in a given area of medicine can raise the performance level of the other 95%.

As mentioned before, legal liability and malpractice issues are significant concerns for physicians. But the Idea Exchange produced a logical argument that CDI could insulate medical practitioners from liability rather than leaving them more exposed. If the actions taken by a doctor are community-approved and recognized as state of the science, the leeway of lawyers to argue the wisdom of a CDI-aided decision should be narrowed considerably.

For hospitals and health systems

Hospital organizations have care-delivery operations that cost upwards of \$100 million annually to support, and they need to bring in every dollar they can while getting the most out of each dollar. Without supreme control over their efficiency, hospitals feel financial hurt. Part of gaining efficiency involves anticipating shifts in disease patterns and demands for certain services; deploying resources and staff to their fullest; preventing unreimbursed complications of care; and capturing all billable activities in the form of supported charges. CDI can enhance all these components of management.

At the community level, CDI technology can scan entire populations for disease-state statistics and give provider organizations better information about the needs of their service area. In an era when only the sickest people are admitted to hospitals, the targeted intelligence and analysis capabilities better integrate the picture of a patient with multiple conditions. By tracking what's done during a patient stay and facilitating next steps faster, the IT eliminates duplication of tests and delays in sequential treatment, reducing the length of patient stays and freeing up capacity for more optimum use. That means available beds and medical equipment, and also availability of staff to treat other patients. Greater efficiency leads to a competitive advantage in a healthcare market.

Healthcare institutions also will have to worry about the dollars coming in once Medicare and private payers make good on intentions to stop reimbursing solely on volume of services and demand evidence of quality performance. Reliance on best practices and compliance with standards tied to reimbursement, both facilitated by CDI, will protect the revenue base and provide opportunity for extra payment. Other benefits: improved reputation and public image, and an organizational culture of excellence that builds staff pride, increases job satisfaction and attracts and retains good people.

For payers

The central goal for payers is not to take in money to spend on healthcare but rather to control the spending. They see CDI as a vehicle to gain control of healthcare costs on a large scale through a host of strategies. Among them: early detection of trends that raise costs; and the sound execution of policies that hold costs down and reduce their financial risk. Payers include the government programs Medicare and Medicaid as well as commercial insurers and Blue Cross Blue Shield plans.

The filtered and analytical data enable payers to identify large-scale healthcare and disease trends and predict patterns of spending. For example, clinicians and business analysts mining the available data can characterize the health status of all diabetics in the U.S. and design more targeted and cost-justified treatment. The dynamic body of knowledge underpinning CDI helps make new knowledge on medical practice actionable in a fraction of the time it used to take. The technology also can guide clinicians more systematically on the many protocols for recommended care already well established—for example, use of beta blockers and ACE inhibitors in the aftermath of a heart attack. A 2003 study on the industry's track record for

clinical-guideline compliance found that only 45% of heart patients who should have received beta-blockers actually got them.³ Research shows beta blockers may cut the risk of death by 13% in the first week after a heart attack and 23% in the months after discharge from a hospital.⁴ Improving compliance to 100% would be a sweeping change in medical practice, and similar improvements in other protocols would help transform healthcare.

Good management is the watchword but not always the result for payers. In a CDI world, they would be able to understand their customers better, manage plan members proactively, monitor their compliance with therapy and customize benefits more smartly. They also would have better data to support contract negotiations with providers, evaluate their outcomes and help develop a better plan with the providers.

For patients

Consumers of healthcare, as highlighted in a previous Idea Exchange, also want control over their health and healthcare costs. They want to trust in the expertise of their caregivers, be involved in their own care, and make informed decisions. Information access is often at one unproductive extreme or the other: either lack of information, or too much information. Lack of it keeps patients in the dark; too much of it leads to confusion and decision paralysis.

Well-analyzed information on patients helps their providers do a better job, leading to more consistency of care and less likelihood that a medical problem will be disregarded in a diagnosis or left to fester without early intervention. Their care is more personalized, and their medical history is communicated more comprehensively to other clinicians. Ultimately, patients reap the benefit in longer life expectancy and higher quality of life.

What's needed to get the campaign going

Organizing for such a sophisticated state of technology and incentivizing the industry to take on the challenges will require another helping of leadership from the federal government and a willingness to try new and aggressive approaches. Chief among challenges: creating and enforcing standards necessary to incorporate a body of knowledge into CDI deployment; developing a platform for the technology and inducing industry compliance; and reducing financial barriers to adoption. The Idea Exchange established scenarios to address these challenges—unencumbered, of course, by the political heat or policy restrictions that normally bear on creative thinking.

Standardizing required elements of CDI

In addition to healthcare's need for standard methods of basic information exchange, the extra reach into knowledge compilation and dissemination will require consensus on standard elements of clinical decision intelligence. The process should start with a small number of required CDI elements—say, 10—and mandate phased-in hospital compliance over a period of about five years, while granting extra time and more gradual compliance for smaller facilities.

At the same time, the healthcare industry must create a public-domain body of knowledge. It's the only way to assure consistency and be able to monitor the medical validity of new and changing decision intelligence. In the emerging medical-knowledge sector, rules maintained by separate companies overlap and are redundant, and methods of representing and operationalizing their intellectual property vary from vendor to vendor. Some rules are not as current as they should be. The industry needs a single living reference body, which can be

constructed partly from borrowing subsets maintained by commercial companies as well as through an accepted process whereby medical specialty societies and consensus groups such as the National Quality Forum build and maintain rules and the scholarship behind them.

Creating an IT platform and inducements

Any foundation for CDI must include one coherent language. At this level of computerization, it's no longer viable for the federal government to make compliance with a standard nomenclature an option rather than a mandate, as it's currently doing with a federally adopted medical vocabulary called Snomed. A public-domain body of knowledge must have a single way of committing medical terms and narration to digital form and loading information into rules databases. Standards for CDI also should include mechanisms to assure interoperability from one system to another, an extensible minimum data set and well-defined security standards for using the medical knowledge.

To induce adoption, the Centers for Medicare and Medicaid Services (CMS) could tie provider eligibility for payment to implementation and utilization of an electronic health record (EHR) system compatible with the defined CDI standards by a certain date. Such a policy should be coupled with programs to help finance EHR costs, such as relaxing laws that prohibit hospital systems from subsidizing IT systems of doctors who refer patients. But CMS also could work with Congress in more unconventional ways where CDI is concerned, for example to provide relief from medical liability for providers and healthcare systems adopting such a quality-improvement system. A suggestion: Enact legislation whereby providers would be eligible to have all claims of medical injury adjudicated by a resolution process modeled on a workers compensation approach rather than in the courts. Such a system is currently used in Denmark. As an alternative, the government could offer tax breaks to subsidize malpractice premiums.

Malpractice costs are daunting. In New York State, obstetricians pay more than \$100,000 annually, according to one Idea Exchange participant. If integrating CDI could either insulate providers from malpractice claims or move them off the litigation model and into a less adversarial model, it would motivate a lot of people to embrace CDI. It also might reduce the hidden costs of practicing defensive medicine.

Taking the simple steps first

Broad changes in the financial and organizational fabric of healthcare delivery are a ways off, but the campaign for acceptance of CDI as a benefit to medical care can start now. There is enough of the technology available to build a case for its continued and more sophisticated use. More and more information is delivered to doctors and nurses in electronic form, so the medium is not as foreign as it was at the beginning of the millennium. Consumers also are more familiar and adept with e-mail and other Internet-style communication, and they are beginning to expect the healthcare industry to function in the information age like other industries.

What's needed to jump-start the discussion of clinical decision intelligence is a short list of unarguable things to start on, actions that improve healthcare delivery and medical outcomes through the assistance of computerized vigilance and advice. Participants noted how the "100,000 Lives Campaign," a recent initiative by the Institute for Healthcare Improvement to instill basic practices that prevent unnecessary deaths, succeeded in galvanizing enthusiasm among healthcare providers. The initiative includes case studies from organizations that are

particularly successful in getting mortality and complication rates down; the how-to cases and their results are published for others to emulate. A similar initiative identifying lives to be saved by computerizing information, say for drug allergies or proper dosing, could demonstrate both immediate benefit and the promise of more complex applications of the technology.

Complex or not, the march of information technology into healthcare is something clinicians have to see as inevitable and nonthreatening. Preparing clinicians for it—easing worries about loss of revenue or marginalization of their judgment—is a challenge that is just starting. One Idea Exchange participant, Larry Grandia, had several insightful anecdotes to contribute on this score. Now a top executive with the hospital alliance Premier Inc., he previously spent 28 years as the chief information officer at Intermountain Health Care (IHC). IHC and LDS Hospital, its largest facility, are acknowledged as a proving ground for IT-assisted clinical decision-making. The informatics leadership at LDS Hospital had to deal not only with the technology but also with some physicians feeling they were somehow diminished because they were utilizing a computer-generated clinical support system. One approach to deal with the issue was to create and share relevant analogies that illustrate the worth of such IT sophistication.

“One such analogy was taken from a photo for the cockpit of an F-16 fighter. Physicians and others were asked the question, ‘Of the data you see in that cockpit, what percent of that data do you think has been filtered by a computer before it’s presented to the pilot?’ Turns out it’s 100%. The next question was, ‘How much less capable or valuable are the pilots perceived to be because they rely on computer-filtered data in order to fly their planes?’”

The object of the discussions with doctors was to poke holes in the notion that it was better to rely on the limits of human judgment rather than work in tandem with an effective, supporting computer system. Another example based on flying:

“Now just imagine you’re in a plane and you’re sitting in the back seat, and halfway through the flight the pilot opens up the door and says basically to you, sitting in the plane: ‘You know, I feel a little frisky today. I think I’m going to turn the computer off and see how it goes.’ It’s those kinds of little messages that say computers are part of the art and everybody gets increased confidence—and we don’t get diminished by the fact that we rely on technology.”

NOTES

1. See 2-part series on clinical information technology systems implementation: J. Morrissey, “One step at a time,” *Modern Healthcare*, July 5, 2004, 20-25. J. Morrissey, “The process comes first,” *Modern Healthcare*, July 12, 2004, 28-36.
2. J. Morrissey, “Doctor’s orders: Computerized decision-support system directs Vanderbilt physicians to the latest treatment data, helping to eliminate unnecessary costs,” *Modern Healthcare*, April 22, 2002, 32-36.
3. A. Robeznieks, “Hospital patient safety effort launched to reduce errors, save lives,” *American Medical News*, January 3/10, 2005, accessed from Website <http://www.ama-assn.org/amednews/site/free/prsb0103.htm>.

4. A. Comarow, "Avoiding Heartbreak," *U.S. News & World Report*, July 18, 2005, accessed from Website <http://www.ihl.org>.

Idea Exchange Participants

Two groups of healthcare executives, physician leaders, and representatives of healthcare payer, supply-chain and IT vendor organizations participated in an Idea Exchange conducted Sept. 7 and 8 by the National Alliance for Health Information Technology and hosted by IBM at its executive conference facility in Palisades, NY. Attendees were from: ActiveHealth Management/Aetna; American Health Information Management Association; American Medical Association; Association of American Medical Colleges; Cardinal Health; Columbus (OH) Children's Hospital; Duke University Medical Center; Eclipsys Corp.; First Consulting Group; HCA Inc.; Healthlink Inc., a unit of IBM; Hospira Inc.; IBM; IDX Systems Corp.; Initiate Systems; Inland Northwest Health Services; Johnson & Johnson; Joint Commission on Accreditation of Healthcare Organizations; Maimonides Medical Center; Medical Information Technology Inc. (Meditech); New York-Presbyterian Hospital and Healthcare System; Premier Inc.; Siemens Medical Solutions; Sutter Health.

Acknowledgements

About Alliance Idea Exchanges

The concept came from our realization that healthcare needs more efficient ways of sharing and synthesizing information. Traditionally, white papers and reports convey information but don't make it easy for the listener to use that information in their organizations. Information combined with context and applicability creates knowledge, and knowledge powers change. Participants include senior leaders from our member organizations with each member category represented.

About the Alliance

The National Alliance for Health Information Technology is a diverse partnership of leaders from all healthcare sectors working to advance the implementation of information technology to achieve measurable improvements in patient safety, quality of care and operating performance. The Alliance collaborates with healthcare and government leaders to accelerate the implementation of world-class, standards-based information technology aimed at creating the most effective, safe, unified, and inclusive health system possible. Since its founding in 2002, the Chicago-based Alliance has helped forge consensus and accelerate progress on such important initiatives as developing an industry-endorsed interoperability definition and making available to the public, The Standards Directory. Scott Wallace, president and chief executive officer, chaired the Commission on Systemic Interoperability (CSI), which issued its report in October 2005. The Alliance is a co-founder of the Certification Commission of Health Information Technology (CCHIT). More information about the Alliance is available at www.nahit.org.

About IBM

IBM Healthcare & Life Sciences (IBM HC/LS) brings together IBM resources, including information technology, deep industry insights, and research expertise, to help clients develop and deliver safer, more affordable and more effective diagnostics, drugs and medical care. For more information, please visit the IBM Healthcare and Life Sciences Web site at: <http://www-03.ibm.com/industries/healthcare/index.jsp>

About the Author

John Morrissey joined the staff of the Alliance in a newly created position of Director of Knowledge in February 2005 after 17 years with the industry publication *Modern Healthcare*, including 11 years as a reporter specializing in healthcare IT, performance measurement, patient safety and quality-of-care issues. John is responsible for formulating and supplying information for the Idea Exchange and following each session capturing the discussion. He also works to build a valuable body of knowledge for and about Alliance members as well as convey information to and from the industry at large.

© 2005 The National Alliance for Health Information Technology
www.nahit.org

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or any information storage and retrieval system, without prior permission in writing from The National Alliance for Health Information Technology. Letter of intent requests for permission to reproduce content should be sent to the permissions department in care of The National Alliance for Health Information Technology, One North Franklin Street, 27th Floor, Chicago, IL 60606.