Nine Tech Trends

Healthcare IT advances are pulling together to manage an expanding universe.

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The time has come again to pause and consider the direction--or directions--in which the healthcare IT industry is drifting. Two years ago, trends were still being influenced heavily by monumental global events as well as by the impact of HIPAA deadlines and skidding revenues. Last year, we saw an industry demanding IT integration during a time of economic rebuilding. This year, a new sense of vigor suffuses the industry, supplied in large measure by strong pushes from the Bush administration. Much of the conversation now pivots on the place of importance that the electronic health record (EHR) eventually will assume.

In the following pages, you'll find the nine trends we believe are most significant for you, our readers. Among the key developments discussed are the state of the EHR, the bar coding and newly emerging radio frequency identification technologies, disease management, emergency preparedness, telehealth and the government's push to establish regional health information organizations.

Narrowing the field to nine was difficult given the explosive growth in so many areas in the healthcare IT field. But the following package represents our best call on areas to watch during the coming year. We didn't do this alone: Stories in this package were spurred on by the latest research, conversations with key industry leaders and consultations with our own editorial board. The aim is to help you keep up with technological changes that may ultimately determine your competitive place in the healthcare universe.

If you're going to Dallas for HIMSS 2005 and want to pick up even more in-depth information about topics covered in our Nine Tech Trends, use the sidebar entries included with each piece as a guide to related sessions.

1

Bar Coding and RFID

by Mark Hagland

Hospital and health system leaders who are just getting used to the idea of bar coding everything will have to get ready for another adjustment. Industry experts see a split screen in the future: bar coding and active radio frequency identification (RFID).

For many uses, such as tracking physical assets and the flow of patients and personnel, active RFID is expected to push aside passive RFID and bar coding. For others, such as medication management, bar coding is still a key technology, and it's an important supplementary tool for some purposes. Wireless technology can be expected to evolve rapidly in the care management arena. The technology itself is helping move implementation forward: It is getting better, more sophisticated and cheaper every day.

The cost of active RFID systems has fallen precipitously, for example, and the price of RFID readers also is dropping. Depending on the quantity and system involved, a typical active RFID tag may run in the "few tens of dollars," as one expert put it. A passive RFID tag may cost only 25 to 40 cents; of course, active tags have far greater power, versatility and range (across a room or even a facility) than passive tags (a few feet). Both types of RFID tags have advantages over bar coding, which requires line-of-sight reading by a scanner.

And as more hospitals and health systems put in wireless networks, hospital leaders will recognize their great potential. At present, several organizations use active RFID for asset management, but only a handful use it to track patients and clinicians. That number looks set to rise dramatically with several start-up vendors entering the market.

Future possibilities

The fact that bar coding is already being required in hospitals will, over time, strengthen the case for wireless solutions, contends Vivek Subramany, an industry analyst in the San Antonio office of Frost & Sullivan. "There are situations where bar coding will take precedence because it's mandated, particularly in budgeting," Subramany says, but RFID has a technological edge. He tells vendors to market RFID as a supplement for bar coding.

Even for medication management, active RFID has clear advantages over bar codes, which must be scanned on the surface of the object itself. In patient management, too, locating, tracking and reading are more advanced and immeasurably easier with RFID tags that can be read at a distance, Subramany

says. In fast-paced hospitals, this may be a key consideration and one that speaks to optimal resource utilization, he adds.

Further down the road, "a combination of basic RFID technologies with sensor technologies--using nanosensors that will monitor the different biometrics from your body and also implanted devices"--will hold the greatest potential, says Luis Taveras, a partner in the Health and Life Sciences Practice at Accenture's Chicago office. In the not-too-distant future, he says, "We can have a post-cardiac patient being at home, and we're monitoring that patient remotely, checking all the vitals--blood pressure, temperature, level of activity, depth of respiration, all those things." And some day, patients will be discharged very soon after procedures and treatments because clinicians will be able to monitor their condition remotely in real time.

IT leaders lay groundwork

Some IT leaders are cementing their wireless infrastructures into place now, anticipating that by the time they're ready to implement active RFID systems in two to three years, costs will be more manageable. Kent Hargrave, CIO at 337-bed Overlake Hospital Medical Center, Bellevue, Wash., sees active RFID as just one tool in a big toolbox of wireless enablers. By later this year, he and his colleagues will be implementing a hands-free system from Cupertino, Calif.-based Vocera Communications for wireless voice communication among clinicians, as well as bedside medication management using PDAs (and initially, bar coding). "As RFID becomes a little more cost-effective in two years, we'll RFID patient wristbands," he says.

The hospital is already set to begin an active-RFID pilot for clinical equipment management, wheelchairs and smart pumps in particular, a move that Hargrave sees as a stepping-stone. "Hospitals are doing the equipment management thing first to get the confidence and experience to do patient management with RFID," he says. "It's easier to begin by managing 100 known items rather than 200,000 patients a year."

The real challenge lies in building the hospitalwide infrastructure and overcoming all the attendant back-office hurdles, says Jeff Bernstein, senior network engineer. Overland already has RFID in admitting, but "the integration of everything" is a bigger task, he says. "People saying they're doing RFID is one thing, but integrating it as a holistic solution under a common umbrella is another." Adds Hargrave, "We need the back-end infrastructure to support whatever we do for patient management," be it typing in a number or scanning an RFID chip or bar code.

St. Vincent's Hospital, a 338-bed facility in Birmingham, Ala., is also integrating multiple technologies, focusing on creating a wireless infrastructure to support patient and personnel management. It already has patient wristband management and medication management in place via bar coding. Last fall it piloted active-RFID tagging of patients in the cardiology unit.

Like Overlake, St. Vincent's is using a mix of technologies. It implemented RFID/infrared tracking from Lawrence, Mass.-based Radianse and is also using technology from San Mateo, Calif.-based AeroScout Inc. (formerly Bluesoft Inc.). St. Vincent's has room-level tracking of patients in radiology and the GI and cath labs. An electronic board at the nurses' station in each of those units indicates where patients are physically, and where they are in their care process (e.g., waiting to be seen in radiology).

St. Vincent's also wants to tie everything together, including Vocera badges, so patients, clinicians and medial equipment will be locatable and trackable. Informational boards will be installed at every nurses' station by this summer, and work will continue on infrastructure-building. "The enterprise layer that sits on top and understands the transactional component will be there, and as we work through these pilots, we then will have a better understanding of how much and what types of RFID technologies we will put into that layer," says Steve Anderson, director of the Center for Advanced Technologies at St. Vincent's. "The technology keeps changing, and our goal is to have an enterprise layer to leverage multiple technologies instead of being stuck with just one technology deployed across the organization."

Vendors take position

Vendor executives are aware of the desire to leverage multiple technologies as they position their companies to take advantage of the coming active-RFID boom. For example, Richard Barnwell, CTO of Framingham, Mass.-based PanGo Networks, says that the key is "to try to leverage a regular Wi-Fi network that's already in place, and to consider locationing as an additional service that you can run over that existing network."

In Barnwell's view, the capital costs of building multiple wireless systems are too high without some strategic leveraging. Beth Israel Deaconess Medical Center in Boston selected PanGo to avoid "going down a completely proprietary path for a reader infrastructure," he says. "What we decided was that the most compelling business case can be generated when you use the wireless LAN/Wi-Fi/IEEE 802.11 family of standards. The simple test is, does the company require any additional hardware to be installed over and above using tags to make their solution work?"

Portland, Maine-based Parco Merged Media prides itself on achieving a level of granularity that allows for very tight tracking of tags. CEO and co-founder Scott Cohen says the trend is toward greater granularity, "and that will require a certain kind of infrastructure." He believes that Parco is well positioned because its system allows for fewer RFID receivers per distance of transmission. There will be a shakeout among RFID vendors in the next few years, Cohen says, and firms unable to demonstrate efficiency and accuracy will be out.

A combination of interoperability, infrastructure, cost-effectiveness and workflow integration will determine success for vendors, contends Suneil Mandava, CEO of Mobile Aspects, Pittsburgh. "Some organizations are having to spend two to three million dollars just on the infrastructure costs for some systems, but we can go in and outfit a hospital for a couple of hundred thousand dollars," he says. "So the financial barriers are starting to drop away."

Hospitals are willing to spend the money now for wireless systems because of a strong focus on patient safety, but vendors must create interoperable systems to prove their value, Mandava says. "We've developed an HL7 system, so we can integrate with medical records, with billing systems, all the various IT systems of the hospital." The ability to use any hospital PC to track patient, personnel and equipment flow will be critical, he says.

Ultimate goal: patient care

Whatever approach is used, evidence is growing that RFID implementation will improve patient care, says Michael Dempsey, CTO and president of Radianse. Its work with Mass General has already yielded an academic study of RFID use, and more will certainly be coming, he says.

Jeffrey Bauer, Ph.D., of the Denver office of First Consulting Group thinks progress may be slow at first. "By five years, I'd expect to see a fair amount of RFID in healthcare, but it will first go toward inventory control and antitheft." In a couple of years, RFID chips will be richer and denser, he adds.

With all the excitement and energy in evidence, widespread implementation of active-RFID in patient care is a given. It's only a matter of time.

Mark Hagland is a contributing writer based in Chicago.

2

Disease Management

by Pamela Tabar

The face of disease management changed for good in late 2003. When the Medicare Modernization Act became law, so did its interleaved self-edict to create the Chronic Care Improvement Program (CCIP), one of the most influential votes for quality-based disease management ever to come from traditional fee-for-service Medicare. CCIP, operated under the auspices of the Centers for Medicare & Medicaid Services (CMS), will transform the way healthcare providers and payers view disease management--starting now.

CCIP is a hefty vote for quality in chronic-disease care, explains Christobel Selecky, president of the Disease Management Association of America (DMAA), Washington, D.C., and CEO of LifeMasters Supported SelfCare Inc., Irvine, Calif. "Medicare historically has driven a lot of change in how providers are compensated and how benefits are structured," she says. "To have CMS take this step and say, 'in a very large-scale, scientific way, we're going to evaluate disease management approaches and disease management in populations of fee-for-service Medicare beneficiaries' means they're going to answer the question, 'does disease management really work?'"

Early in 2004, CCIP offered funding by way of grants to 10 disease-management projects for three years of controlled monitoring. Applicants for these Phase I demonstration project grants were asked to propose programs combining patient education, behavioral-change initiatives and clinical care regimens that would help providers, patients and payers achieve the long-term goals of chronic care. Programs were to target congestive heart failure (CHF) or diabetes with co-morbidities, two of the most expensive chronic conditions under Medicare. Winners of the Phase I grants, announced in late December, are listed at www.cms.hhs.gov/medicarereform/ccip.

Shifting sands: The payers

Nearly everyone agrees that, in concept, disease management should work, and the CCIP program may encourage payers and providers to fast-track their disease management leanings. Traditionally, payers have focused on the five chronic diseases considered most costly--pulmonary disease, CHF, asthma, diabetes and end-stage renal disease. But now, Selecky says, payers are beginning to look ahead to conditions that might cost them big bucks later on, like hypertension and obesity.

Disease management was never meant to be limited to the costliest chronic diseases, says Erica Drazen, vice president of emerging practices, First Consulting Group, Long Beach, Calif. And some of those "lesser" conditions are encroaching quickly; obesity might soon become number 6. Hartford, Conn.-based Aetna; Horizon Blue Cross Blue Shield of New Jersey (BCBS-NJ), Newark; and others have launched programs on obesity. A weight management outreach program that Horizon BCBS-NJ piloted in 150 New Jersey schools in October already has a waiting list.

New attention also is going to co-morbid conditions, such as pain and depression, that often accompany chronic diseases. And payers are beginning to link their disease management programs instead of classifying diseases as separate conditions. Horizon BCBS-NJ added multiple sclerosis and hepatitis C programs in 2004, with depression, cancer and pain-management programs coming in 2005.

Aetna is looking at the role of ethnicity and culture within its overall insured demographics. Its initiatives to reduce ethnic disparities in disease management service, including in African-American pregnancy and Latina breast health awareness, earned Aetna the 2004 Health Plan Leadership award from DMAA.

The approach to disease management is becoming much more holistic, says Cheryl Pegus, M.D., M.P.H., Aetna's national medical director for women's health and clinical programs. "We're addressing issues long before you have a chronic medical condition, based on what we know of how you're using the healthcare system."

Many also predict shifts in reimbursement models. Testing the waters with group employers, payers are developing creative incentives to promote patient behavior change, notes Christopher Valerian, D.O., senior medical director of health affairs, Horizon BCBS-NJ. One of Horizon's group employers is offering cash incentives to diabetic patients who fulfill the nationally accepted diabetes testing guidelines. Other clients are trying the opposite method, in which patients who receive a premium discount for joining a disease management program can lose that discount for noncompliance.

But payers are still working to show providers what's in it for them, Valerian says. When payers first developed their disease management programs, providers were excluded purposely, "but as the programs became more comprehensive, everyone realized that if you have the providers on board, it makes life a lot easier and a more collaborative effort," he says.

Disparate data

In the past, when it came to identifying high-risk patients, payers and providers each had select pieces of data, but neither had the complete health puzzle. Predictive modeling tools, commonly used by payers for risk stratification, tapped into claims and pharmacy data and utilization rates but not the rest of patients' medical records or lifestyle information, Drazen says. Primary care physicians, who might see patients only a few times per year, usually spent office visits treating illness instead of promoting wellness. Some providers tagged patient charts for certain chronic diseases, but such initiatives tended to fall apart if patients failed to return for needed tests.

These days, more providers are running disease management programs using computerized patient registries, which contain patient-service checklists and sometimes provide electronic alerts on patients who are overdue for tests or services. But many physicians cannot afford the IT investments, notes DMAA's Selecky. "I'm a huge proponent that disease management should be done at the provider level," she says. But "most providers operate in small environments where they don't have sophisticated technology to do the database analysis, predictive modeling and risk stratification."

The industry is in transition, though, she says, adding, "The questions are, how can we make that [technology] available at the provider level, and how do we incentivize providers to use those systems?"

The new view: Collaborative design

As always, conjoined program efforts are the ones to watch. The Duke Prospective Health program through PrimaHealth IPA, Durham, N.C., has approached chronic disease management as a deep collaboration among provider, patient and health plan--earning it the 2004 Provider Engagement Initiative award from DMAA.

The program combined a 31,000-patient base with clinical teams, disease management guidelines and IT to help engage patients in their own better health, explains Peter Jacobi, M.D., medical director of PrimaHealth and the Duke program. Incentives were used at every step: Patients received a $25 grocery coupon just for agreeing to a health-risk assessment. Those falling into a high-risk category on the basis of hypertension, obesity, elevated lipid levels, tobacco use, and/or diabetes received an additional incentive--$100 toward medication costs--if they agreed to work with a care manager for at least 90 days.

Patients registered in the program have a computerized portfolio that includes their risk assessment, goals, guidelines and reminders for regular testing. Soon, the system will also integrate clinical outcomes, lab data and reminders for wellness services, such as mammography.

Physicians also receive incentives, which now are based on the number of patients registered in the program but later could involve patient outcomes (e.g., improved lab results), Jacobi says.

Close attention among physicians to the health plan's goals was vital to the program's success, according to Jacobi. "Most [other] disease management programs are aimed directly at the patient, and the clinical team is just along for the ride."

If we build it, will someone pay?

The long-standing complaint among providers has been that robust disease management requires proactive communication tools and a hefty amount of provider time--time that doesn't necessarily fall under a handy billing code.

Charles Kilo, M.D., M.P.H., and CEO of GreenField Health, near Portland, Ore., admits that healthcare's visit-driven system doesn't give physicians enough incentives for wellness maintenance. "We're paid for cranking through patients," he says ruefully. "We're paid for the hamster wheel."

GreenField's five-physician clinic built a patient registry for its Logician EMR, a system now marketed by Waukesha, Wis.-based GE Healthcare's Centricity line. The registry maintains patient lists for various disease-condition indicators, such as hypertension and elevated lipid levels. Physicians and care managers communicate often with patients, including by email, Kilo notes.

Not all primary care facilities can afford such a holistic approach, he acknowledges. "When push comes to shove, hospitals and large healthcare organizations are financial entities. Finances will trump quality every single day," Kilo says. "Until the dynamic changes of how care is organized, until we stop getting paid for defects--i.e., the sicker people are, the more we get paid--we'll be stuck in this conundrum."

Geisinger Health System, Danville, Pa., took on pushing change, one payer at a time, after it launched its aggressive osteoporosis intervention program in 1996. To justify bone-density screening and diagnostic testing prior to disease diagnosis, and in patients younger than age 65, providers and payers forged reimbursement agreements and some special billing codes, explains Eric Newman, M.D., Geisinger's director of rheumatology and chairman of the osteoporosis program. Adding a multipayer code grid to the system reduced billing rejections; clicking on the patient's insurance carrier automatically fills in the pre-arranged code.

Quality rewards

National attitudes about quality are shifting. CCIP sets a precedent that chronic care quality should matter--and that quality efforts should be rewarded. "Some very well-intended people are now asking some very hard questions and trying to put forward some innovative programs, and I congratulate that," says GreenField's Kilo. "Unfortunately, the skeptics will say that what the average primary care practice [gains] from it is not going to be enough to overcome the financial barriers to do it, to purchase and use the technology. So there are pros and cons."

But providers may be more willing to step forward now, adds Geisinger's Newman: "Before the demonstration projects, the incentives weren't aligned with the outcomes you wanted to achieve. Now, this is a first step in saying, 'if you provide best care and save money along the way, we'll allow you to keep some of that.'"

The disease management bar has been raised. And healthcare institutions that embrace that change will most likely be viewed as trendsetters for the coming years.

Pamela Tabar is a freelance writer based in Cleveland.

Related Sessions at HIMSS 2005

- **Session 6:** Managing Chronic Disease: IT's Value Proposition (2/14 a.m.)
- **Session 52:** Chronic Disease Management: Integrating Healthcare Delivery Through IT (2/15 a.m.)

3

Electronic Health Record

by Kevin Featherly

The electronic health record (EHR) is heading forward and progress toward its adoption will continue, agree experts interviewed for this story. But accompanying the advancement is continuing confusion about exactly what the term means.

For the past year, particularly since it was broached in the presidential State of the Union address in January 2004, the EHR (or the electronic medical record [EMR], a term interchangeably applied by some, much to the chagrin of others) has been the talk of the industry. It dominated conversation at the February 2004 Healthcare Information and Management Systems Society (HIMSS) conference in Orlando, Fla. And a great deal of public activity in 2004 validated the discussions.

Former Health and Human Services (HHS) Secretary Tommy Thompson made several bold moves, perhaps the most notable being appointment of the first National Health Information Technology Coordinator, David Brailer, M.D., Ph.D. Last summer, Brailer presented a framework for creating an

interoperable EHR-based national health infrastructure within 10 years. Around the same time, Health Level Seven (HL7), Chicago, put forth a draft standards document listing what its members deem the essential features and functions of the base-level EHR.

Later, partly at Brailer's instigation, an industry consortium was formed to develop EHR certification standards for providers unsure whether they're buying a genuine EHR or electronic snake oil. Payers, largely for that reason, have been slow to reimburse caregivers for adopting the technology.

So that's where things stand on the EHR front. But where are they going?

Before that question can be answered, says Dave Garets, president and CEO at HIMSS Analytics, Blaine, Wash., an even more fundamental question remains: What is an EHR? Despite the best efforts of HL7, Brailer and others, Garets indicates, the question is still wide open. "And that's a problem," he says, "because I think it's just hype city."

Wes Rishel, an analyst at Gartner, Stamford, Conn., and a member of the HL7 group that formulated the draft standards, says the EHR is, like most new technologies, falling prey to what Gartner famously calls "the hype cycle."

New technologies, Gartner says, start out with a lot of excited attention, rise to the peak of hype and then--as their shortcomings come into clearer view--fall into a "trough of disillusionment." After that, reality sets in, and either the new technology falls off the charts or adoption proceeds based on more realistic expectations. The process can take years.

At the moment, says Rishel, "it's not even clear where the peak of hype is" with the EHR. Garets, Rishel's former Gartner colleague, agrees. "EHRs are still climbing the hype cycle; they're not even at the top, in my opinion," Garets says. "They're going to go screaming down the other side and land."

Trend without a name

One problem with attaining a clear definition of the EHR stems from the fact that people aren't even sure what to call it. Although some disagree, Garets regards the EHR as the ultimate realization of the concept that has passed through various names, from computerized patient records to EMRs.

In Garets' view, the EMR is the province of providers--the deep, digitized, contextual and lifelong patient record that clinicians can access in-house to facilitate better care. The EHR is much the same idea, according to Garets, but bigger. The EHR is an EMR that patients can access and add to--without being able to edit physician- or machine-generated data. It is the record that patients own.

The reality, according to Garets, is that not one EHR has been successfully implemented. A successful system, he insists, has to include controlled medical vocabulary, real clinical decision support, workflow enhancement, electronic medication administration, and integration of nursing documentation, the pharmacy and the supply chain. "There are a lot of people that are making a lot of progress," he says, "but nobody has all that stuff, plus patient access and input."

But none of that prohibits making an educated guess about where ultimately successful iterations of the EHR might originate, says Scott Tiazkun, program manager for healthcare IT at market research firm IDC, Framingham, Mass. Many companies are involved in developing EHR-related products and technologies, but Tiazkun thinks the database firms may be in the best position to see the technology through--companies like IBM, Armonk, N.Y.; Oracle Corp., Redwood Shores, Calif.; and SAP, Newtown Square, Pa.

"IBM is doing this," he says. "Oracle should be able to do this, too. They have the database but also the applications that sit on top. They have the technology stack. ... Maybe even SAP, if they jump in this like they promised to do. The database vendors initially will be at the heart of this because they will have the data story. You have to be able to tie all of this together in order to produce the electronic patient record."

There may be an even simpler answer to spurring adoption. Tiazkun points to portable health records from companies like CapMed, Newtown, Pa., and Med-InfoChip L.L.C., Boynton Beach, Fla., which provide portable key chain dongles that slide into USB ports and can be uploaded with health data from a PC. CapMed's Personal HealthKey was featured at last year's TEPR conference in Fort Lauderdale, Fla., in a demonstration involving new continuity of care record standards.

"I think those kinds of initiatives from these small companies are just as important as these huge multi-million- or billion-dollar efforts from these service vendors," Tiazkun says. "It's just as important because it's going to have a psychological component." With a palpable device they can easily use, he says, people will begin to understand the EHR. Then it will begin to take off.

Rishel warns that such efforts should not be viewed as a substitute for building the national architecture that is needed for digital records to travel with a highly mobile U.S. citizenry. Tiazkun agrees: "You would still do that. But this drives the point home, how important this could be."

Public money?

Brailer has argued in favor of public funding of a national health infrastructure to interconnect EHR systems, which in any many cases lack the standardization needed to make various vendors' software interoperable. But he also has stated that, even with public funding, the government is not going to build the network the way it built the interstate highway system or the Internet itself. Private money is also essential, Brailer says.

That point hit home hard in late November, when Congress declined to allocate a modest $50 million to fund Brailer's office and several pilot projects for 2005. The *New York Times* reported that Brailer won't lose his job, because HHS will likely dip into discretionary funds to pay his way. But the snub sent a signal some interpreted to mean politicians aren't prepared to back President Bush's goal.

Garets doesn't think the political machinations will seriously alter the EHR's fate. "Congress is distracted in a big way," he says. "It's got all kinds of political games that are being played. I don't think this is any indication at all that they don't care."

Peter Basch, medical director for e-health initiatives at MedStar Health, Washington, D.C., and co-chair of the newly formed Physicians EHR Coalition, is optimistic about the EHR's future, mainly because for the first time in the 25 years he has pushed it, the technology has the ears of both the public and policy leaders. Meanwhile, vendors are beginning to produce quality EHR products. "We have achieved an alignment of the stars," Basch says. He predicts that within three to four years, close to half of practicing clinicians will "be at some stage of adoption."

Bill Bria, medical director for clinical information systems at the University of Michigan, Ann Arbor, also sees things pointed in the right direction for the EHR. "The most hopeful thing I've seen is, Health and Human Services is taking charge here, because we've been bellyaching for a long time about nothing being standardized and who's going to make them standardized and the FDA is going to get involved and it's going to hell," he says.

But before real progress is made, key issues must be resolved, in Bria's view: "First of all, we need basic systems that aren't as mysterious. Second, it needs to be possible for large and small health systems to be able to afford these things." And the debate on inpatient versus outpatient care as the focus for EHR development must come to a close. "That's over," Bria says. "It's the continuum, stupid."

Rishel, too, is guardedly optimistic. "The important thing to remember about the hype cycle is that during that period where disillusionment is growing--so attention is crashing--there are individual success stories going on in the midst of other lack of successes," he says. "It only takes a few successes ... to say that we're beginning to see the process of turning it around."

Many in the industry are seeing that turnaround already as they anticipate the future.

Kevin Featherly is news editor at Healthcare Informatics.

Related Sessions at HIMSS 2005

- **Session 11:** Caution! Construction Zone: Building an EHR from an HIS (2/14 a.m.)
- **Session 50:** The Benefits of an Electronic Health Record in Peace, War and in Support of Homeland Security (2/15 a.m.)
- **Session 79:** You Can't Manage What You Don't Measure: Managing Measurement (2/15 p.m.)
- **Session 82:** Using IT to Enable a Community Model of Healthcare Delivery (2/15 p.m.)
- **Session 122:** EHR: A Powerful Patient Safety Tool for Nursing (2/16 a.m.)

4

Emergency Preparedness

by Fred D. Baldwin

The most important weapons in fighting bioterrorism and preparing for disease outbreaks and other emergencies, experts are finding, are free and readily available: human awareness and readiness. Sophisticated IT tools--biosurveillance, peer-to-peer networks and crisis management software--are valuable. But as urban sociologist Jane Jacobs concluded, neighborhoods where people sit outside on their doorsteps and know beat cops by name are safer than those where occupants stay inside high-rise apartments and rarely meet cops cruising around in patrol cars.

"Eyes on the street," Jacobs writes, reduce violent crime. Bioterrorism experts offer a similar message. The first step in combating any emergency is recognizing that it exists. Now that homeland security is a national objective, the healthcare industry is increasingly incorporating "eyes on the ward," "eyes in the ER" and "eyes in the clinic." Expect more use of everyday IT tools for antiterror readiness and more attention to matching antiterror resources to business-as-usual needs.

Readiness through realization

Recognizing an infectious disease outbreak is relatively easy for rare diseases with distinctive symptoms--the later stages of smallpox or anthrax, for example. But early symptoms of these and other diseases, including terrorist-spread pathogens, may resemble those commonly seen in emergency rooms, at least during flu season. No individual doctor, or even a hospital staff, can easily decide when a surge in respiratory or gastrointestinal complaints signals that an epidemic has begun.

Biosurveillance (also called syndromic surveillance) software can help. The Centers for Disease Control and Prevention (CDC), Atlanta, has developed a syndromic surveillance system called EARS. Since 2001, the Defense Advanced Research Projects Agency (DARPA) of the Department of Defense has sponsored similar research.

The Potomac Institute for Policy Studies, Arlington, Va., conducted an evaluation of the CDC algorithms and those developed by four DARPA contractors: General Dynamics, Falls Church, Va., in partnership with the Stanford (Calif.) University Medical Informatics group; IBM, Armonk, N.Y.; a Pittsburgh-based University of Pittsburgh/Carnegie-Mellon partnership; and the Johns Hopkins University Applied Physics Laboratory, Baltimore. At least some of this is open-source software available to hospitals for no initial cost beyond set-up fees and some hardware. (However, supporting a surveillance effort requires time commitments from an epidemiologist and IT staffs.)

Results of the evaluation, published in September 2004, show that syndromic surveillance software can identify infectious disease outbreaks with great accuracy--often pinpointing the very day that human experts later agree marked the onset. Even at the most discriminating level tested (one false positive every six weeks), the best-performing software detected outbreaks an average of 18 days sooner than did human experts, potentially a huge advantage for public health officials.

Spotting demand surges early also can help hospitals improve operating efficiency and quality of care. "Hospitals are already stretched very thin," says Monica Schoch-Spana, a Baltimore-based senior fellow with the Center for Biosecurity of the University of Pittsburgh Medical Center (UPMC). "They suffer from response-capacity issues in a chronic way. A regular influenza season can really tap out hospitals and their staffs."

That's why Emergency Medical Associates (EMA), Livingston, N.J., began to warehouse patient tracking data as early as 1998. The independent emergency medicine physician group provides emergency services to hospitals in New York and New Jersey, collectively treating about 2,600 patients per day. EMA uses off-the-shelf business intelligence software from Business Objects (U.S. headquarters, San Jose, Calif.) to analyze daily encounter information by syndromic groups (based on filters developed by the New York City Department of Health and Mental Services). The software flags variations of more than two standard deviations from historical norms and automates physician alerts.

"Faster is the key," says Jonathan Rothman, EMA's director of data management. "Last year we were the first in New Jersey to spot that the flu season had hit. This allows us to get prepared in our emergency departments." Recently, EMA identified the "Bill Clinton effect," Rothman says. "Right after he went in for his triple bypass, we saw a doubling in the number of chest complaints."

EMA's experience has helped the CDC and departments of health cope with a difficult technical problem in syndromic surveillance: how to crosswalk from presenting complaint (e.g., fever, aching back) to an ICD-9 code diagnosis (e.g., influenza). Complaint data, while often vague, is available several hours to several days earlier than diagnostic data. But, Rothman warns, the usefulness of mathematical analysis depends on good historical data. "You need at least a year," he says "probably three or four years, so that you can understand the seasonality of certain diseases."

Everyday surveillance

"For any biosurveillance system to detect bioterrorism," says David Siegrist, the principal investigator for evaluation of biosurveillance software by the Potomac Institute, "it has to be useful to clinicians in the hospital on a day-to-day basis. And to be useful on a day-to-day basis, it will either have to improve patient care or assist in managing the hospital."

That philosophy is central to the work of the UPMC's Center for Biosecurity, which serves a 20-hospital network in western Pennsylvania. The program has been cited as a model of how to prepare for disease epidemics.

"If you make a system that is only useful in the time of crisis," says Michael Allswede, an emergency medicine physician and senior fellow at the Center, "nobody will ever use it, including during the time of crisis. But if you create something that people use every day to get patients admitted and moved around the hospital, and use that same system to query bed status, med status, and things like that, you end up with a very functional system."

UPMC relies on a system known as MedCall, an inbound call center begun in 1989 and significantly enhanced since 1998. Robert Schwartz, an emergency physician who serves as UPMC's medical director for physician relations, describes MedCall as "one-stop shopping to get patients transferred in to UPMC." With MedCall, UPMC always knows which hospitals within its network have open beds, operating room suites, or other needed resources. "Since we do that on a daily basis," Schwartz says, "the bioterrorism task of monitoring surge capacity is part of our daily business."

MedCall incorporates a peer-to-peer network that enables any of approximately 7,000 physicians to call a single number and talk to an expert within five minutes, a system UPMC calls curbside consults. "We modeled them," Schwartz says, "on two doctors who meet in the hall, and one says, 'Hey! I'm glad I ran into you. Let me just run a case by you.'" A typical day includes 30 or 40 such consults. Designed to improve patient care, this feature provides a single reporting point for 7,000 pairs of clinically trained "eyes on the street." MedCall knows how each doctor in its network likes to receive data (e.g., by email, fax, a call to a pager).

MedCall can also function as a command-and-control communications center, one that's been tested in small-scale crises like fires, floods and breakdowns of hospital ventilating systems. Western Pennsylvania healthcare providers, public health officials and law enforcement personnel all have the MedCall phone number for emergency contact. In the event of a bioterrorism incident, UPMC has contingency plans for joint public briefings by physicians, public health personnel and elected officials modeled on the kind of briefings former New York mayor Rudy Giuliani gave during a West Nile virus alert.

Sharing the data

UPMC developed MedCall in-house, but commercial crisis management software is available, such as WebEOC, developed by Emergency Services integrators (ESi), Augusta, Ga. It's used by various government agencies (including NASA), Delta Airlines and other clients managing events where security is a major concern (e.g., the Democratic National Committee's 2004 national convention).

An ESi partner, Global Emergency Resources (also headquartered in Augusta, Ga.), focuses on marketing WebEOC to healthcare organizations. Stan Kuzia, Global's president and CEO, says the Web-based product can display information "from personnel resources to sandbags," on either command-center screens or individual PCs. Potential users learn to navigate the system in 10 to 15 minutes and, equally important, he says, remember how to use it a year later. A license fee of about $50,000 provides "perpetual" password-controlled access to any number of authorized users--such as the 10,000 users online simultaneously in an airline's test. Hardware costs vary, depending largely on what customers already have in place.

At the federal level, the Agency for Healthcare Research and Quality (AHRQ), Rockville, Md., has focused much of its research on managing surge capacity and tools to facilitate state and local plans for preparing and, if necessary, responding to mass casualty events. Sally Phillips, AHRQ's director of bioterrorism preparedness research, also cites research on predicting the trajectory of epidemics and on developing computer models for decisions on mass prophylaxis and mass vaccination.

Since 2001, the Health Resources and Services Administration (HRSA) has administered the National Bioterrorism Hospital Preparedness Program, which in 2004 awarded states $498 million to increase healthcare organizations' ability to respond to terrorism or other public health emergencies. Much of this money has been spent on telecommunications technology or software to improve data exchanges between hospitals and state health agencies.

It's not just technologies and programs focused on emergency preparedness that are increasing. So is awareness. "Our philosophy since 9-11," says Melissa Sanders, chief of HRSA's hospital bioterrorism branch, "has been that we as healthcare providers have got to re-tool our thinking. We've got to become more comfortable with emergency response, with incident command systems, and that whole structure of how information flows in an emergency." *

Fred D. Baldwin is a freelance writer in Carlisle, Pa.

Related Session at HIMSS 2005

- **Session 50:** The Benefits of an Electronic Health Record in Peace, War and in Support of Homeland Security (2/15 a.m.)

5

Integrating PACS

by Mark Hagland

Ten years ago, picture archiving and communications systems (PACS) were new, and the first hospital implementations were greeted with some skepticism. Five years ago, despite having proven their technological worth and ability to improve day-to-day practice, PACS were still seen largely as image-viewing tools for radiologists. Today, industry experts say that the future of PACS lies in evolving systems toward integration and interoperability.

Executives at leading-edge healthcare organizations see a cluster of factors pushing integrated PACS forward: the rise of electronic medical record/electronic health record (EMR/EHR) systems, growing consensus on technical standards, clinician demands for technical capabilities, and an ever-greater need to save costs and improve operational and patient care efficiency. Experts also see everything getting linked together: PACS; radiology information systems (RISs); images from cardiology, gastroenterology, and pathology; plus all relevant data from the EMR/EHR.

Seamless sharing of all the data and images that clinicians will need for patient care is the vision for the future of PACS. "As recently as the late 1990s, people thought of PACS as a radiology department solution," says Keith Dreyer, M.D., Ph.D., vice chairman of radiology at Massachusetts General Hospital, Boston, and an assistant professor at the Harvard Medical School. "Now they think of it as an enterprise solution."

Tool in the EMR

Dreyer, who speaks widely on PACS topics, says that the rise of EMRs and, especially, computerized physician order entry is creating an environment in which physicians not only want but demand access to images and data from a variety of specialties. In that environment, PACS cannot remain something that radiologists "own." It must become another of an emerging array of clinical tools.

Referring physicians won't necessarily want to access the diagnostic-level PACS images that radiologists will still use, but in the coming years, they will have electronic access to a far wider range of data and images from multiple specialties, Dreyer says. And the technology is already there to facilitate this access. Partners Healthcare, the gigantic integrated parent organization for Mass General, has had a hierarchical management system central archive in place since 1999, so "anybody in any department can see the images from anywhere else," Dreyer says. Partners also developed its own EMR and supports its archiving with jukebox technology.

No more than a tiny handful of patient care organizations are as far along as Partners, but the general trend for the future is obvious, says Deborah Kohn, a principal at San Mateo, Calif.-based Dak Systems Consulting. "PACS has been expanding horizontally, and then vertically," she says. "First, images started being relayed to all the people who wanted to see them--in the ICU, the ED, the OR and the orthopedics department, for example. That was the horizontal movement. Now, we're starting to see vertical integration of technology, with cardiology and the other image-driven disciplines."

The key to getting the most from PACS is for it to go "hand in hand with the EHR," Kohn says. "As the EHR gets implemented, this is a piece of that. The video from ultrasound is a video element, and the audio from an echocardiogram is an audio element." Together, the elements make up the complete patient record, she says. "But this will take a long time. We're just starting to see pieces of structured, coded data, like order entry, now finally coming around. And happening with it is the PACS, whether just for radiology or cardiology or all of the above." And the CIOs she works with "are making sure that [the pieces] all converge together," she says.

CIOs say yes

CIOs are definitely on board, although they still struggle with the technological, standards, workflow and political aspects of such a comprehensive move forward. "It still gets back to the online EMR," says George Evans, CIO at 292-bed Lexington Medical Center in West Columbia, S.C.

Customers have to start making vendors structure their systems so data can be easily exchanged, Evans says. "I want to pick my EMR product and then tell the vendors, 'You've got to be able to feed my EMR product, and then you're my vendor.'" Evans looks for products that adhere to established standards and operate on open platforms, and when he selects an EMR, he wants to be able to tie all the pieces together. "A lot of vendors feel that continuing in their proprietary fashion is most protective of their market," but when it comes to partnering with such companies, he says, "I personally feel the opposite."

There are practical reasons why interoperability will have to be the watchword going forward, says G. Daniel Martich, M.D., vice president of e-records for the University of Pittsburgh Medical Center (UPMC) and codirector of the Cardiothoracic Intensive Care Unit at UPMC-Presbyterian Hospital, Pittsburgh. "I don't anticipate the big EMR/CIS systems coming out with a state-of-the-art PACS system to rival the big PACS systems," he says, "so I think it's got to be interoperability that will take us there." Martich says that he and his colleagues at UPMC have already mapped out a path toward true interoperability and are busy moving along it.

Step one, already accomplished, is to create a strong EMR/EHR-based repository in which all digital images, sounds and data can be stored, Martich says. Step two, largely accomplished, is to change

workflow. Martich and his colleagues have asked radiologists and cardiologists to provide preliminary reports for referring physicians and others to access.

Step three, on which some preliminary work has begun, is to create a "context-related, single sign-on for multiple clinical applications," Martich says. He and his colleagues are utilizing HL7's CCOW standard and working with UPMC's access management, EMR, PACS, cardiology and other vendors to create the broad access and single sign-on.

Step four, to be accomplished in the next few years, is to create a standardized data set that clinicians can plug into and also populate as they care for patients. Step five, still far into the future, will take place when clinical care advances make it possible to proactively prevent developments like sepsis and heart attacks. Clinical and IT leaders need to envision that future, Martich says, and move toward it comprehensively.

Work to be done

Organizations that have moved boldly toward integrated systems, like Partners and UPMC, are decidedly in the minority. Most hospitals are just taking their first steps toward new ways of working with images.

Beaverton, Ore.-based Planar Systems manufactures PACS workstations and in December 2004 commercially introduced one specifically designed for use in the operating room. Only a few early-adopter hospitals seem ready even to extend PACS into the OR, reports Matt Harris, vice president of marketing. "The overwhelming majority of items we sell are still product-focused on the radiology suite," he says. "We hear from hospitals and doctors that there's a real issue as to how you extend PACS into the OR in a cost-effective way. We think that's going to be the next hurdle that hospitals need to overcome."

PACS technology still has penetrated only a minority of hospital facilities nationwide, though that is changing, says Antonio Garcia, an industry analyst in the San Antonio office of Frost & Sullivan. What's more, he notes, "so-called integrated RIS/PACS packages still have some bugs to be worked out. We're going through two or three releases for some of the earlier companies that got involved in that, and some companies still haven't been able to come to market with a truly integrated product."

Still, some major vendors are making headway in that area, Garcia says, and overall there's no question that integration, interoperability, and better storage solutions will be the main themes going forward. He adds that although it is always difficult to precisely predict a timeframe for widespread adoption of emergent technologies, five years seems like a reasonable period of time in which to expect significant progress toward integration, interoperability and near-universalization of PACS. Financial barriers remain among the most significant, he notes.

Key word: interoperability

Consensus among experts and IT and clinician leaders is strong: Ultimately, PACS will be integrated as one element in a comprehensive array of clinical IT tools and will be interoperable with other key clinical systems--allowing sharing of data, sounds and images among appropriate clinicians. "All of this is going to improve the quality of care," Kohn says. "By making a base system available and providing information more quickly to the referring physician and the consulting physician as well, that will all improve care quality."

--M.H.

- **Session 10:** PACS -- Is it a Measurable Success? (2/14 a.m.)
- **Session 60:** Seamless Transitions: Integrating Diagnostic Images Directly in the EHR (2/15 a.m.)
- **Session 76:** Understanding Digital Mammography (2/15 p.m.)

6

IT and Biomedical Devices

by Kevin Featherly

For most of recorded history, medical devices have been the province of a hospital's biomedical engineers and clinical staff. Say a nursing unit needed a new glucometer; staff would simply go out and buy one. Patient monitors? Ditto. Biomedical devices, while critical for patient care, were essentially dumb readout machines and didn't require much critical review from the executive suite.

Not anymore. In these days of proliferating digital data and blossoming electronic health records, it's increasingly hard to sneak medical devices past the CIO's door. When even an average IV pump has a virtual brain, generates digital data and hooks up wirelessly to the hospital's backbone infrastructure to feed information into the patient record, there's little equipment that doesn't require a CIO's imprimatur.

Demands of digitization

The shift to CIO involvement in device integration is "a solid trend," according to Ravi Nemana, senior healthcare IT adviser at research firm HealthTech, San Francisco. "Anything that's being developed in terms of medical devices and sensors now is digital," Nemana says. "That means you can transmit it anywhere and process it distributively, you can decouple diagnosis and treatment, you can do lots of things. ... The minute you are transmitting, sorting or processing this information, you now have an involvement with the CIO," Nemana says.

According to the research firm Freedonia Group Inc., Cleveland, demand for patient monitoring systems is expected to grow 6.7 percent annually by 2008. Roughly half the sales--$3.6 billion--will go toward hospital systems and the rest to home monitoring equipment and the like. Freedonia has no statistical data indicating how much of that patient monitoring equipment will process and produce digital information, but anecdotal evidence, and common sense, points to ever-accelerating digitization.

Larry Sharrott, CIO for AtlantiCare and the Atlantic City Medical Center, Egg Harbor, N.J., says he began noticing the shift perhaps four years ago. But it began in earnest within the past year or two as device manufacturers began converting their wares to digital.

"What we're all finding is, where that stuff used to be kind of its own closed product--its own separate monitoring product--it now happens to be a computer with a different front end that's got to ride on the network," says Sharrott. "What it really means is that we end up having to assign analysts to a heck of a lot more stuff than we did just a year ago."

One simple example: Atlantic City's medical staff decided to deploy new point-of-service glucometers that plug directly into a desktop computer, which displays and records the readings. That required building a lot of new interfaces. "Because we are moving in the direction of an electronic medical record," Sharrott says, "every one of those desktop glucometers had to get connected in a way that we see the results back into the laboratory database."

Making the sale

Hospital staff and CIOs aren't the only ones forced to respond to what amounts to wholesale transformation in biomed equipment purchasing. Vendors' sales staffs also are changing tactics.

To sell a monitor in the past, says Isabelle Werkheiser, senior modality manager for patient monitoring at Dräger Medical, Telford, Pa., sales staff would describe things like functionality, features, ease of repair and service availability to prospective customers. The CIO had little involvement.

"Now what's happening is that, because hospitals are looking at going to the electronic medical record, they are looking for ways to make these devices work with that strategy," she says. "I hear now that about 50 percent of the decision factor is on the CIO." In the simplest terms, Werkheiser says, what was once almost entirely a medical device manufacturer has become an ersatz IT company, heavily invested in software development.

Something similar is happening at GE Healthcare, Waukesha, Wis., one of the largest companies involved in both the medical-device and radiological spaces--though, of course, GE's stature as an IT firm is long-standing. Like Werkheiser, GE's acute care business marketing manager Philip Settimi says that CIOs have veto power over about half of the monitoring equipment that his company sells to hospitals.

"What has happened, I think, is a bit of a role-reversal," Settimi says. "We now see in our business about one-half of the hospitals have their biomed and IT reporting up to a single CIO, so that the CIO now has operational responsibility for both of those businesses."

As for the other half, Settimi says, the trend is moving solidly in the same direction, with biomed purchasing decisions gradually becoming the province of the CIO. In fact, Nemana's HealthTech colleague, analyst Kent Soo Hoo, projects that within a few years, it will be almost impossible to distinguish between most hospitals' IT and biomed departments.

At CentraCare HealthSystem, St. Cloud, Minn., the biomed department does not currently report directly to CIO Charles Dooley, but he recognizes the digitized-device trend and is working a lot more closely with his biomedical engineers as more monitoring equipment goes online. So far that list includes neonatal monitors, critical care monitors and endoscopy procedural machines. To some degree, lines of duty demarcation already are blurring, he says.

"We basically have a joint service-level agreement that says when a help desk call comes in, we'll take the call for each other's department," Dooley says. "And whichever department would get the call first would do the assessment and then bring in the other department if it falls into their realm." The line between biomed and IT is drawn at the point where equipment is attached to patients, he says. "Then biomed services the hardware. If not, IT services it."

All this is happening, notes Hardy North, director of healthcare business development for Dell Computer Corp., Round Rock, Texas, at the same time that mobile devices such as tablet PCs, PDAs and Blackberry-type email devices are proliferating to a critical mass in clinical medicine. These also require wireless connections into hospitals' infrastructure and, increasingly, must fit with electronic medical record strategies.

"You have to find the way to share information across not only physical boundaries in a hospital but logical boundaries, like departments and functionalities," North says. "It's a world where you're going to have seven-by-24 connectivity between the patient and the care provider and all of the hospital support functions like financial services and housekeeping. ... The whole idea in healthcare today is that we're building out a real-time environment."

Techie, know thy physician

Atlantic City's Sharrott prides himself on having always staffed his IT department with clinicians, saying he has found it easier to train medical experts in technology than to teach medicine to technology geeks. That approach has been fortuitous, he says, because as his department's responsibilities draw closer to the point of care, an appreciation of clinicians' medical needs has proven essential.

Unfortunately, says Sharrott, the reverse is not always true. While clinicians really should consider overall IT strategy as they suggest and make equipment purchases, they don't always take an enterprisewide view of their needs. And it can mean real headaches.

"What's problematic is when people go ahead and buy things and they don't realize that these are now computer devices that have to have servers and all kinds of other things installed, and they don't find out until it kind of rolls in the door," Sharrott says. "And all of a sudden we find that we're being called to the table."

The biggest change CentraCare's Dooley has noticed is the need to incorporate device vendors into his department's vendor-access support policies--resulting from the introduction of a computer virus into the health system's network by a biomedical device vendor. "We've blocked out all vendor access," he says. "They have to call first and have their access opened."

Just the beginning

Sharrott is a little surprised that major vendors like GE and Dräger see as little as 50 percent of equipment purchasing authority falling to the CIO. In his institution, he says, it's more like 90 to 95 percent; what doesn't get CIO review has simply slipped through the cracks. However, despite a dramatic spike in new responsibilities, Sharrott warns, the digital-device cascade has barely begun.

Consider the forthcoming arrival of radio frequency identification tags, he says. Or the proliferation of so-called mini-PACS units that already are in production. Or what's going to happen shortly with voice over Internet protocol. And who can say where nanotechnology will eventually leave the CIO?

"I really think we're just beginning to see digitization," Sharrott says. "I think if we're talking 10 or 20 years out, the amount of integrated digitization is going to be amazing."

--K.F.

Related Sessions at HIMSS 2005

- **Session 33:** Leadership: Successful Strategies Through Turbulence (2/14 p.m.)
- **Session 62:** Maximizing Patient Throughput and Decision Support Dashboards: A Case Study (2/15 a.m.)

Patient-Centric Portals

by Mary Van Beusekom

Web portals that allow patients and physicians to communicate online have a firm foot in the door. "There's certainly evidence that organizations are investing more in portals," says David Ahern, national program director for Boston-based Health e-Technologies Initiative, the foundation arm of the Robert Wood Johnson Foundation, Princeton, N.J. "All the major players in healthcare have had an interest in portal development."

As doctors realize their effectiveness, portals will open up in smaller organizations, too, says Giovanni Colella, M.D., president and CEO of RelayHealth, Emeryville, Calif. "I expect about half of the physicians in the United States will communicate online with their patients within the next five years," he says.

Bob Letzeisen, president of portal manufacturer PatienTree, Tampa, Fla., predicts that portals will be universal within that timeframe, because patients will demand bedside access. "We expect [Internet access] at McDonald's, we expect it at the airport, and we expect it at the Hampton Inn, and I only pay them $79 a night," he says.

Many healthcare consumers do appreciate the convenience of access to multiple services in one place. A recent article in the *Journal of the American Medical Informatics Association* revealed that the majority of 4,282 patients who used Danville, Pa.-based Geisinger Health System's patient portal expressed positive attitudes about the experience.

This finding is underscored by statistics from Manhattan Research, New York. Mark Bard, president, says that about 16 million consumers reported using a hospital Web site last year, up 6 million from just two years ago. Another 30 million used health plans' portals. "If you're one of the leading hospitals, it's a big enough segment that you can't ignore it," Bard says. "In a competitive market, a 2 percent, 3 percent market share can be the difference between losing money and making money one year."

Adoption rates are difficult to quantify because there is no standardized definition of a portal. "You've got these degrees, ranging from regular email to secure email to Web-based communication," says Lyle Berkowitz, M.D., an internist and medical director of clinical information services, Northwestern Memorial Physicians Group, Chicago. But the consensus is that healthcare, true to its reputation, is investing only slowly in portals, despite growing interest.

"There's no other service sector in the United States in which you can't communicate online," Colella says. Bard agrees, noting, "The only one that is resisting it is healthcare." However, Bard believes that 2005 will be a critical juncture for the technology.

In a recent survey from Capgemini, New York, 88 percent of executives at 84 healthcare organizations said they have either begun to invest in an EHR or plan to do so within the next six months, a good indication that portals aren't far behind. "As more physicians start using electronic medical records, they're going to want to communicate electronically with their patients as well," Berkowitz says.

A range of options

Portals range widely in functionality. Home-grown portals typically consist of a Web site that allows one-way communication between patients and healthcare staff.

On the portal at Berkowitz's facility, for example, patients can use a form to securely email requests for prescription refills and appointments and to ask nonurgent questions about billing, referrals and clinical issues. For nonclinical issues, the appropriate staff person contacts the patient during the timeframe requested. For clinical issues, the text is sent to the physician by "cutting and pasting" it into the group's EMR messaging system. Physicians then deal with the message as they would a phone message.

Berkowitz says the system is a good first step, but he wants to fully integrate it with the EMR and set up a system for two-way communication. Although the group hasn't done a return-on-investment analysis, it knows the system saves time and reduces frustration by eliminating phone tag. "The time-shifting makes things more efficient," Berkowitz says. "There's no question that it can decrease the wait time for patients and the pressure on our call agents."

Independent commercial portals such as those offered by RelayHealth and Kryptiq, Beaverton, Ore., offer two-way communication over a secure Web connection through multiple templates. Such systems may or may not integrate with an EMR.

Colella says health plans see significant savings from physician-patient communications. "When patients and physicians communicate online, they are saving approximately $3 per member per month, which is an astonishing savings," he says. "For reference, the net income of health plans is usually around $3 per member per month."

EMR-based portals such as those offered by Cerner, Kansas City, Mo., and Epic Systems, Madison, Wis., integrate with hospital information systems. Letzeisen, whose PatienTree bedside portal also links to CPOE and EMR systems in real time, says that staff access to even nonclinical information, such as billing and inventory, saves money. "If you send $10 of inventory to the seventh floor, are you going to capture all $10 of inventory?" he asks. "Unless you capture all 10, there are areas for improvement."

John Halamka, M.D., CIO of Beth Israel Deaconess Medical Center and Harvard Medical School, Boston, reports savings from his system's intranet, extranet, and EMR-linked customized patient portal, PatientSite. "In this era where everyone has to cut cost, this is a way that everyone can contribute, rather than [hiring] an army of HTML programmers," he says. PatientSite has recorded 2.5 million transactions since it went live in 1999.

Investing in applications that allow PatientSite to link to all area insurance and doctors' offices for billing purposes has reduced filing costs from $5 per transaction to 10 cents, Halamka says. And its link to all pharmacies in New England has cut down on phone calls to patients regarding lab results and prescriptions. Email communications between patients and healthcare providers go into the patient's medical record, where they will remain for 30 years.

Overcoming the obstacles

Reasons for lack of portal adoption are familiar. "It requires a change in habits, and doctors are not comfortable with it," Colella says. "And doctors don't get paid for this, so [investment] requires a longer time than in other industries."

But Berkowitz believes that the growing number of organizations adopting EMRs will also adopt portals to make care delivery that much more efficient. When patients can complete their history from home and

doctors don't have to leave patients multiple phone messages, the full benefit of portals will come to light. "It's a big pain to track someone down to give them their lab results," Berkowitz says.

Another roadblock has been doctors' concern that patients with "cyberchondria" will clog their email inboxes with long missives about their condition, a fear that Halamka says is unfounded. "Patients and doctors treat each other with the greatest respect over email," he says. About 35,000 patients use the Beth Deaconess portal each month, but on average, a patient sends only 1.2 emails per month, 90 percent of which are handled by a nurse practitioner or other staff member.

In addition, certain inquiries are very common, and doctors can store answers to frequently asked questions. "So the average busy doctor is only seeing five to 10 emails from patients a day, which replaces phone calls. And doctors tell me they actually get out of the office sooner, because the beauty of emails are that they are asynchronous," Halamka says.

Patient privacy is an often-cited concern about portals, but Halamka says the Health Insurance Portability and Accountability Act (HIPAA) does not prohibit securely sharing information about a patient's treatment. "HIPAA is meant to keep me from sharing your medical information with the Boston Globe, not from sharing your medical information with a doctor responsible for delivering quality care," he says.

The proof is in the portal

Finding a way to save money may be the primary driver behind portals, but improved patient care is expected to come along on the ride. Some good research has been done in this area, Ahern says, but nothing very scientific. "There certainly have been studies looking at the cost benefits of certain functions; for example, in the area of secure messaging." However, there has been no study "looking at a range of functions, although some are emerging," Ahern says.

To fill this void, Health e-Technologies Initiative has undertaken a tightly controlled study of whether patient and physician use of portals improves management of weight, diabetes and other chronic diseases. Last October, it awarded $2.45 million in two-year grants to six healthcare organizations to study the effectiveness of their portals. It provided a basic definition of portals and required that each organization's portal have a certain number of transactions in certain functional areas.

The potential benefit from this study is substantial, Ahern says. "If the results are favorable for their projects, the healthcare groups and hospitals have the capacity to generalize these findings fairly quickly to a much larger population." There would be little reason to keep a technology waiting at the door once it's found to save money and promote patient care.

Mary Van Beusekom is a contributing editor at Healthcare Informatics.

Related Sessions at HIMSS 2005

- **Session 34:** What Do Patients Want? Patient-Centered Information Technology (2/14 p.m.)
- **Session 68:** Three Cs: Online Communication between Clinicians and Consumers (2/15 p.m.)
- **Session 73:** The Online Revolution: Changing Expectations in Patient-Provider Communications (2/15 p.m.)
- **Session 92:** e-Health Revolutions: Innovations in Provider-Patient Communications (2/15 p.m.)

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8

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Regional Networks

by Charlene Marietti

The goal is clear: to improve patient safety and the quality and efficiency of care through sharing of health information. The clock started ticking in the race toward that objective last spring when President George W. Bush issued his executive order calling for widespread deployment of healthcare IT and electronic health records (EHRs) for most Americans by 2014.

The National Health Information Infrastructure project was already in motion at the time, but as strategies evolved, it has been redefined and renamed the National Health Information Network (NHIN). Basically middleware, the NHIN is a collection of technologies, business frameworks, financing arrangements, legal contracting and other mechanisms, policy requirements, organizational issues and related components that support nationwide implementation of interoperable health IT.

And underpinning the NHIN will be regional health information organizations (RHIOs). Lori Evans, senior advisor to National Health Information Technology Coordinator David Brailer, M.D., Ph.D., and head of his RHIO program, describes them as nongovernmental organizations charged with governance of business and legal issues necessary to facilitate the exchange of health information. Specifics are unavailable since RHIOs are still being developed. But eventually every American will be covered by a RHIO, just as every American will ultimately have an EHR.

Local workhorses

Although the NHIN architecture is still conceptual, the need for it is real, and urgent. The network has to be ready by the time EHRs are deployed, and preferably sooner, Brailer says, "so that we can bind the way the central middleware works, so we know how to specify what it takes for an electronic health record to connect to that or another information appliance."

RHIOs, which have taken the place of the earlier local healthcare information infrastructures and, for reasons of financial and technical scalability, are expected to cover larger geographical areas, will provide much-needed support and services to small physician offices as they adopt EHRs. But they will not be responsible for developing components needed for interoperability. "RHIOs will support deployment of applications that we hope will be plug-and-play and be integrated and implemented with the NHIN," says Evans.

Nobody really knows what will work best, but experts are fairly certain that RHIOs cannot be built with a cookie-cutter approach. This is the discovery phase and thinking is extremely fluid, notes Holt Anderson, executive director, North Carolina Healthcare Information & Communications Alliance, Research Triangle Park. "What we define today may change tomorrow," he says. Right now, the only absolute is keeping the patient and quality as the central focus.

There are currently two basic network models--distributed and centralized--defined by where the data resides, explains Steve Steindel, Ph.D., senior advisor for data standards and vocabulary at the Centers for Disease Control and Prevention in Atlanta. A distributed model, which has been selected for a project in Santa Barbara, Calif., allows members to store data at each site and uses a locator system to find and

access it. A major disadvantage with this model is that a translation system must be installed in each location.

In a centralized model, a single repository accepts data from members and uses transformation tables to convert and store it in standard formats. Data is then accessible to the community. The RHIO in Indianapolis is moving some types of data under this model.

Haven't we done this already?

Remember CHINs (Community Hospital Information Networks)? Don't confuse that '90s failure with this initiative. This is very different.

"CHINS were largely an HIT initiative, with no federal, no state, no big employer, and modest insurer interest," says John P. Glaser, Ph.D., vice president and CIO at Partners HealthCare System in Boston. This approach has broader national interest, involvement from insurers and physicians' professional organizations and bipartisan legislative support, and it benefits all stakeholders, including big, Fortune 50 and 100 companies. Plus, the federal level of interest is not going away, he adds.

But this is still the learning phase, emphasizes J. Michael Fitzmaurice, senior science advisor for IT, Agency for Healthcare Research and Quality (AHRQ), Rockville, Md. To learn what works and what doesn't, AHRQ is funding--at $1 million per year over a five-year period--state and regional demonstrations in Colorado, Indiana, Rhode Island, Tennessee and Utah.

Evans is hopeful the demonstrations will emerge as prototype RHIOs. But, says Fitzmaurice, "There are a lot of questions to be answered," including what incentives are required to maintain data sharing. "A lesson we learned from CHINs is, if we don't pay attention to incentives, we don't have everybody playing in the game."

At this early stage, people are beginning to confront the core operational issues behind RHIOs. How will they be governed and funded? What kind of policies, including privacy and security, and standards are necessary? What architectural model is most appropriate? Where should initiatives start, and with what data types? In Indiana, they started with lab information in the emergency department; in Boston's New England Healthcare EDI Network, they started with claims. "It is still very early. We have a molehill of experience, as distinct from a mountain," says Glaser.

Federal leadership is crucial in this effort--and the feds could play any number of roles, according to Glaser. For example, they could force boards and leadership to talk, much as the Washington, D.C.-based Leapfrog Group is doing, or set standards and models of clinical data exchange across regions.

Legislatively, laws that impede progress need to be adapted. A prime candidate is the Stark Law, also known as the federal self-referral law because it prohibits referrals for federally insured patients to services between parties who have a financial relationship.

Perhaps most important is increased funding, which will make the difference between progressive growth and stalled projects. However, even with a lot of money on the landscape, this undertaking will not be a slam dunk, notes Glaser.

Shepherding the flocks

With little solid experience upon which to build, most providers and payers are likely to want more concrete plans than currently available before committing. To meet this need, the Washington, D.C.-based Foundation for eHealth Initiative, through government and philanthropic money, is compiling a

knowledge base of various communities' work products. This includes charters, mission statements, pricing approaches and architecture documents.

Watch for regional workshops through such professional groups as the College of Healthcare Information Management Executives, Ann Arbor, Mich., to stimulate the exchange of experiences and working strategies. They will likely address practical issues, such as how much to charge physicians, what level of support to provide and whether vendors will allow extension of licenses to physicians.

Lack of experience in collaboration and data sharing--not to mention building and managing a shared clinical information systems infrastructure--is a big problem. Few regions have a history of organizations sitting down together and solving complex problems. Learning how to govern themselves and developing trust will take time.

The Healthcare Information and Management Systems Society (HIMSS), Chicago, perceives itself as uniquely positioned to take a leadership role. The HIMSS RHIO Task Force has proposed a HIMSS RHIO federation in which HIMSS would use its reach to support RHIOs, says Pete Palmer, task force member and principal security analyst for advanced patient management at the St. Paul, Minn., division of Guidant (recently acquired by Johnson & Johnson, New Brunswick, N.J.).

What's not to like?

The degree to which each of the 80 to 100 projects nationwide will conform on standards remains in question. Lack of a common medical vocabulary, and thus difficulty in getting the important concepts mapped to each other, is a major barrier. There aren't enough standards and they're not put together well enough or consistently enough to allow interoperability and seamless data handoff, says Steindel. To what degree these regional networks conform to standards depends somewhat on the role the feds play, says Glaser.

Without incentives, there is little hope that stakeholders will move. The resounding success of the Centers for Medicare and Medicaid Services' strategy--using a 0.4 percent differential reimbursement to encourage hospitals to report quality data--indicates that even small financial incentives will promote formation of data-sharing networks. However, financial incentives remain elusive, with nearly all proposals still in the early planning stage.

The driving force, and the one that won't go away, is patient safety. Will these efforts be enough to support significant improvement? "Nobody knows," says Fitzmaurice. "What we're hoping to do is light a spark. Is the spark enough? We don't know, but there has never been a better time than now."

As leaders seek a sustainable financial model to achieve quality-improvement goals, IT also needs to pay off economically. A real market is developing, notes Steindel. "The large vendors smell money in HIT, and when people smell money, they tend to fill [the market] pretty quickly," he says. "President Bush says he wants an EHR in 10 years. I think it will be five."

Charlene Marietti is editor of Healthcare Informatics.

Related Sessions at HIMSS 2005

- **Session A:** Moving Health Information Technology to the Next Level: The Portable Electronic Health Record and NHII (2/13 p.m.)
- **Session 2:** Standardizing Health Care IT: National and Local Approaches (2/14 a.m.)

<div align="center">**9**</div>

Telehealth

by Frank Jossi

Telehealth is truly coming of age. More and more medical systems across the country employ video, image and telephone consultation, often in combination, to extend healthcare to rural and underserved urban areas. Distance consultation still has a decidedly rural appeal but is finding applications even in larger cities.

Increasing use

Fueling the growth has been the expanding availability and plunging cost of high-bandwidth connections capable of offering real-time video and transmission of enormous files, such as X-rays, through private networks and the Internet. A move by the Centers for Medicare and Medicaid Services and private insurers to begin reimbursing for select activities and treatments has added to telehealth's expansion. And insurers and hospitals are beginning to see telehealth applications as a way to manage and prevent disease, offer a high level of care and potentially save money.

Jonathan Linkous, executive director of the Washington, D.C.-based American Telemedicine Association, says more than 150 healthcare systems have telehealth networks in place, and countless institutions use point-to-point connections for care delivery. The inability to arrive at a solid number for telehealth applications nationwide bodes well for the industry, he says. "It's a sign of success, because it shows telemedicine has become a seamless part of an integrated delivery care system."

The largest use of telehealth applications continues to be in radiology, cardiology, pathology, dermatology and retinal imaging, he says. Physicians have worked remotely in these disciplines for years and have received reimbursement from private health insurers and the government. Now, two new categories are growing--treatment of patients in medical centers, especially for psychiatric counseling, and treatment at home using health-monitoring equipment, says Linkous.

Federal support "has never been stronger," he says. Federal spending, which continues to drive telehealth applications, tops $400 million annually and is increasing as much as 15 to 20 percent a year. Much of that money goes to the military, although other government departments offer healthcare funding via grants.

Telehealth monies that the government provides through programs to veterans, Native Americans and others are harder to track, says Linkous, though evidence points to increases. The Department of Veterans Affairs, the single largest user of telemedicine in the government, has embarked on an ambitious home healthcare project, for example, and "the use of telemedicine for the population receiving direct services from the government is increasing," he says.

Reimbursement issues

States do offer reimbursement for patient care services, but levels vary, and the lack of a more orderly system has become a roadblock to greater expansion. "We need to have the Centers for Medicaid and Medicare Services and physician groups agree on a reimbursement model," Linkous argues. "The lack of reimbursement for telemedicine is causing us to fall behind other countries."

Nina M. Antoniotti, program director of the Marshfield, Wis., Clinic's telehealth network, says reimbursement for telehealth depends greatly on who pays. Private payers have increased payments, albeit inconsistently, and 15 states reimburse for some kinds of telehealth, she says. California's Blue Cross Blue Shield offers payment for all telehealth services, while in Wisconsin the same insurer pays only after patients meet 10 criteria, she says.

Antoniotti's advice to providers includes holding meetings at which medical directors and quality assurance personnel explain to their biggest insurers the cost savings and high-quality care that telehealth delivers. Another strategy is to network with other telehealth directors to work with insurers. A third approach: bill private insurers. If questions are raised, she says, offer answers showing how telehealth works and drives down costs.

Store-and-forward

Telehealth applications range from common teleradiology to futuristic telesurgery, from treatment delivered in a "store-and-forward" mode to real-time videoconferencing. Web-based store-and-forward technology, the most commonly employed by healthcare providers, electronically stores medical data for forwarding as required, such as for medical consultation.

For Stanley M. Saiki Jr., director of Honolulu-based Pacific Telehealth & Technology Hui, store-and-forward technology is an effective solution because it is inexpensive and it overcomes the problem of time zones. An effort of the VA and the Department of Defense, the Hui has applied the technology to telepathy, behavioral health, dermatology, digital radiology and internal medicine. Doctors at American bases throughout the Pacific send records and images to experts at the Tripler Army Medical Center and other VA clinics, says Saiki.

"We don't do as much live [videoconferencing] because of our time zones--we service people in the west Pacific who are five or six time zones away--and because of telecommunications' costs," he says. "Two-way video can get quite expensive quickly."

Christopher N. Otis, M.D., director of the Division of Surgical Pathology at Springfield, Mass.-based Baystate Medical Center, part of Tufts University School of Medicine, employs a teleconsultation application to save time and allow greater input by his staff. A consultation room houses a large plasma-screen monitor that as many as a dozen pathologists can view at once. With MedMicro, an Internet-based solution designed by Irvine, Calif.-based Trestle Corp., they can examine cell and tissue sections residing on remote microscopes and offer opinions to colleagues miles away, he explains. The microscopes are located at satellite sites, as well as in a frozen-section laboratory only 100 yards from the conference room.

Otis says he can operate the system in real time, controlling the microscope "virtually" with a computer mouse. A major challenge has been to make his staff "less microscope-reliant and more screen-able" in viewing the slides on computer or plasma screens, he says.

Otis also can use his office or home PC to look at slides sent by remote colleagues or the health center's 24 operating rooms. But despite the impressive technology, he concedes, pathologists still have to view certain types of tumors and other samples through traditional microscopic devices to ensure accuracy.

Store-and-forward telehealthcare is also useful in disease management. Primary care physicians with the Methodist Hospital division of Thomas Jefferson University in Philadelphia have installed MedStage MD from Siemens, Malvern, Pa. Implemented with the help of Baltimore-based Interactive Medicine Inc., the telemedicine platform for ophthalmology examinations in diabetic patients employs two cameras for retinal photography during office visits. Physicians transmit the images via the Internet to specialists, who look for signs of diabetic retinopathy or glaucoma.

Robert Sergott, M.D., director of ophthalmic services at Methodist Hospital, says that over the past year, the system revealed eye problems in 10 of 100 previously undiagnosed patients seen at the Bove Diabetic Center in south Philadelphia. In the largely disadvantaged neighborhood, diabetic patients often do not get regular eye exams because of the cost and the problems of getting to a doctor, he says. He hopes to see store-and-forward devices appearing in primary care offices in the neighborhood. Prevention and early detection of eye disease in diabetics is much less expensive than the cost of care for glaucoma and blindness, he argues.

Real-time treatment

Already popular, rural telemedicine uses continue to grow. For the past year, through a system designed by Anchorage-based GCI ConnectMD, the Alaska Psychiatric Institute has been delivering remote care via videoconferencing. CEO Ron Adler says a high-bandwidth link has been established with Fort Yukon, a village more than 100 miles away, to allow his staff to visit with patients and observe their behavior.

"The benefits of bandwidth and the ability to zoom in on the features of a child, for example, are amazing," says Adler, who oversees the largest psychiatric clinics in Alaska. "A child can be 15 or 20 feet out from where the camera and video equipment is located, and the picture's so good you can see a teardrop forming in their eye." And adult patients "completely forget you're speaking to them through a television monitor" by the second or third teleconference, Adler says. The institute offers a full range of behavioral health consultations through videoconferencing, from depression and chemical dependency counseling to dealing with family and children's issues, he says.

Videophone use, although stalled in the commercial market, is having success in telemedicine applications. Using videophones from Tucson, Ariz.-based StarView Corp., INTREGIS Health, Oklahoma City, treats more than 200 patients at six rural hospitals for asthma, diabetes, hypertension and congestive heart failure. Nurses offer care using videophones in conjunction with vital-sign monitoring data collected on the MedStar System, developed by Cybernet Medical Corp., Ann Arbor, Mich.

Pamela Forducey, director of the INTEGRIS Telehealth network, says the federal government-sponsored videophone is among many telehealth applications being tried. Another employs videoconferencing equipment to deliver speech pathology and physical therapy to patients at eight rural hospitals.

Despite the projects' success, INTEGRIS, like many healthcare providers, has been searching for a sustaining business model based on insurer reimbursement. "INTEGRIS is committed to telehealth, but we're not billing the insurance providers yet," Forducey says. "We're going to stay in the game and find a revenue model that works."

Frank Jossi is a technology writer in St. Paul, Minn.

Related Sessions at HIMSS 2005

- **Session 84:** Technology Advances: Finding IT Solutions in the Military (2/15 p.m.)
- **Session 143:** Home is Where the Heart Is: Home-Based Connectivity (2/17 a.m.)

- **Session 144:** Extreme Mobility: Linking Doctor and Patient Anytime, Anywhere (2/17 a.m.)

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