

Using IT to Prevent Adverse Events Part One: Trends

EXECUTIVE SUMMARY

Monitoring quality in healthcare has a long and rich history and it is coming into maturity in our efforts to use IT to track and prevent adverse events (AEs). But it wasn't until the IOM report at the tail-end of the last century that it became a mainstream mandate and the pioneers in this critical field began to get their proper due. Listening to people like Brent James, MD, and Don Berwick, MD, is like listening to prophets whose message is finally being heeded.

But the IOM report made people pay attention. This issue of Information Edge set out to examine from an IT perspective just how far we've come in our journey to identify, predict and prevent AEs. The feedback was so rich and engrossing that we felt it needed to be published in two reports. This first one is an overview of the trends in this area and an attempt to provide a framework for thinking about IT to prevent AEs. Next month's IE report will focus more specifically on emerging solutions.

In this issue we talked to experts from FCG, KLAS, Thomson Healthcare, Allina and Intermountain Healthcare, all with slightly different yet surprisingly similar takes on the topic of IT and AEs. Measuring the progress we've made using IT to prevent AEs is closely entwined with the progress of IT generally in healthcare. A standardized IT infrastructure and clinical nomenclature is an absolute prerequisite to making headway nationally. Also, the stars are aligning nationally in the form of P4P and national quality groups. Last but not least, virtually everything is becoming IT-enabled or "smart"—even humans with embedded chips, we might add—and that means both the challenge and the opportunity get greater everyday.

Smart alarming

"We're at the beginning of an era where not just EHRs but all peripheral devices will be IT-enabled to prevent adverse events," says David Classen, MD, MS, VP at FCG and associate professor of medicine and consultant in infectious

Chairman

Stanley R. Nelson

Vice Chairman

Donald C. Wegmiller

Executive Director

Shelli Williamson

Editor

Chuck Appleby

Managing Editor

Jean Appleby

Advisors

George Bo-Linn, MD,
Catholic Healthcare West

Paul Browne,
Trinity Health

David Classen, MD,
FCG

George Conklin,
CHRISTUS Health

David Dimond, TSC
Bill Dwyer, Cerner

Tom Giella, Korn/Ferry

Nick Hilger, UnitedHealthcare,
Clinical Advancement division

Jim Jones, Hewlett Packard

Adam McMullin, Hill-Rom

Jerry Osheroff, MD,
Thomson Healthcare

Bruce Smith,
Advocate Health Care

Kevin Wardell,
Norton Healthcare

SCOTTSDALE
INSTITUTE

Membership

Services Office:

1660 Highway 100 South
Suite 306

Minneapolis, MN 55416

T. 952.545.5880

F. 952.545.6116

E. scottsdale@scottsdaleinstitute.org

W. scottsdaleinstitute.org



WELCOME NEW MEMBER

The Scottsdale Institute is proud to welcome new member Children's Hospital of Pittsburgh.

Children's Hospital of Pittsburgh of UPMC is one of the premier pediatric referral centers in the world and is committed to a three-part mission of providing high-quality patient care, groundbreaking biomedical research and outstanding pediatric medical education.

Children's Hospital is renowned for a wide spectrum of primary care and specialty services, including cardiology, cardiothoracic surgery, critical care medicine, diabetes, hematology/oncology, neurosurgery, organ and tissue transplantation, orthopaedics, otolaryngology (ENT) and pediatric surgery. Children's also operates the only accredited Level 1 (highest level) Regional Resource Pediatric Trauma Center in western Pennsylvania and one of only three in the state.

continued on next page

diseases at the University of Utah School of Medicine. "This is smart alarming. It's more sophisticated than alarms in the old days limited to monitoring heart and oxygen rates. It will tell you if a patient has a nosocomial infection with other context factors. Smart alarms are going to become increasingly important in a pay-for-performance (P4P) marketplace," he says.



David Classen, MD, VP, FCG, Long Beach, Calif., associate professor, University of Utah, Salt Lake City



The forces are already in play. In October 2008 Medicare will implement reduced payments to hospitals where patients have complications such as nosocomial infections. The AHA is working with Medicare this year to finalize the first system-wide P4P program. "There's increasing interest in smarter detection, the use of electronic systems to detect potential adverse events," says Classen.

"In the future, all peripheral devices will have the ability to detect AEs. Market demand for that capability will drive vendors to incorporate such capability into products, accelerated by the quality movement by the National Quality Forum and other quality groups," he says.

Kicking and screaming...

Other observers see the industry at a similar point in the quest to control medical errors through automation.



Kent Gale, president, KLAS, Orem, Utah

"IT to prevent AEs is still in its infancy," says Kent Gale, president of KLAS, an Orem, Utah-based research firm that measures performance of IT in

healthcare. Smart infusion pumps, a market KLAS is currently studying, are an example of how innovative technology can fail to "take" in a clinical environment due to workflow and cultural factors. These smart devices can be programmed with electronic "guardrails" or automatic drip-rate limits to increase safety for patients on IV. However, the study is finding that some nurses turn off the guardrails because they're either too cumbersome or get in the way of care. "There are too many false warnings and nurses devise workarounds. They're prone to fiddling with it as a result of these inconveniences," potentially negating the value of the investment, says Gale.

That doesn't mean there aren't smart-pump success stories and that most IDNs

aren't in the process of investing in them—they are. "IT is embedded in the smart pumps and can have an immediate impact on quality, especially the wireless ones," he says. But they're not plug-and-play. Provider organizations are finding there are critical prerequisites to exploit smart pumps: First, building of a wireless infrastructure so that nurse usage data, drug library updates and tweaks in guardrails can be done quickly and frequently, if needed. Second, establishment of hard and fast operational rules to govern the pumps' use and encourage the utilization of the medication safety tools on the pumps.

An industry facing fatigue

Other research highlights the cultural challenges that healthcare systems continue to grapple with as they adopt IT to prevent AEs.

A CPOE study just completed by KLAS, for example, asked provider organizations if they used "complex clinical alerts," or ones with multiple components, as opposed to simple alerts with only a single component. "We've found in the last few years that the number of sites using CPOE has increased dramatically, but the use of complex alerts has not kept pace with the opportunity. There are too many false alerts causing alert fatigue so growth in complex alerts tapered off the last two years," says Gale.

There is marked growth in hospitals that have physicians entering orders, he

says, and "you'd expect the same proportion with alerts, but it's not happening. There's a lot more electronic ordering going on but alerts are not keeping pace. And it takes real energy to build alerts, opening the door to commercially available databases that would speed up adoption." Ironically, over half the alerts currently used by hospitals are financial ones to stop adverse financial events, according to hundreds of recent interviews.

On the clinical side, hospitals are implementing more and more simple alerts, which are the equivalent of clinical tickler files: simple to set up and useful in their ability to notify clinicians with basic information about potential dangers. To date, most organizations that are using alerts with two to three data elements—like a lab result and medication dosage—have fewer than 10 complex alerts in place, according to Gale, who estimates that only about five IDNs in the country are "mature" in the sense of employing hundreds of complex alerts.

Complex alerts can spot potential danger amid a myriad of seemingly contradictory factors such as, when a patient is on a sodium-depleting medication at the same time she's on a low sodium diet. Her lab result would likely signal that the patient will be at risk. An alert would say that she needs immediate attention based on the lab value, diet order and medication. "You'd have to build that alert and have to specify an appropriate

Welcome New Member continued

As the only hospital in western Pennsylvania devoted solely to the care of infants, children and young adults, Children's has been named consistently to several elite lists of pediatric health care facilities. This recognition includes being listed as one of the top 10 in pediatric research funding provided by the National Institutes of Health.

Children's Hospital of Pittsburgh of UPMC is affiliated with the University of Pittsburgh School of Medicine. It has 260 beds, a hospital-based medical staff of about 170 and an admitting staff of more than 500. Children's offers comprehensive inpatient and outpatient care at its main campus in the Oakland section of Pittsburgh and provides outpatient specialty and same-day surgical services in key regional locations north, south and east of the city.

Welcome Roger Oxendale, president and CEO, Jacqueline Dailey, VP & CIO, James Levin, MD, CMIO and the entire Children's Hospital team.

WELCOME
NEW
SPONSOR



The Scottsdale Institute is proud to announce Technology Solutions Company (TSC) as a Sponsoring Partner.

Technology Solutions Company (NASDAQ: TSCC), based in Chicago, delivers specialized, technology-enabled business solutions. The company applies knowledge derived from the intersection of industry expertise, technology and processes to client business challenges. TSC serves the healthcare, financial services, manufacturing and consumer retail industries.

TSC's Digital Healthcare Team brings cross-industry breadth and depth to IDNs, hospitals and virtual providers using performance-optimization techniques to maximize the value of their digital-technology investments, especially radiology and cardiology. TSC offers solutions that prepare clients

continued on next page

action. The hard part is who do you send the alert to and who confirms receipt? The doctor, the nurse or the pharmacist?" asks Gale.

But that's just the beginning. Like the guard rails on smart pumps, alerts are useless without supporting staff and workflow. "Once you build an alert," says Gale, "if you don't think through factors like alert routing for staff vacations, your system can fall apart because alerts can go into the black hole. That impacts patient care. It goes miles past IT."

No tipping point

Performance measurement and improvement has long been the focus of Lou Diamond, MD, and now, as VP and medical director at Thomson Healthcare, he's been acutely aware of how far we still have to go on that journey. "I don't think that detecting adverse events in the inpatient or outpatient settings has reached the tipping point yet," he says, despite the fact it's been seven years since the first IOM report identified medical errors as a national emergency. Detecting adverse events and process errors is an essential component of a robust system of preventing errors and adverse events.

Diamond says part of the challenge lies in the multiple methodologies—typically IT-based—geared to collect, aggregate, analyze and report on errors and AEs in healthcare. First are structured staff-reporting systems, which should exist in all settings, but which have not



Lou Diamond, MD, VP and medical director, Thomson Healthcare

yet significantly penetrated even hospitals. A second method is reporting by the patient, which also has not received widespread adoption. A third is to mine existing databases, either administra-

tive or clinical, using special algorithms and indicators. "You really can't pick up errors, but can pick up the results of errors, i.e. AEs, using this methodology," says Diamond. Other methodologies include the use of direct observations and video recording.

The Joint Commission's sentinel-event program, which requires reporting of certain types of AEs, continues to drive action in this area, but even that program has resulted in significant under-reporting. National Quality Forum identified and adopted a list of "Reportable Never Events" (revised last year) a reporting system that's been adopted by more than 20 states. But even state action, says Diamond, has resulted in significant under-reporting, and very little documented use of the data to prevent errors and AEs.

Get trustees on board

The Patient Safety Act of 2005 required development of a national events-report-

ing system, the implementation of which has been handed off to AHRQ, which has been working on it for a year. One of AHRQ's charges is to develop a national plan and taxonomy, or classification system, of errors and AEs. "Over the next five years we might be able to put in place a more robust reporting and prevention system. This will require major cultural change and a number of other factors working together in a coordinated manner," says Diamond.

Federal legislation enacted in 2004, described in the January issue of the *Journal of the American College of Medical Quality*, will be found to be very helpful once implemented. For hospitals, as an example, the support of boards of trustees will be critical. "For hospitals, that's where the world starts," asserts Diamond. "The kind of change we're talking about requires commitment from the board, the CEO, CMO and CNO. As the NQF has urged, boards need to be 'quality literate.'"

Additional action at the state level would also facilitate development of reporting systems. Finally, improving data collection and supporting IT will require standardized data elements and definitions of AEs, and health information exchange (HIE) standards. "It's multidimensional. They all have to play out in some organized way," he says. In the end, one can't look at the issue of adverse event reporting isolated from the

issue of the lack of a national health information infrastructure to support healthcare delivery, consumer engagement and oversight.

"We've got a long way to go before we put in place a national AE identification reporting system. Has there been some activity? Yes. Is enough happening? No. We're in the early stages of adoption. The amount of cultural change within organizations to alter the mindset of secrecy and protection is quite significant," says Diamond.

Mining data in Minnesota

Even leading healthcare delivery systems are on a learning curve as to what the best tools and technologies are to detect and prevent AEs in their particular environments.

Allina Hospitals & Clinics, a Minneapolis-based 11-hospital system that has been tracking ADEs for decades, recently concluded that an internally-developed self-reporting method was as effective as a specially designed tool from a national quality organization. In early 2005, just after launching an EHR at two of its hospitals, Abbott Northwestern and Buffalo, Allina began using the Trigger Tool for Measuring Adverse Drug Events from the Cambridge, Mass.-based Institute for Healthcare Improvement (IHI) as a way to exploit the rich data to which it now had access.

Welcome New Sponsor continued

for the emerging shift to consumer-based healthcare, retail medicine and virtual-medicine centers. Instead of the traditional inside-out approach that focuses on cutting internal costs, TSC takes an outside-in, growth-oriented approach that begins with the customer. TSC applies the disciplined rigor of Six Sigma, Lean, Toyota and other proven cross-industry techniques to identify, create and realize increased customer value. With this approach, TSC designs, implements and optimizes digital systems to guarantee they deliver measurable quality and value.

Welcome Milton Silva-Craig, president and CEO, David Dimond, senior vice president of Innovation, and the rest of the TSC team.

For information on any of these teleconferences, please register on our Website scottsdaleinstitute.org

March 7

Nursing Admissions Process Redesigned to Leverage EHR at Christiana Care

- Jennifer Guite, RN, MS, project manager and clinical analyst, Christiana Care Health System, Wilmington, Del.
- Mary Lang, RN, MS, director, Nursing Informatics, Christiana Care Health System
- Patrick McCartan, RN, MSN, BC, Nursing Informatics Team, Christiana Care Health System

March 8

The MidSouth e-Health Alliance: Overcoming Policy, Privacy and Security Barriers

- Vicki Estrin, program manager, Regional Informatics, Vanderbilt Center for Better Health, Nashville, Tenn.

March 9

KLAS on Cardiovascular Reporting

- Jeremy Bikman, VP, Strategic Research, KLAS Enterprises, Orem, Utah

March 15

The Coyote Crisis Campaign: Scottsdale Healthcare Project Wins Both Healthcare Informatics and CHIME Innovator Awards

- James Cramer, CIO, Scottsdale Healthcare, Scottsdale, Ariz.

more events on next page

The IHI Trigger Tool prompts staff to look at patient charts based on “triggers” like combinations such as the use of anti-emetic and anti-diarrhea drugs, sodium and serum levels, and white blood counts under 3,000—situations that could be associated with ADEs. Allina used the tool for three years when staff cuts necessitated dropping use of the labor-intensive tool. That’s when the organization realized that its old self-reporting technique was probably just as good.



Sharon Henry, director of clinical decision support and benefits realization, Allina Hospitals & Clinics, Minneapolis



“We looked at more identified charts as a result of the Trigger Tool, but the actual prevalence of ADEs was

the same as before using the tool,” says Sharon Henry, Allina’s director of clinical decision support and benefits realization. Allina is continuing to track ADEs using its Patient Visitor Safety Report, a self-reporting tool used by nurses, pharmacists or physicians when they believe an ADE has occurred. The report is electronically transmitted to the particular hospital’s safety officer, then, after being read and coded, it is communicated to pharmacists and others involved in medication management.

Besides ADEs, Allina tracks other events, including such incidences as when a patient falls and breaks a hip. “It all goes on a single self-reported tool. We thought the IHI Trigger Tool would be more granular,” says Henry, but while the tool turned up three times the charts of the in-house program at Abbott Northwestern, for example, actual ADE results turned out to be unchanged.

Despite the ambiguity of results, Henry does not rule out use of the Trigger Tool in the future, speculating that Allina was not able to use it long enough to exploit its true value. “We had only September 2005 to January 2006 with our EHR implemented in two hospitals. You need at least six to 12 months with the EHR and the Trigger Tool,” she says.

Trigger happy

Indeed, new, yet-unpublished research by Intermountain Healthcare’s renowned quality expert supports use of the IHI Trigger Tool.

Brent James, MD, MStat, VP of medical research at Salt Lake City-based Intermountain and a nationally recognized pioneer in the area of quality, says the Trigger Tool outperforms many other such tools partly because it relies on explicit criteria to trigger alerts. That is just one conclusion from an AHRQ-funded study Intermountain did on development of a Targeted Injury Detection System—in essence a system to detect and prevent adverse events.



Brent James, MD, MStat, VP, medical research, Intermountain Healthcare, Salt Lake City

The study, whose results will be published this spring, provides a framework for adverse-event detection. James says the essential process of detecting and picking out AEs involves not only the ability to track

patterns but also, once implemented, to monitor if the system working. He breaks AE detection and prevention into three elements: 1) Case Finding—identifying areas that might represent adverse events, “casting the net broadly;” 2) Evaluation—specificity, nail down exact events; 3) Clarification—“a scheme to load them into the computer.”

Case Finding further breaks down into three methods:

Voluntary Reporting—Front-line clinical care staff are asked to report on adverse events they witness or suspect with the reporting process made as easy as possible. The approach is not unlike the Joint Commission’s Sentinel Events or NQF’s Never Events programs. However, says James, this approach is vastly insufficient. “Research in the last 10 years has shown that voluntary reporting systems miss the vast majority of AEs depending

on the category,” he says. When it comes to ADEs, which are the biggest single source of AEs, voluntary reporting by hospitals catches only one in 150. Other categories of AEs aren’t much better: One in 100 of pressure injuries and half of post-operative wound infections are caught. On the other hand, no pun intended, 100% of wrong-site surgeries and mechanical device failures are voluntarily reported.

“We now have three good studies,” says James, “showing that, for some classes of events, the clinical teams never associate the patient’s symptoms with the treatment. It has to do with complexity and attribution. So, for some sources of events like ADEs, pressure injuries and in-hospital infections, voluntary reporting does rather poorly. For others, where the connections are more obvious—like wrong surgeries or device failures—voluntary reporting does quite well.”

The IHI Global Trigger Tool tracks a wide range of AEs, well beyond just ADEs.

Retrospective Chart Review—“There’s a clear winner here,” says James, and it’s the IHI Global Trigger Tool, which “outperforms others.” (Information on the Trigger Tool can be found on the IHI website at <http://www.ihl.org/ihl/workspace/tools/trigger/>). The triggers are based on explicit criteria—“Clues that an AE may have occurred,” according to the IHI website—which a multidisci-

Upcoming Events continued

March 20

CPOE Outlook: 2005 vs. 2006

- Adam Gale, EVP and COO, KLAS Enterprises, Orem, Utah

March 22

Personal Health Records-Connecting Patients with Their Health Care

- Archelle Georgiou, MD, United Health Group, Minneapolis

March 27

SUMMA Health System Case Study: Medication Reconciliation Results

- Pam Banchy, director, Clinical Systems, SUMMA Health System, Akron, Ohio
- Trish Enos, manager, Performance Improvement, SUMMA Health System
- Peggy Kuhar, nursing director, Medical Surgical Services, SUMMA Health System
- Stephanie Peshek, director, Pharmacy Services, SUMMA Health System
- Irene McQueen, senior clinical systems analyst, SUMMA Health System

April 10

Adoption of CPOE in Community Hospitals: Leading Practices

- Erica Drazen, VP, Emerging Practices, FCG, Boston

April 12

Integrating e-ICU and Robotics at Parkview

- Susan Ahrens, MD, director, Adult Critical Care, Parkview Health, Fort Wayne, Ind.

For information on any of these teleconferences, please register on our Website scottsdaleinstitute.org

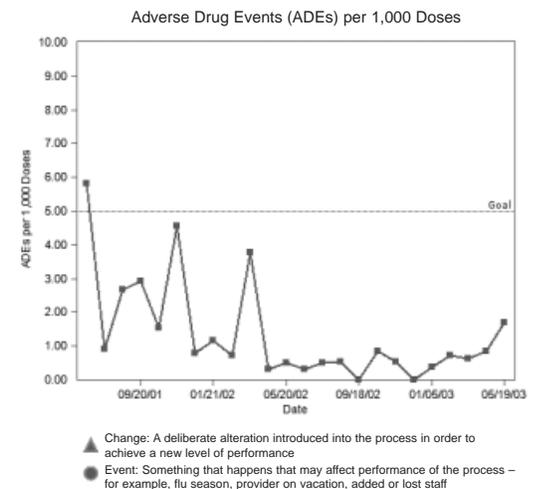
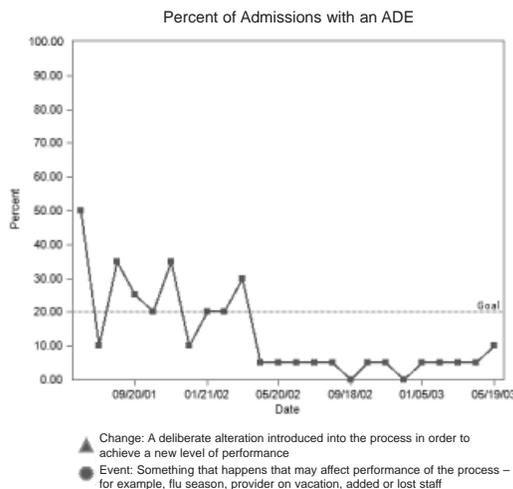
plinary team assigned by the provider organization uses to review samples of patient records. An interactive tool is

used to calculate and graph AEs per 1,000 Patients Percent of Admissions with an AE.

OSF Healthcare, Peoria, Il., Tracks Improvement Using the Trigger Tool

Charts courtesy of the Institute for Healthcare Improvement

“If you’re using a prospective clinical review system you can intervene before the patient is harmed. It probably saved my father’s life at LDS Hospital.”



Prospective Clinical Review System— These are software systems that identify patterns that trigger alerts in real time at a clinician’s point of decision. “If you’re using a prospective clinical review system you can intervene before the patient is harmed. It probably saved my father’s life at LDS Hospital,” says James. The key is building rules that can make inferences among complex factors that would otherwise be missed by humans. The ability to do that has turned a traditional belief about patient safety culture on its head, according to James: “We used to think that people

didn’t report out of fear, but it was probably because they weren’t making the connection. A prospective system helps make the association between the treatment and the care event.”

James recommends that hospitals put in place all three case-finding methods together: 1) Prospective trigger system; 2) Retrospective trigger system; and 3) Voluntary reporting system. The latter continues to be important, he says, because, unlike the first two methods which use pre-selected criteria, voluntary reporting is a way to “find something you’re not looking for.”

Conclusion

Healthcare organizations are at the threshold of automating the detection and prevention of AEs to eliminate medical errors and improve patient safety. It's a task that lies at the heart of not only the quality equation in healthcare but the efficiency one as well. With the advent of smart biomedical devices and RFID tracking of staff, patients and equipment, the whole healthcare environment is gradually joining desktop PCs and PDAs on the network. The context of care—

identity, time and location—will merge with medications and other treatments as a truly integrated knowledge-based environment. The reality, of course, is that we're just at the beginning—technology, workflow and cultural issues lie unresolved. This issue of the IE report tries to paint a broad-brushed portrait of where we are and where we're going in this quest. Next month's report will focus on more specific solutions, both local and national.



REGISTER NOW

scottsdaleinstitute.org

SPRING CONFERENCE 2007

*Informatics and Technologies Transforming
the Delivery of Care*

April 25-27, 2007

Camelback Inn, Scottsdale, Ariz.

SCOTTSDALE INSTITUTE MEMBER ORGANIZATIONS

Advocate Health Care,
Oak Brook, IL

Allina Hospitals & Clinics,
Minneapolis, MN

Ascension Health,
St. Louis, MO

Billings Clinic, Billings, MT

Catholic Healthcare West,
San Francisco, CA

Catholic Health Initiatives,
Denver, CO

Cedars-Sinai Health
System, Los Angeles, CA

Children's Hospital of
Pittsburgh, PA

Children's Hospitals &
Clinics, Minneapolis, MN

CHRISTUS Health,
Irving, TX

Cincinnati Children's
Hospital Medical Center,
Cincinnati, OH

Clarian Health,
Indianapolis, IN

DeKalb Medical Center,
Decatur, GA

Hackensack University
Medical Center,
Hackensack, NJ

HealthEast, St. Paul, MN

Heartland Health,
St. Joseph, MO

Integris Health,
Oklahoma City, OK

Intermountain Healthcare,
Salt Lake City, UT

Legacy Health System,
Portland, OR

McLaren Health Care
Corporation, Flint, MI

Memorial Health System,
Springfield, IL

Memorial Hermann
Healthcare System,
Houston, TX

Munson Healthcare,
Traverse City, MI

New York City Health &
Hospitals Corporation,
New York, NY

New York Presbyterian
Healthcare System,
New York, NY

North Memorial Health
Care, Minneapolis, MN

Northwestern Memorial
Healthcare, Chicago, IL

Norton Healthcare,
Louisville, KY

Parkview Health,
Ft. Wayne, IN

Partners HealthCare
System, Inc., Boston, MA

Piedmont Healthcare,
Atlanta, GA

Provena Health,
Mokena, IL

Rush University Medical
Center, Chicago, IL

Saint Luke's Health System,
Kansas City, MO

Saint Raphael Healthcare
System, New Haven, CT

Scottsdale Healthcare,
Scottsdale, AZ

Sentara Healthcare,
Norfolk, VA

Sharp HealthCare,
San Diego, CA

Sparrow Health,
Lansing, MI

Spectrum Health,
Grand Rapids, MI

SSM Health Care,
St. Louis, MO

Sutter Health,
Sacramento, CA

Texas Health Resources,
Arlington, TX

Trinity Health, Novi, MI

Truman Medical Center,
Kansas City, MO

University of California
Los Angeles Medical
Center, Los Angeles, CA

University of Chicago
Hospitals & Clinics,
Chicago, IL

University of Missouri
Healthcare, Columbia, MO

**Scottsdale Institute
Conferences 2007/08****Spring Conference 2007**

April 25-27, 2007
Camelback Inn,
Scottsdale, Ariz.

Fall Conference 2007

Hosted by Piedmont
Healthcare
Sept. 27-28, 2007
The Ritz-Carlton, Buckhead
Atlanta, Ga.

Spring Conference 2008

April 16-18, 2008
Camelback Inn,
Scottsdale, Ariz.

SCOTTSDALE INSTITUTE SPONSORING PARTNERS