Thank You!

Hospitals & Health Networks extends special thanks to Accenture, McKesson, and the College of Healthcare Information Management Executives (CHIME) for their support of the 2007 Most Wired Survey and Benchmarking Study.
Ten Lessons from the Top 100

One thing is certain: Technology is part of the process of improving care.

The nation's 100 Most Wired Hospitals and Health Systems have better outcomes than other hospitals on four key measures: mortality rates, the Agency for Healthcare Research and Quality's patient safety measures, the Hospital Compare's Core Measures and average length of stay. This is the strongest evidence in the nine-year history of the survey of an association between the implementation and adoption of information technology and the quality and cost of patient care.

Although the analysis is compelling, chief information officers and researchers are quick to point out the limitations. The research shows that, in general, hospitals with good quality results are also dedicated to information technology. It does not show that IT caused those benefits.

"These initiatives are a combination of people, process and technology, not just technology alone," says Mike Alvenson, acting CIO, Texas Health Resources, Arlington, which makes its eighth appearance on the Most Wired list in 2007 and is an Innovator Award finalist. "Health care IT is a team sport."

Analysts point out two general caveats to the outcomes research. First, information technology is one of many tools for achieving process improvements that lead to better outcomes. It must be used in conjunction with other tools and techniques to have an effect on care. Second, the analysis shows an association between IT adoption and key quality measures, but association is not causality. (See sidebar, "A Higher Standard.")

One thing is certain: like much of health care, CIOs and other senior executives at the nation's Most Wired hospitals use technology as part of the process of improving care. They have measured the benefits of these changes. Disentangling the gains from using high-tech tools from the value of a skilled staff and better processes isn't even of interest.

How are the Most Wired achieving their results? What are they doing to make technology part of their process improvement plans? Here are 10 lessons from this year's benchmark group of top hospitals.

The Survey

Every year since 1999, Hospitals & Health Networks has surveyed the nation's hospitals on how they use information technology to accomplish key strategic and operational goals, including safety and quality objectives. Based on a detailed scoring process, H&HN annually names the 100 Most Wired Hospitals and Health Systems. The 2007 Hospitals & Health Networks Most Wired Survey and Benchmarking Study is a joint project of H&HN, Accenture, McKesson Corp. and the College of Healthcare Information Management Executives.

Along with the 100 Most Wired, H&HN uses the survey results to name the 25 Most Improved, the 25 Most Wired and the 25 Most Wired—Small and Rural. This year, for the first time, H&HN named three hospitals from outside the United States as Most Wired International Citation of Merit recipients.

From a set of separately submitted essays, we also identify individual projects that are noteworthy, naming a set of Innovator Award winners and finalists, as well as recognizing hospitals with Innovator in the Supply Chain Awards. (See "About the Survey").
IMPROVE PATIENT FLOW

The Most Wired have committed time and resources to improving patient flow, combining process improvement techniques with information technology. The University of Pennsylvania Hospital System, which appears on the Most Wired list for the seventh year, combined consulting assistance with technology and routine data reporting to address patient flow issues. The Philadelphia-based system uses LCD monitors in a wide variety of locations—on patient care units, in the operating rooms, admissions, environmental services and patient transport—to display the most current information on each patient’s location, as well as specific details of pending patient movements.

“When a pending activity is delayed or overdued, the system displays an alert so that any issue may be resolved,” says Milie Restuccia, interim CIO. The process also provides automated paging for bed dining and transport. Staff review bench-marking reports at weekly meetings allowing them to address issues and learn from each other.

Internal analysis shows that, as a result of the project, one of the system’s hospitals, the Hospital of The University of Pennsylvania, has gained efficiencies equivalent to opening 17 additional beds. Bed turnaround time fell from 90 minutes to 45 minutes. Discharge prediction accuracy increased from 11 percent to 46 percent. The process has been implemented at two of the system’s hospitals, with plans to expand the project to a third.

“Patient-flow projects can be a powerful tool for reducing capacity constraints,” says Lewis Reddy, managing partner, Accenture Health Provider Practice, Atlanta.

The Most Wired use electronic bed boards both in the emergency department and for inpatient bed management. There is a huge gap between the Most Wired and the least wired—the 100 hospitals that scored the lowest on the survey—in use of the bed management systems. The Most Wired are four and a half times more likely to use inpatient electronic bed boards than the least wired and almost three times more likely to use bed boards in the emergency department (see figure 1).

Patient-flow efficiency, workflow optimization and reduced LOS are being addressed through the deployment of automated bed tracking, the installation of inpatient scheduling and a regional health information organization initiative,” says Richard Rogers, vice president and CIO of Health First Inc, Rockledge, Fla., which appears on the Most Wired list for the third time. The RHO project is intended to identify immediate bed opportunities for patients being transferred to rehab facilities, long-term care or mental health facilities.

“We do not believe that any system is going to overwhelmingly affect our patient flow in itself,” says Spencer Harmon, CIO, St. Louis Val-Kley Regional Medical Center, a 2007 Most Improved Organization. “It must be paired with good management techniques, best practices from other hospitals, and a heavy dose of common sense.”

That’s a consistent theme among the nation’s Most Wired.

“There appears to be no overarching solution to this complex issue,” says Paul Llorens, vice president and CIO, Wake ForestUniversit y Baptist Medical Center, Winston-Salem, N.C., which appears on the Most Wired list for the fifth time. “It is an area that needs to be addressed on many fronts with expectations gained to grant incremental improvements.”

IMPROVE WORKFLOW

“We use multidisciplinary teams to analyze and document workflow prior to implementation of automated systems,” says Frank Richards, CIO, Gettysburg Health System. “When looking at existing practices, we follow a principle of first trying to eliminate, if not possible then automate, if not possible then delegate.” The Danville, Pa., system makes its fifth appearance on the Most Wired list in 2007.

The theme is consistent among Most Wired organizations. Eliminating waste and improving care is the goal for workflow redesign, it is a facilitator.

“Anytime you can reduce a step in a process, it is one less opportunity for error,” says Michael Simpson, senior vice president and general manager with McKesson Provider Technologies, Alpharetta, Ga.

Analyzing workflow is key. “We’ve used workflow as a major part of our EMR install,” notes Rogers. Only after workflow analysis was done would IS begin the ‘build for that function’. It was one way of getting user input into the EMR install process,” says Tom Smith, Evansville (II) NorthwesternHealthcare, which appears on the Most Wired list for the fourth time. Users developed 2,000 pairs of pre-EMR and post-EMR step-by-step workflow descriptions.

“Two major areas that have benefited from the introduction of electronic workflow are the nursing task lists and the physician inbox,” says Philip Loftus, vice president and CIO, Aurora HealthCare, Milwaukee, a 2006 Most Wired recipient. “In the case of the nursing task list, this brings together in one convenient place all of a nurse’s activities for an upcoming shift, including physician orders, reminders and nursing interventions.”

Nurses can check off tasks as they are completed, providing an easy way to monitor progress and to keep a formal record of completed activities. Similarly, the electronic physician inbox brings together all of the physician tasks in one place, including patient schedules and historical data on the patients that they will be seeing,” Loftus adds.

Finding the key places where technology can and will be used to improve patient flow takes a collaboration between clinicians and technology. “None of this can be effectively utilized unless those doing the work specify how the new structures can be incorporated in their day-to-day efforts,” says Penny Schaefer, director of clinical information systems, St. John HealthSystem, Tulsa, Okla., a 2007 Most Improved Organization. “Design takes into account core technology, such as wireless access, handheld tools and complex integrations. Perhaps the most important lesson to learn is that the job of addressing efficiency and effectiveness is never really done. You can only face the work remaining ahead by partnering with end-users, technical staff, vendors and colleagues.”

PROCESS IMPROVEMENT AS A DISCIPLINE

Hospital executives using information technology to improve clinical and operational results are finding that help is available in a variety of forms. Many have discovered the deep reservoir of knowledge, talent, commitment and energy within their own organizations, harnessing that power by adding formal process-improvement programs such as Six Sigma, Lean production principles, CQI or external consultants.

“We have very strong clinician representation when we utilize IT to improve workflow,” says Deane Moreton, CIO, Connecticut Valley Hospital. The hospital has a chief medical information officer who leads a team of three additional physicians, a nurse informaticist who leads a team of four additional RNs and two pharmacists. The hospital makes its third appearance on the Most Wired list in 2007.

Sharp HealthCare, San Diego, uses "collaborative workflow design among key clinicians across our hospitals as we implement our new clinical systems,” says Bill Spooner, senior vice president and CIO. He says process changes are facilitated by staff trained in Six Sigma techniques. Sharp appears on the Most Wired list for the ninth time.

Six Sigma and Lean tools and methods have become more prevalent among Most Wired hospitals and health systems. For example:

- ProMedica Health System, Toledo, Ohio, uses a team of Six Sigma Black Belt process engineers

PRESCRIPTIONS ORGANIZED ELECTRONICALLY

The average percentage of medication orders entered electronically by clinician group

<table>
<thead>
<tr>
<th>All Respondents</th>
<th>Most Wired</th>
<th>Least Wired</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physicians</td>
<td>17%</td>
<td>36%</td>
</tr>
<tr>
<td>Nurses</td>
<td>8%</td>
<td>10%</td>
</tr>
<tr>
<td>Pharmacists</td>
<td>67%</td>
<td>57%</td>
</tr>
<tr>
<td>Nonclinicians</td>
<td>3%</td>
<td>2%</td>
</tr>
</tbody>
</table>

Total medication orders | 104% | 100% | 100%
1 IMPROVE PATIENT FLOW

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The University of Pennsylvania Hospital System, which appears on the Most Wired list for the seventh year, combined consulting assistance with technology and routine data reporting to address patient-flow issues. The Philadelphia-based system uses LCD monitors in a wide variety of locations—on patient care units, in the operating rooms, admissions, environmental services and patient transport—to display the most current information on each patient's location, as well as specific details of pending patient movements.

"When a pending activity is delayed or overtaken, the system displays an alert so that any issue may be resolved," says Millie Restuccia, interim CIO. The process also provides automated paging for bed-doubling and transport. Staff review benchmarking reports at weekly meetings allowing them to address issues and learn from one another.

Internal analysis shows that, as a result of the project, one of the system's hospitals, the Hospital of The University of Pennsylvania, has gained efficiencies equivalent to opening 17 additional beds. Bed turnaround time fell from 90 minutes to 45 minutes. Discharge prediction accuracy increased from 11 percent to 46 percent. The process has been implemented at two of the system's hospitals, with plans to expand the project to the third.

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2 IMPROVE WORKFLOW

"We use multidisciplinary teams to analyze and document workflow prior to implementation of automated systems," says Frank Rispoli, CIO, Gettysburg Health System. "When looking at existing practices, we focus on a principle of first trying to eliminate, if not possible then streamline, if not possible then delegate." The Davenport, Pa., system makes its fifth appearance on the Most Wired list in 2007.

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"Two major areas that have benefited from the introduction of electronic workflow are the nursing task lists and the physician inbox," says Philip Lothian, vice president and CIO, Aurora Health Care, Milwaukee, a six-year Most Wired recipient. "In the case of the nursing task list, this brings together in one convenient place all of a nurse's activities for an upcoming shift, including physician orders, reminders and nursing interventions."

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• ProMedica Health System, Toledo, Ohio, uses a team of Six Sigma Black Belt process engineers.
as facilitators of process design and improvement efforts.

- Denver Health and Hospital Authority uses lean production methodology tools, including rapid improvement events and vertical value stream mapping.
- Eastern Maine Medical Center, Bangor, used a Lean project to redesign the elective knee and hip replacement process.

This is ProMedica Health’s fourth appearance on the Most Wired list and the first for Denver Health. Eastern Maine is a 2007 Most Improved organization.

“We believe lean is the perfect tool to take waste out of workflows and, in so doing, provide even greater levels of patient safety,” says J. Scott Jorysh, senior vice president and CIO, Memori-

AlCare Medical Centers, Long Beach, Calif., which appears on the Most Wired list for the eighth time. The organization introduced Lean manufacturing principles with a major IT rollout, “So much opportunity remains,” he says.

**MEASURE RESULTS**

One core principle of many process improvement systems is measurement. You can’t successfully improve or manage a process unless key results are measured and analyzed.

At San Luis Valley, staff determine appropriate metrics for success before launching a project; then monitor those measures throughout the project. “It’s of vast importance to determine what you want to accomplish in a technology project before you begin the process, otherwise you risk having the project goals drift away from IT or be the vendor,” Hamms says.

A key measure at Denver Health is “time to care”—that is, the time between order placement and delivery of care. Using computerized provider order entry, the system reduced time between radiology orders and the availability of results by nearly 55 percent, the time between laboratory orders and the availability of results was reduced by nearly 64 percent, and the time between medication orders and the availability for the medication to be administered was reduced by more than 83 percent.

“Not getting what you inspect, not what you expect,” says McKesson’s Simpson.

Of the Most Wired hospitals and health systems, 80 percent conduct pre-project cost/benefit assessments and establish baseline metrics for their top five strategic IT projects, compared with 45 percent of the least wired (see figure 2, page 9). The Most Wired are also more apt to have a specific plan for when project metrics and original business case objectives will be measured and evalu-

ated and conducted pre-project risk assessments.

Most Wired hospitals are keenly aware of qualitative feedback from clinicians, often seeking comments and concerns from medical personnel before streamlining issues become full-blowen problems. Qualitative feedback also provides a sense of how clinicians use and per-

cieve the value of information technology.

Texas Health’s Aberson quotes an MD who said, “Tonight I was able to complete admission orders for a pediatric patient in the ER within 10 minutes after receiving the request. Within minutes of placing an order for an antibiotic, the pharmace-

tist called me to suggest a different form of the (continued on page 14)

**Figure 4**

**MEDICATION ORDERS MATCHED ELECTRONICALLY**

The average percentage of medication orders matched electronically by method

<table>
<thead>
<tr>
<th>ALL Respondents</th>
<th>Most Wired</th>
<th>Least Wired</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BAR CODING</strong></td>
<td><strong>BAR CODING</strong></td>
<td><strong>BAR CODING</strong></td>
</tr>
<tr>
<td>Bar coding or RFID matching of drug matched to patient and order at bedside</td>
<td>86%</td>
<td>55%</td>
</tr>
<tr>
<td>Bar coding or RFID matching of drug, patient, order and nurse at bedside</td>
<td>78%</td>
<td>59%</td>
</tr>
<tr>
<td>Patient and user ID keyed into automated dispensing device at bedside</td>
<td>51%</td>
<td>9%</td>
</tr>
<tr>
<td>Patient and user ID keyed into automated dispensing device away from bedside</td>
<td>50%</td>
<td>40%</td>
</tr>
<tr>
<td>User ID keyed into automated dispensing device away from the bedside</td>
<td>50%</td>
<td>10%</td>
</tr>
<tr>
<td>Medication not electronically matched</td>
<td>28%</td>
<td>18%</td>
</tr>
</tbody>
</table>

Total medication orders 100% 100% 100%

**Source:** 2007 Hospitals & Health Networks’ Most Wired Survey and Benchmarking Study

**About the Survey**

For the ninth year, Hospitals & Health Networks has named the Most Wired Hospitals and Health Systems. The list is based on the Most Wired Survey and Benchmarking Study that asks hospitals to report on how they use information technology to address five key areas: safety and quality, customer service, business processes, workforce, and public health and safety. The 2007 survey was made possible through a partnership among HIMSS, American Hospital Association, College of Healthcare Information Management Executives and McKesson Corp.

The Most Wired Survey and Benchmarking Study undergirds an extensive review process. The survey team then research to create new questions and to check the relevance of previous years’ questions, and then puts together a draft copy. Leaders throughout healthcare care are asked to review all new questions.

For a list of 2007 reviewers, see “The Most Wired Team” on page 60. Then the entire survey is posted online to the survey reviewers. These reviewers are asked to evaluate the relevance of these questions, answer the questions themselves and submit questions of their own. The magazine editors take all the comments, evaluate them, modify questions and finalize the survey.

After all the survey responses are submitted, the Most Wired team evaluates the initial responses and identifies organizations whose scores indicate extreme variance in year-over-year analysis. The team chooses 10 percent of the respondents to review certain questions, provide modifications and/or explana-

tions for their answers. Organizations can modify their answers and are asked to sign a form stating that their survey answers accurately reflect the technological ability of their organization. This year, all organ-

izations were also asked to verify their responses to two alert system-related questions by submitting screenshots. The survey results are the basis of several awards:

- **Most Wired:** The 100 organizations that scored highest on the survey.
- **Most Wired Staff:** The 25 organizations that scored highest on the survey questions focused on wireless applications.
- **Most Improved:** The 25 organizations not appearing on the Most Wired list whose scores improved the most from 2006 to 2007.
- **Most Wired Small and Rural:** The 25 small and rural organizations not appearing on the Most Wired list that scored highest on the survey.

This year, 568 hospitals and health systems completed the survey, representing 1,284 hospitals.

Each organization completing the survey receives a customized report comparing its responses with the 100 Most Wired organizations. As the result of the inherent value judgment in any scoring system, HIMSS does not publish the rankings as part of the Most Wired lists.

This year, the Most Wired and the Innovator Award winners will be recognized for their accomplishments at the 2007 American Hospital Association–Health Forum Leadership Summit, July 22-24, in San Diego. The winner and finalists of the Supply Chain Innovation Award will be recognized at the Association for Healthcare Resource & Materials Management Annual Conference & Exhibition, Aug. 12-15 in San Diego.

**2007 MOST WİRED SURVEY RESPONSES VS. U.S. HOSPITALS**

For the 2007 Most Wired Survey and Benchmarking Study, 1,284 hospitals are represented in 968 survey responses. They represent roughly 30 percent of U.S. hospitals and make up a diverse sample.

**BY REGION**

<table>
<thead>
<tr>
<th>M.D.</th>
<th>Respondents</th>
<th>M.H.</th>
<th>Respondents</th>
<th>M.U.S. Hospitals</th>
</tr>
</thead>
<tbody>
<tr>
<td>New England</td>
<td>5.0%</td>
<td>4.0%</td>
<td>5.0%</td>
<td>4.0%</td>
</tr>
<tr>
<td>Mid Atlantic</td>
<td>9.2%</td>
<td>8.7%</td>
<td>9.2%</td>
<td>8.7%</td>
</tr>
<tr>
<td>South Atlantic</td>
<td>17.8%</td>
<td>16.3%</td>
<td>17.8%</td>
<td>16.3%</td>
</tr>
<tr>
<td>East North Central</td>
<td>20.1%</td>
<td>18.0%</td>
<td>20.1%</td>
<td>18.0%</td>
</tr>
<tr>
<td>West North Central</td>
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<td>12.9%</td>
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<td>12.9%</td>
</tr>
<tr>
<td>West South Central</td>
<td>11.6%</td>
<td>10.9%</td>
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<td>10.9%</td>
</tr>
<tr>
<td>Mountain</td>
<td>5.7%</td>
<td>8.0%</td>
<td>5.7%</td>
<td>8.0%</td>
</tr>
<tr>
<td>Pacific</td>
<td>6.5%</td>
<td>10.4%</td>
<td>6.5%</td>
<td>10.4%</td>
</tr>
</tbody>
</table>

**BY LOCATION**

| Rural | 30.1 | 34.7 | 30.1 | 34.7 |
| Urban | 70.0 | 65.3 | 70.0 | 65.3 |

**Directives**

- **BY NUMBER OF BEDS**
  - All Respondents: 6,243
  - M.H.: 2,562
  - M.U.S.: 3,681

- **BY ADMISSIONS**
  - All Respondents: 3,958,000
  - M.H.: 1,547,000
  - M.U.S.: 2,411,000

- **BY STATUS**
  - All Respondents: 36
  - M.H.: 15
  - M.U.S.: 21

- **BY RESPONSES TO U.S. HOSPITALS**
  - All Respondents: 36
  - M.H.: 15
  - M.U.S.: 21

**Scoring Distribution**

The scoring for the Most Wired emphasizes the use of information systems to improve patient safety and quality, with applications used by compliance receiving the largest percentage of points.
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After all the survey responses are submitted, the Most Wired team evaluates the initial responses and identifies organizations whose scores indicate extreme variation in year-over-year analysis. The team chooses 10 percent of the respondents to review certain questions, provide modifications and/or explanations for their answers. Organizations can modify their answers and are asked to sign a form stating that their survey answers accurately reflect the technological ability of their organization. This year, all organizations were also asked to verify their responses to two alert-system-related questions by submitting screen shots. The survey results are the basis of several awards:

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<tbody>
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<td>New England</td>
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<tr>
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<td>2000 or more</td>
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</table>

Sourcing Distribution

The scoring for the Most Wired emphasizes the use of information systems to improve patient safety and quality, with applications used by compliance receiving the largest percentage of points.
2007 International Citations

The Most Wired Survey and Benchmarking Study was opened up to international applicants this year. These three organizations received the Most Wired International Citation of Merit.

Kameda Medical Center
Located in Kamaishi City, Japan, Kameda Medical Center has a 356-year history spanning 11 generations of the Kameda family. There are three hospitals and 1,500 operating beds. The emergency department receives 30,000 visits annually while outpatient visits total 750,000 a year. By law, Kameda (as well as all Japanese hospitals) must operate as a not-for-profit entity and adhere to a national fee structure, a challenge for any organization as it pertains to cost and quality. Still, Kameda found a cost-friendly way to develop a completely integrated fingerprint and paperless electronic medical record system. All physicians and nurses access the system on a daily basis and can do so from anywhere thanks to a Web-based portal.

Hermitage Medical Clinic
Operational since January 2007 in Dublin, Ireland, Hermitage Medical Clinic is an acute care facility with 101 beds and seven operating rooms. The majority of health care in Ireland is public, and Hermitage is one of only three private hospitals to open in the last 29 years. As such, the hospital was able to realize an integrated information system from the beginning. Physicians and surgeons have online access to clinical information and diagnostic images at any hospital workstation, including at the bedside and in operating rooms. Because of the high level of technology implemented at Hermitage, recruiting IT-experienced staff presented a challenge. Through international recruitment, a multinational staff has been formed.

Hospital de Farnábodra
Hospital de Farnábodra in Madrid is breaking away from the mold of a traditional Spanish hospital by adopting a public enterprise management model. Established in 2002, the hospital serves about 250,000 patients a year with a staff of 1,400, 70 percent of whom are women. The hospital is leading the way in Spain with a complex information system that bridges the processes between primary care and specialty care. Hospital de Farnábodra has reduced the time a patient receives a consultation to when they receive a radiology test from six days to two.

A Higher Standard

When it comes to quality, the work is never done: the goal is to continuously improve. As a result, benchmarks and standards get tougher and tougher. That was precisely hospitals & Health Networks’ aim when examining the association between IT adoption and outcomes measures. The analysis was expanded to include four indicators of quality and two measures of cost.

For this year’s report, A&HN increased the rigor of the analysis in two ways. First, we expanded the breadth of the review to include a wider range of quality and cost measures. For the past three years, our analysis focused solely on risk-adjusted mortality rates. The fundamental research question was whether or not the Most Wired hospitals as a group showed better risk-adjusted mortality rates than other organizations. To varying degrees, each analysis of the past three years showed that the Most Wired achieved better mortality results than other hospitals.

This 2007 analysis included six variables: risk-adjusted mortality rates; risk-adjusted complication rates; separate composite indices, one assessed from the Agency for Healthcare Research & Quality’s patient safety measures and the other from a subset of the Joint Commission’s Core Measures based on data reported on the Hospital Compare Web site; severity-adjusted average length of stay, case mix, and wage-adjusted expenses per adjusted discharge. Thomson Healthcare conducted the study; the same team has conducted the review for A&HN since 2005. Second, we shifted the focus of the analytics. For the past three years, we compared the Most Wired hospitals and systems as a group with the largest universe of hospitals. This year, the analysis focused on an in-sample comparison of individual hospital results. In essence, Thomson examined whether higher scores on the Most Wired survey—which are achieved by both adoption and implementation of information technology—were associated with better results on the six measures.

NHIA/Approved Thomson with the Most Wired scores for the hospitals in two benchmark groups: the 100 Most Wired and a second, smaller group of those hospitals and systems that scored highest on the safety and quality section of the survey. Both groups exclude federal hospitals that appeared in either of the two lists. Because organizations can submit surveys either as individual hospitals or as systems, 580 hospitals are represented in the 100 Most Wired. 76 hospitals are represented in the top 50 scorers in the safety and quality section of the survey.

The results:
- The top 50 scorers on the safety and quality section of the survey had better results for mortality rates, the patient safety index and ALOS. All three results were statistically significant at the 10 percent confidence interval.
- The 100 Most Wired had better results for mortality rates, the core measures index and ALOS. All three results were also statistically significant at the 99 percent confidence interval.
- Neither analysis showed an association between Most Wired scores and either complication rates or the cost per discharge measure.

The analysis included controls for hospital geographic location and type, major teaching hospitals, teaching hospitals, large community hospitals, medium community hospitals and small community hospitals. The location adjustment was based on the nine U.S. Census Bureau divisions.

Improving safety and quality is a prime motivator for many major IT investments. "Many hospitals have made strong commitments to using information technology to improve the quality of care," says Rich Umbertostock, president and CEO of the American Hospital Association. "They are combining technology with clinical knowledge and creativity with a focus on improving outcomes, and making care safer and more streamlined for both patients and clinicians."

Lewis Reed, managing partner, AcuteCare Provider Practice, Atlanta, agrees. "If you look at the huge projects and outcomes relative to clinical systems, you find that the focus is on improving quality, physician involvement and outcomes," he says. "A metric for success in these projects is that they are used to improve quality. They are directly related."

Reed points out that hospitals fall into two camps: those that are focused on improving quality and those that are focused on improving returns. "Quality and costs are inversely related," he says. "When you deploy these systems to improve quality, for the most part you can reduce cost at the same time."

"The 100 Most Wired had better results for mortality rates."
5  

**MEDICATION MANAGEMENT DRIVES QUALITY TO THE BEDSIDE**  

The Most Wired hospitals continue to lead the nation in electronic ordering and bedside medication matching to reduce the number of potential medication errors. This result has been consistent since these two medication management questions were added to the survey in 2005. The results have stayed fairly consistent for the past three years (see figure 3, page 4, and figure 4, page 6).

Joe Butler, vice president and CIO, Hamot Medical Center, Erie, Pa., is among the IT execs who see bar-coded medication management as one of the leading technologies in the drive to improve safety.

“For four years, we have been collecting and evaluating data generated by our medication administration system,” Butler says. Each month, staff monitor and review 99 percent of the medications administered, including data on incorrect patient scans, patient overrides, incorrect product scans and product overrides. “These metrics are routinely used to evaluate our processes, make improvements and measure again,” he says. “The data has created a conversation and focus around the factors that contribute to medication errors.”

The Most Wired are also finding ways to use IT to address the challenges of medication reconciliation. Among the Most Wired, 98 percent have an electronic system to develop a list of current medications, with 62 percent of the least wired; 89 percent of the Most Wired can compare current and prescribed medication lists electronically with 48 percent of the least wired; and 99 percent of the Most Wired use IT to provide new medication lists targeted to caregivers and patients, compared with 59 percent of the least wired.

“Many hospitals, including ours, initially thought we’d be doing all of this by hand. A few IT clinicians knew we could do this electronically,” says Angela Nicholas, M.D., vice president and chief medical information officer, Susquehanna Health, Williamsport, Pa. “Most Wired hospitals are usually already capturing the information required. All they had to do was design a process around it.” Susquehanna Health makes in eighth appearance on the Most Wired list in 2007.

6  

**SMART ALERTS IMPROVE CARE**  

Sharp HealthCare has implemented a real-time harm monitor that uses information in the clinical charting application to identify patients with potentially deteriorating conditions. This provides clinicians with the opportunity for early intervention. Sharp tracks and reports those interventions.

Hamot Medical Center uses technology in an effort to reduce patient falls. An automated system checks whether a fall-risk assessment is on file for each patient. If not, an instruction to conduct an assessment is automatically added to the work list for caregivers. Humot appears on the Most Wired list for the fifth time.

The Most Wired are trailblazing the use of electronic surveillance systems tied to alert systems. Nearly 80 percent of the Most Wired hospitals have some form of electronic surveillance tied to alerts, compared with only 14 percent of the least wired (see figure 5). Much of this activity takes place in critical care units in the form of an electronic ICU. Health First’s electronic ICU program is a remote critical care management system that has allowed the organization to use a limited number of critical care specialists across a three-hospital, 78-bed ICU system.

“We’ve observed up to a 35 percent reduction in ICU mortality, a 30 percent reduction in ICU cardiopulmonary arrests and significant reductions in time on the mechanical ventilator,” Rogers says. Health First has implemented a variety of ICU evidence-based care initiatives, including using an automated system that generates alerts and has developed a protocol that has led to a 35 percent reduction in sepsis mortality.

The Most Wired also use information technology to ensure compliance with key indicators in the Centers for Medicare & Medicaid Services Hospital Compare databases. According to 2007 survey results, 45 percent of the Most Wired use an automated review of Hospital Compare key quality indicators to provide caregivers with automated alerts, compared with 12 percent of the least wired (see figure 6).

“The availability of integrated alerts provides our clinicians with tools that are not available in the paper world,” says Randy Haskins, director of information services, Mercy Medical Center—North Iowa, a 2007 Most Wired—Small and Rural hospital.

7  

**PROVIDE UNINTERRUPTED ACCESS TO DIGITAL IMAGES**  

The Most Wired are leading the way in providing digital images to a broad array of clinical service areas and a variety of patient settings. While nearly all of the Most Wired provide uninterrupted access to digital radiologic images—as well as access in clinics, physician offices and other remote locations—more and more are providing the same breadth of access to images for cardiology, neurology, oncology and nuclear medicine (see figure 7). Unlimited access to pathology images lags behind the other services.

“Hospitals are driving toward clinical imaging as a quick win,” says McKesson’s Simpson. That win, he says, comes in the form of both storage and distribution of images.

This is a strategy that the least wired hospitals and health systems have also begun to adopt, but primarily on the inpatient side. The majority of least wired hospitals provide inpatient access to radiology and nuclear medicine images and a growing number provide inpatient access to car...
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**Provide ubiquitous access to digital images**

The Most Wired are leading the way in providing digital images to a broad array of clinical service areas and a variety of patient settings. While nearly all of the Most Wired provide convenient access to digital radiology images—as well as access to clinician, physician offices and other remote locations—more and more are providing the same breadth of access to images for cardiology, neurology, oncology and nuclear medicine (see figure 7). Ubiquitous access to pathology images lags behind the other services.

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**Note:**

For additional Most Wired survey results and analysis, don’t miss these stories/articles:

- **2007 Supply Chain Innovation Award winners, Materials Management in Healthcare Care, July 2007**
- **Perspectives on the 2007 survey results, Most Wired Online, July 2007**
- **2007 Innovation Award winners, HIMSS Most Wired Magazine, August 2007**
- **Technology applications in the supply chain, Administration in Healthcare Care, August 2007**
- **Quality issues, Trustee, October 2007**
diology, oncology, radiology, and pathology images. "Image capture through PACS has almost become the standard of care for hospitals. The return on investment for these systems includes the decrease or elimination of film costs," says Susiehanna's Nicholas. "The next step was to make these images available for image-intensive physicians such as orthopedics, pulmonology, cardiology and neurosurgeons. And the increase in efficiency in patient care does hospitals to figure out ways to provide images to physicians."
CLINICAL DOCUMENTATION IN THE OR

The percentage of respondents that say 81 percent or more of their clinicians, by category, use clinical documentation online

<table>
<thead>
<tr>
<th>Category</th>
<th>All Respondents</th>
<th>Most Recent</th>
<th>Least Recent</th>
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<tr>
<td>Physicians</td>
<td>84%</td>
<td>90%</td>
<td>75%</td>
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<tr>
<td>Nurses</td>
<td>80%</td>
<td>85%</td>
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<tr>
<td>Pharmacists</td>
<td>70%</td>
<td>75%</td>
<td>60%</td>
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</tbody>
</table>

**Operating room documentation**

Aesthetics documentation

- 37% 60% 12%
- 24 43% 9%
- 18 35 5%

Source: 2007 Hospitals & Health Networks' "Most Wired Survey and Benchmarking Study"

**INFRASTRUCTURE IS KEY TO THE FUTURE**

To ensure business continuity and make sure capacity is available for future IT investments—many of the Most Wired identify infrastructure investments as major priorities this year.

"Our infrastructure must be continually refreshed and maintained in order to support the ever-increasing requirements for bandwidth and sub-second performance," says Fox.

Moeller Cancer Care Network agrees. "We plan to invest heavily in furthering our store infrastructure to provide physical and logical storage for all of our discrete data and images being collected at an ever-increasing rate," he says.

More than half of the Most Wired say that they are planning infrastructure improvements in the next 12 months.

"Funding the infrastructure improvements necessary to support the numerous deployed systems is a challenge," says Audra Polkakis, director of IS planning at the University of Illinois Medical Center at Chicago. "We are continually finding the balance between capital investments for improving the underlying computing infrastructure and capital investments to support deploying new functionality and further automating our clinical and business processes.

That challenge may become more complex, says Accenture's Reid. IT systems are holding more information and data and require more comprehensive support. Maintaining IT infrastructure support will take hard work and skilled workforce, Reid cautions.

"That's a significant issue facing the industry down the road."

**DISCUSSION:**

In this crisis, we have introduced a tracking solution that allows patients, families, friends and clients to track the status of the patient through the entire vis-

"It's essential to be proactive and maintain a consistent process throughout the patient and consistent communication to all involved people," information is available to the patient, family, physicians, nurses, transporters, registrars, equipment supply clerks, and specimen procurement and labora-

tory specimen processing personnel.

Hospitals large and small see the OR as an area for automation and process redesign, and an area where IT can assist in improving safety and quality. Both the University of Illinois Medical-

Center at Chicago, a second-time Most Wired organization, and Massachusetts General Hospital, a Memorial Hospital, have implemented OR systems.

"We will be beginning a paperless, fully integrated touch-screen OR system," says Jana M. Grone, Massachusetts' MIS director. "This will provide patient tracking, operating room scheduling, equipment and resources scheduling and documentation of all patient care through electronic medical records.

The system will provide real-time perioperative documentation, inventory management, implant tracking and cost information. It will also generate surgeon preference cards.

**THE LEADERSHIP SHEET**

The use of clinical documentation online has increased by 5 percent since last year, with 50 percent of respondents saying they use clinical documentation online.

**COVERAGE**

H&H now offers the expertise and support of many individuals who contributed to the success of the 2007 Most Wired Survey and Benchmarking Study. The 2007 Most Wired Survey and Benchmarking Study has grown into the most respected, insightful and respected research and analysis vehicle in the hospital industry. This year's winners were announced in the March 19 issue of H&H.

"The Most Wired Survey has grown into the most respected, insightful and respected research and analysis vehicle in the hospital industry," says Brian McVey, senior editor and director of special projects for H&H, Chicago. "It has grown into a respected study that we look forward to each year."

**ACCOMPLISHMENTS**

Since 1998, the Most Wired Survey has grown into a respected study that we look forward to each year.
Thank You!

Hospitals & Health Networks extends special thanks to Accenture, McKesson, and the College of Healthcare Information Management Executives (CHIME) for their support of the 2007 Most Wired Survey and Benchmarking Study.
2007 Innovator Awards

Texas Health Resources | Arlington, Texas | www.thr.org
Interactive training, skills assessment and progress monitoring are the keys for a successful electronic health record at Texas Health Resources. The enterprise is web-based and empowers an intuitive navigation tool for ease of use. Content was created under the rapid development model, resulting in cost savings of 30 percent. The modular content is more easily updated, resulting in long-term cost savings as well.

Texas Health Resources | Arlington, Texas | www.thr.org
To obtain financial and productivity information from a single source, Texas Health Resources put together an interactive financial portal offering in-depth information for its leadership. Monthly departmental and productivity reports are accessible through the online portal, eliminating costly and labor-intensive collection, printing and distribution of the data. Automatic notification of updates and posts is sent via e-mail the previous day’s financial data is available by 10 a.m. each day.

2007 Supply Chain Innovator Award Winner

Health Quest | Poughkeepsie, N.Y. | www.healthquest.org
With a 97 percent occupancy rate over a 24-month period, Health Quest requests point-of-care clinical equipment for timely and effective patient treatment. To combat the incidence of missing equipment, as well as equipment in the wrong place or in poor condition, the organization implemented real-time tracking through its enterprise-wide, multi-facility wireless system using transducers and tags. A significant result was seen in the pilot program when, after four months, the time a nurse spent searching for equipment per shift was cut in half.

2007 Supply Chain Innovator Award Finalists

Kalida Health | Buffalo, N.Y. | www.kalidahs.org
Kalida Health initiated projects to manage its materials, notably through automated replenishment and an expensed-inventory project. Ideally, each supply item is replenished through a clinical documentation process of bar coding. When patients receive treatment, the nurse responsible for the room scans the bar codes of products used. By keeping track of the inventory in real-time and in-house, rather than through outside agencies, Kalida Health has saved more than $300,000.

Hunters Healthcare | Louisville, Ky. | www.cernerhealthcare.com
In an effort to streamline product and service addition, changes and deletions, and replace the paper process, Natan Health created a Web application to automatically update these items. The Web application is available to all employees and, after approval is obtained through an automated e-mail system, all relevant systems are updated.

2007 Innovator Award Finalists

Mountain States Health Alliance | Johnson City, Tenn. | www.msha.com
Mountain States Health Alliance needed a solution to address emergency department overcrowding and improve patient satisfaction. The solution: post ED wait times online for the public. This initiative was facilitated through implementation of an ED patient-tracking system. The Web team worked with information systems analysts responsible for implementing the tracking system; together, they developed a product that posts up-to-the-minute wait times at all five facilities. For inpatient cases, patients can check the Web site to determine which emergency department has the shortest wait time.

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