Revitalizing Healthcare Delivery with Mobile Communications

PART ONE: Overview

This four-part series examines the ways that wireless technology and mobile communications can enhance the efficiency and quality of institutional healthcare, improving the processes through which doctors, nurses, specialists and support staff members deliver medical treatment. Part One offers an overview of the current healthcare situation and suggests ways in which wireless technology solutions address healthcare challenges.
Escalating Healthcare Challenges

Healthcare challenges rank among the most serious concerns of communities around the globe. Multiple factors are driving many systems to the brink of crisis. Aging populations; emerging disease threats; rising healthcare costs; and shortages of healthcare professionals all contribute to the overall problem. These well-documented issues present substantial challenges. Advances in wireless technology, however, offer opportunities to revitalize healthcare institutions, improving communication and contributing to the efficiency and effectiveness of doctors, nurses and support staff members. With wireless technology and unified communication tools in place, healthcare organizations can deliver higher quality care to patients while efficiently containing costs.

In a study conducted by the Spyglass Consulting Group\(^1\), released in November 2006, three key factors were shown to drive the adoption of mobile communications solutions in healthcare:

1. **Efforts to improve patient safety**: Medical errors cost insurers and healthcare providers billions of dollars a year, causing millions of injuries and up to 98,000 deaths. The healthcare industry is determined to make improvements in this area by focusing on patient safety issues.

2. **Rising healthcare costs**: Healthcare spending is high (14.1% of the GDP in the U.S.) and getting higher (with projections of double-digit rate increases) as baby boomers reach retirement age.

3. **Chronic labor shortages**: Shortages of healthcare workers also impact patient safety, as workers in healthcare facilities struggle to deliver an acceptable level of patient care. Retiring baby boomers will create additional pressures in this area.

Quality patient care can be achieved through better monitoring of patient conditions, more precise communication among doctors and nurses, better access to information for improved decision-making and improved coordination among staff members in performing daily tasks. These types of activities are well suited to smartphone solutions.

Benefits from Wireless Technology

Wireless technology, and especially the latest generation smartphones, offer opportunities for substantially improving healthcare processes and providing a unified communication framework for staff members. Technology advances include:

- Strengthened communication security, in support of patient privacy regulations
- Push data delivery, ensuring prompt notification in the event of medical crises or urgent situations
- Dual-mode connectivity (combining cellular and Wi-Fi), minimizing barriers to communication inside buildings or while traveling
- Single point of contact through integrated smartphone applications, providing better coordination of communication tasks among doctors, nurses and support staff members
- Improved access to vital electronic medical records (EMR), decision support tools, medical references and similar resources

\(^1\) Healthcare Without Bounds: Trends in Mobile Communications, Gregg Malkary, Spyglass Consulting Group, November 2006.
PART ONE: OVERVIEW

The greater functionality of converged device solutions—such as the smartphone—has helped overcome traditional barriers to adoption, such as doctors who normally shun computer-based solutions. As reported by Spyglass Consulting Group, 82% of the physicians surveyed prefer a single communication device that combines functionality rather than a collection of pagers, cell phones, PDAs and other devices.

In institutions that have adopted wireless technologies, studies indicate marked improvements in workflow efficiency. A leading Canadian healthcare organization with over 2000 staff members performed a cost benefit analysis of a mobile communication solution to be deployed in their facility. The analysis concluded that the voice and text communication benefits alone would recover up to 12% percent of a nurse’s time, which could then be directed to improved patient care. This organization calculated annual savings for their staff of almost USD 16 million annually, equal to the work performed by 192 full-time nurses. Similar or higher levels of savings were demonstrated for other healthcare worker specialties.

Examples and short case studies in this series describe the use of the BlackBerry® Enterprise Solution and smartphones from Research In Motion (RIM). RIM has pioneered many of the technologies that equip the mobile workforce with tools to increase their productivity. From the initial breakthroughs in wireless voice and email communications, BlackBerry® solutions have been broadly adopted across a span of industries—including manufacturing, real estate, logistics, pharmaceutical, financial services and government. Push-communication capabilities, built-in security features and the wide selection of enterprise-specific applications have contributed to the acceptance of the BlackBerry solution.

Throughout this series, a variety of scenarios discuss cellular and Wi-Fi approaches to communications, as well as the expanded potential for an emerging generation of dual-band smartphones that can take advantage of any available wireless network connections.

“The combination of email, cell phone, organizer and electronic prescription system in one secure BlackBerry smartphone is an innovative and spectacular improvement in e-prescribing technology. This solution can increase safety, save patients’ time and money and make life easier for physicians.”

— Deborah Whitehead, Assistant Vice President for Pharmacy, Tufts Health Plan, USA

Fresh Solutions to Healthcare Issues

Faced with an aging population, rising healthcare costs and new disease threats, many healthcare organizations are seeking new techniques to deliver quality healthcare in a timely, cost-effective and efficient manner.

In response to today’s challenges, hospitals and clinics are increasingly rethinking their traditional models for providing healthcare services. In many cases, this leads to the consideration of emerging technologies with the potential to empower staff members with better communication tools—applications that strongly support work processes and can adapt to diverse environments with flexibility.

Wireless technology advances effectively address the most pressing industry concerns and create environments where high quality healthcare can flourish.

www.blackberry.com/bettercomms
<table>
<thead>
<tr>
<th>The typical concerns for many healthcare organizations are:</th>
<th>Fresh solutions and innovative approaches are needed to counter serious healthcare concerns. Those involved in understanding the problems, addressing the challenges and developing solutions include:</th>
<th>Technology alone can’t meet the challenges of the healthcare industry, but a strong communication infrastructure can:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Revenue generation and cost containment</td>
<td>• Stakeholders in healthcare IT groups</td>
<td>• Facilitate staff member interactions and coordinate activities.</td>
</tr>
<tr>
<td>• Attraction and retention of skilled healthcare professionals</td>
<td>• Telecommunication companies that provide the communication platforms</td>
<td>• Support work processes and policies in effect within the institution.</td>
</tr>
<tr>
<td>• Wait times for available hospital beds</td>
<td>• Privacy advocates and legislative bodies concerned with information distribution issues</td>
<td>• Place vital tools and current information in the hands of those who evaluate, administer and provide healthcare services.</td>
</tr>
<tr>
<td>• IT infrastructure investment</td>
<td>• End users—including the doctors, nurses, and staff members—who will embrace or reject proposed technology solutions</td>
<td></td>
</tr>
</tbody>
</table>

“The BlackBerry solution is a truly HIPAA- and FERPA-compliant solution for end-to-end communication.”

–Dr. John D. Halamka, CIO, Harvard Medical School

Safeguarding Patient Records

Data security is a prime concern at Harvard Medical School, where the IT department recently deployed a BlackBerry Enterprise Solution to meet the needs of the IT support group, doctors and administrators. With 18,000 individuals who regularly connect to the school's network, having a robust, dependable solution—to keep records and information accessible and yet securely protected—was an essential requirement.

The CIO, Dr. John D. Halamka, who oversaw the deployment, commented on the importance of security: “In the medical profession, we have to be compliant with both HIPAA (Health Insurance Portability and Accountability Act) to protect confidential patient information and FERPA (Family Educational Rights and Privacy Act) to protect student data. You only have to look at the Veterans Administration’s unfortunate spill of 26 million veterans’ records to see how devastating an information leak can be. We move 100 million patient records or 100 Terabits of data a day and we haven’t had handwritten doctor’s orders or X-ray film since 2001. Our doctors rely on the ability to communicate digitally. What’s unique about BlackBerry smartphones is they use robust, cryptographic, key-based encryption. And there is never a point at which the message is being sent between the BlackBerry® Enterprise Server and the BlackBerry smartphone in an unencrypted fashion. The BlackBerry solution is a truly HIPAA- and FERPA-compliant solution for end-to-end communication.”

For more information, view CIO Perspective: BlackBerry Security at www.blackberry.com/bettercomms.
Streamlining Work Processes with Improved Communications

The barrage of information, communications and task requests faced by most overworked healthcare facility staff members is simply overwhelming and creates multiple problems downstream. Miscommunication or delayed communication contribute to inefficiency and operational costs, but—more importantly—communication problems can also be life-threatening in a medical environment.

Each broken link in the communication chain that includes doctors, nurses, pharmacists, support workers, administrators and others represents an opportunity for delay, error or worse. For example:

- Does a nurse need the physician’s approval for a higher dose of medication in response to the latest diagnostic indications?
- Is the resident cardiac specialist available for an urgent consultation?
- Are receptionists or unit clerks able to easily transfer calls directly to the right staff member?
- Are housekeeping staff members promptly notified of a vacant room in maternity to accommodate an incoming patient?
- Is the doctor directly notified of his patient’s lab results in a timely manner?
- Has the shortage in subcutaneous fluid packs been communicated to materials management?
- Are porters effectively managing their time and the movement of patients?

Most ‘modern’ healthcare facilities still rely on outdated communication technology. Very often, this is an uncoordinated collection of devices from various eras: pagers, public address systems, mounted and portable house phones, PDAs, handwritten status reports and patient records, cell phones and walkie talkies.

Work processes improve when a reliable, systematic means of communication is in place, providing a mechanism for tasks to be prioritized, important messages to be acknowledged, vital data to be confirmed and organizational policies to be distributed and enforced.

Improved Quality through Better Access to Relevant Data

Information drives many different parts of the healthcare delivery system. Immediate access to vital information—such as medical histories, drug interactions, lab results, diagnostic equipment availability and similar data—can sharpen decision-making, reduce medical errors and boost staff productivity.

In an executive survey conducted by Research In Motion (RIM) in October 2006, healthcare professionals were asked what three processes or applications they would like to have available in a mobile solution. As shown in the graph in Figure 1, the results strongly favored emergency medical records (EMR), medication safety and communications.

“Our goal is to combine telemedicine with nursing, feet on the ground, to keep people healthy, improve their quality of life, and keep them out of hospitals.”

– Jeff Forbes, CIO, Tellicare
PART ONE: OVERVIEW

Overcoming Inefficiency

The current fragmented approach to healthcare delivery results in wasted energy, frustrated workers and error-prone medical treatment. With staff members frequently trying to cope with multiple communication devices, instructions and queries are often delayed or overlooked. Critical messages may not be received promptly, simply because staff members tend to be driven by interruptions coming from every direction.

This kind of miscommunication and disconnected workflow lie at the heart of many healthcare facility problems—a root cause of inefficiency and error. Treatment information scrawled on a notepad may be misread or misinterpreted. The instructions from a nurse ending a shift may not be relayed accurately to the nurse on the next shift. A patient’s drug allergy records may not be readily available when prescribing a new medication. Malfunctioning air conditioning or heating equipment within the facility may not be corrected promptly, making patients uncomfortable. All in all, the stress on staff members trying to contend with multiple communications from a variety of sources may lead to faulty decision-making or ill-advised actions.

When asked “If you could mobilize three processes or applications in your organization what would your top choices be?”

<table>
<thead>
<tr>
<th>Application</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic Health Records</td>
<td>65%</td>
</tr>
<tr>
<td>Medication Safety</td>
<td>27%</td>
</tr>
<tr>
<td>Communications</td>
<td>23%</td>
</tr>
<tr>
<td>Computerized Physician Order Entry</td>
<td>19%</td>
</tr>
<tr>
<td>Registration</td>
<td>4%</td>
</tr>
<tr>
<td>Other</td>
<td>4%</td>
</tr>
</tbody>
</table>

Figure 1. Preferences for mobilized applications: U.S. Top 300 - Healthcare Executive survey, RIM - October 2006
Asking the Right Questions

In choosing a mobile communication solution, healthcare organizations should consider these important questions:

1. Can several communications functions be consolidated into a single device?
2. What are the unique requirements of different user groups in the organization?
3. How will the use of this new technology impact existing workflows?
4. How can wireless devices increase adoption of electronic health records (EHR)?

Existing solutions, such as paging, usually do not add additional costs. However, organizations should evaluate the overall costs associated with paging, factoring in the impact on workflow efficiency and indirect expenses resulting from miscommunication.

Providing realistic answers to these kinds of questions can help select a technology solution well suited to an organization’s needs. Perhaps the single most important characteristic of a solution is how well it provides a unified approach to communications. Improved communications lead naturally to workflow efficiency. In contrast, non-unified, disconnected communication processes often lead to judgment problems, inefficiency and a disruptive work environment.

*Part Two of this series takes a closer look at popular communication devices and considers their usefulness and effectiveness within healthcare facilities.*
Revitalizing Healthcare Delivery with Mobile Communications

PART TWO: Communication Devices in Healthcare

This four-part series examines the ways that wireless technology and mobile communications can enhance the efficiency and quality of institutional healthcare, improving the processes through which doctors, nurses, specialists and support staff members deliver medical treatment. Part Two takes a closer look at popular communication devices and considers their usefulness and effectiveness within healthcare facilities.
Introduction

Technology has spawned a dizzying array of communication devices—each with individual strengths and weaknesses. These devices, by virtue of their unique functionality, fit into niches within organizations to address very real problems. However, the varying kinds of specialized devices that have gained popularity complicate the communication picture. Healthcare professionals often find themselves relying on several different pieces of communication gear to stay in contact and get through the day.

Hospitals and clinics, for example, often employ pagers, cell phones, PDAs, VoIP house phones and other devices to satisfy communication requirements. Beyond the physical burden of ensuring that each device is fully charged and operable, this situation makes it necessary to monitor and respond to several different communication channels during the day. Maintaining and responding to several communication channels can create confusion and indecision in hospital workers and raise difficult questions, such as:

• Does a pager trump an incoming message on a smartphone?

• What is the protocol in force: for example, if a nurse wants to reach a doctor urgently, should she call his cell phone or page him?

• Who has access to the required numbers?

• Is a co-worker currently covering for a sick colleague?

• Will an email message be read and answered in time to resolve a patient issue?

• Did the maintenance worker get the task request about the broken water pipe in the bathroom?

• Was an important message even received?

These kinds of questions—and the decisions made as to how to address them—affect the overall efficiency of the facility and, often, the well-being of the patients receiving care.

Support and maintenance of a wide array of communication devices also adds to IT headaches within the organization. IT professionals must address a number of difficult issues resulting from device proliferation:

• Can data security and patient privacy be maintained for each communication device?

• Can vital information be freely and securely exchanged between different devices, such as a handheld PDA and the organization’s database server?

• Can upgrades and maintenance of a wide range of devices be handled in a timely and efficient way?

• Can the cost of service be easily monitored and budgeted? Can bill reconciliation, usage policies and controls be effectively maintained?

Communication issues and IT issues can often be resolved by adopting a single communication device with converged functionality, as discussed in the following sections.
Prioritizing Requests

Doctors and nurses, as well as support staff members, are often bombarded with multiple requests throughout the day. This steady onslaught of requests and information can make it difficult to respond appropriately to the priority and urgency of messages. Just as triage techniques are used in the crisis center to ensure that the most critically ill patients are handled first, communication techniques must be coordinated in a way that ensures that staff members respond to critical alerts and vital requests in order of importance. When multiple communication devices are in use, prioritizing can be a nightmare. Healthcare professionals contend with an uncoordinated stream of answering machine messages, pager calls to return, unread emails, casual requests made while passing in the corridor and similar kinds of queries. Some devices—such as pagers—provide only limited information: a number to call rather than the context or reason for the call, making it difficult to know how to respond.

Communication in the intensive care unit (ICU) at Trillium Health Center just outside Toronto used to be as basic as it gets. Nurses typically jotted down notes on a piece of paper to record the needs of patients; doctors took action when they discovered the notes. Since those days of paper-based communication, however, Trillium has advanced and unified their information processes by deploying wireless BlackBerry® smartphones throughout the ICU and the subsequent improvements in staff communication have resonated across the organization.

The project initiator, Dr. Chris O’Conner, a critical care physician and medical informatics consultant (who has since been promoted to the Director of Medical Informatics and Critical Care Medicine), championed the BlackBerry smartphone approach to escape the disruptive nature of pagers and the uncertainty of handwritten notes, which were sometimes jotted on paper towels by the nursing staff (the most convenient supply of paper that was located next to the nursing station).

“We began by just giving the BlackBerry smartphones to the ICU’s four physicians. The nurses had to log into their desktops to send their messages to the doctors,” Dr. O’Conner said. “But that actually worked. It was a stunning success right from the start. It significantly defragmented the care process and improved the response time to messages.”

From the earliest stages, the improvements in the process were striking. In recalling his first use of the technology, Dr. O’Conner said, “The nurse sent me a message [on my BlackBerry smartphone] suggesting that a certain patient needed more anti-hypertension medicine. That seemed reasonable, so I touched the Reply button and typed ‘Yes, go ahead.’ then hit the Send button and it was done. Done in less time that it would usually take me to even find a phone to answer a page. It took my breath away.”

The success of the initial pilot project quickly led to a more extensive deployment across the ICU and all staff members received BlackBerry smartphones as well, further increasing the flexibility and effectiveness of the approach. Staff members found that they could use short breaks during the day to respond to email messages and keep on top of pressing tasks. Testing determined that radio frequency interference did not pose any problems even in sensitive areas of the ICU. Since this testing, this finding has been further substantiated in a study by the Mayo Clinic titled the Use of Cellular Telephones in the Hospital Environment. BlackBerry smartphones are issued at the beginning of a shift and collected at the end, reducing the risk of any confidential data being moved offsite or stolen. Central control of BlackBerry smartphones through the BlackBerry® Enterprise Server includes the option of deleting data on any device identified as stolen, further minimizing privacy risks.

This BlackBerry solution has earned near universal acceptance from both doctors, nurses and staff members. As Dr. O’Conner commented, “Everybody likes it.”

For more information, view the Trillium Health Center Case Study: Hospital Sees BlackBerry Smartphones as a Way to Improve Patient Care and Save Lives at www.blackberry.com/bettercomms.

Within such an environment, clinicians typically rely upon communications from colleagues who are known and trusted. Conversely, they sometimes block out others, limiting access to their personal cell phone numbers or e-mail addresses. To avoid work interruptions, clinicians rely on input from administrative assistants, nurses, and, secondarily, pagers and answering services, prioritizing contacts and tasks according to their own preferences and prerogatives.

A report from Spyglass Consulting Group, *Healthcare Without Bounds: Trends in Mobile Communications*; provided a number of insights into the difficulties faced by healthcare practitioners. In one example, an emergency department physician at a community hospital in Ohio stated, “I am constantly juggling and prioritizing the needs of my patients. Unnecessary disruptions affect my ability to deliver quality patient care. I do not have a standardized way to prioritize or manage incoming messages so I rely upon my nurse practitioner and my administrator to triage the situation.”

## Communication Device Strengths and Weaknesses

The unique capabilities and diverse functionality of various communication devices results in a mix of strengths and weaknesses for hospital and healthcare applications, as shown in Table 1.

<table>
<thead>
<tr>
<th>Device Capabilities</th>
<th>Pager</th>
<th>In-Building Voice</th>
<th>Cell Phone</th>
<th>PDA</th>
<th>Smartphone</th>
<th>Tablet</th>
<th>COW's</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Voice</strong></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Alerts</strong></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Data</strong></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td><strong>Portability</strong></td>
<td>*****</td>
<td>*****</td>
<td>*****</td>
<td>*****</td>
<td>*****</td>
<td>**</td>
<td>*</td>
</tr>
<tr>
<td><strong>Coverage</strong></td>
<td>Pervasive</td>
<td>Wi-Fi</td>
<td>Cellular</td>
<td>Wi-Fi</td>
<td>Cell/Wi-Fi</td>
<td>Wi-Fi</td>
<td>Wi-Fi</td>
</tr>
<tr>
<td><strong>Security / Privacy</strong></td>
<td>*****</td>
<td>***</td>
<td>*****</td>
<td>**</td>
<td>**</td>
<td>**</td>
<td>*****</td>
</tr>
<tr>
<td><strong>T.C.O.</strong></td>
<td>*****</td>
<td>**</td>
<td>***</td>
<td>*****</td>
<td>***</td>
<td>**</td>
<td>*</td>
</tr>
<tr>
<td><strong>Telco / IT Support</strong></td>
<td>*****</td>
<td>**</td>
<td>*****</td>
<td>*****</td>
<td>***</td>
<td>**</td>
<td>*</td>
</tr>
<tr>
<td><strong>Ideal Use</strong></td>
<td>Alerts</td>
<td>Comms</td>
<td>Comms</td>
<td>PIM, Med Ref</td>
<td>Multi-Purpose</td>
<td>EHR Access</td>
<td>EHR Access</td>
</tr>
<tr>
<td><strong>Drawbacks</strong></td>
<td>Asynchronous</td>
<td>Single use Voice</td>
<td>Single use Voice</td>
<td>Single use Data</td>
<td>Screen size, data entry</td>
<td>Size, battery, no voice</td>
<td>Size, no voice, login</td>
</tr>
</tbody>
</table>


*BlackBerry Enterprise Server offers additional security capabilities enabling a BlackBerry Solution to work fully and effortlessly with a HIPAA compliant environment.*
Structured Communication for Quality Care

A messaging approach based on the SBAR format (Situation, Background, Assessment Recommendation) supports more structured communications among nurses and doctors. This can help improve care by promoting critical thinking and removing ambiguity about instructions (such as dosages of medications and frequency instructions). An essential component of this approach is conveying values (doses, measures, diagnostic readings) in both words and numerals.

Two modes of communication that offer this capability in mobile computing devices are:

- **Email (mobile):** Offers context, quick response and an audit trail. However, email communications require regular review and management with the possibility of misinterpretation.

- **Instant messaging (mobile):** Provides quick, reliable and unobtrusive communication among team members. However, instant messages are essentially disposable with a limited audit trail.

Mobile healthcare solutions that incorporate both email and instant messaging contribute to the goal of achieving flexible communications.

---

Many of these devices have become established in the healthcare work environment, but earlier devices sometimes fare poorly in comparison with more modern, converged functionality devices, as described in the following points:

- **Pagers:** Being an asynchronous form of communication, paging often results in endless telephone tag and delays in reaching a contact. This can negatively impact healthcare quality. Overhead paging is generally annoying and disruptive, with no guarantee that the intended message recipient will respond or even if she has heard the page.

- **In-building voice solutions:** These expensive, single-purpose devices are limited to campus-only applications and typically lack significant data capabilities. Hands-free operation creates issues with regulatory compliance (HIPAA, PIPEDA) and built-in voice recognition features often struggle with duplicate names, foreign accents or non-English languages.

- **Cellular phones:** Dedicated cellular phones provide an ideal, wide-area voice solution, but expensive service costs, restricted in-building coverage and electromagnetic interference (EMI) concerns impact the usefulness in hospital environments.

- **Smartphones and PDAs:** Highly portable smartphones and PDAs provide an ideal converged solution for the healthcare industry, although options, pricing and features vary widely. To be effective in healthcare applications, end-to-end security is necessary to protect patient data privacy and central management is essential. Wireless data plans can be quite expensive; a dual-band communication device that combines cellular and Wi-Fi is desirable for maximum flexibility and cost-effectiveness.

- **Tablets, COWS:** For data-intensive tasks, tablet computers and computers on wheels (COWS) provide an ideal solution, offering portability, ease of data entry, large screens and support for workflow processes. On the negative side, these issues impact the usefulness: logging in while attending patients, security management of unattended devices, relatively limited battery life and high equipment expense.

“I do not have a standardized way to prioritize or manage incoming messages so I rely upon my nurse practitioner and my administrator to triage the situation.”

—Emergency department physician, community hospital, Ohio
Adopting a Converged Communication Model

Given the problems and repercussions of disconnected communications discussed in previous sections, is it technologically possible to combine the functionality and capabilities of many different types of communications into a single device? Such a device would most likely take the highly portable form factor of a smartphone with:

• Voice (including VoIP) and data connectivity, by means of cellular and/or Wi-Fi connectivity
• Sufficient data processing power to run clinical and multimedia applications
• Intelligent power management for battery longevity
• Data compression for preserving network bandwidth
• A robust security framework

Functionality of a Pager...and More

In many ways, the communication tool that ideally suits the needs of the healthcare industry starts with the capabilities of the humble pager and then extends that functionality. The portability and simplicity of pagers are major advantages, but the restricted functionality, call-back requirement and lack of information context diminishes the utility of the device. Ideally, a hybrid communication device targeted to healthcare requirements should combine features and functions from other computing devices, from the rich data access of a notebook to the convenience and ease of use of a PDA. This new class of communication device should:

• Provide the connectivity and discretion of a pager (vibrating for a non-urgent notification or ringing for a code-blue alert), with additional context and priority on messages and voice capabilities for immediate response.
• Create a single focal-point for coordinating communications among in-facility staff members, combining cellular to VoIP calls, voicemail, email, instant messaging and alerts. An audit trail would track communications for compliance and accountability.
• Incorporate real-time synchronization to ensure that messages, critical alerts, and patient data are delivered to recipients automatically and unobtrusively.
• Feature organizing and scheduling tools to simplify staff interactions and coordinate tasks.
• Deliver ready access to essential information, such as emergency procedures, staff contact data, facilities information, medical references, patient data (EHR), and pharmaceutical data.
• Include security and privacy provisions consistent with industry best practices and compliant with legal requirements.
• Provide centralized management features that allow mobile devices to be updated, activated, deactivated or managed remotely with greater efficiency.

“In 2002, we had a network outage that regressed the hospital by decades, making it look like the hospital of 1972 – doctors couldn’t get their orders, couldn’t prescribe drugs, and we couldn’t diagnose the problem in the absence of a network. We began using PIN-to-PIN on BlackBerry smartphones to communicate during the network outage; this is now an integral part of our disaster recovery plan for situations when our other communication channels go down.”

– Dr. John D. Halamka, CIO, Harvard Medical / Beth Israel Deaconess
Ensuring Continuity of Operations during Emergency Situations

During emergency situations, hospitals and clinics have a strong responsibility to patients and stakeholders to ensure continuity of operations (COOP). Without proper planning, disruptions to facility operations can cause unnecessary personal or property damage, as well as substantial financial losses. Countering emergency situations effectively requires a combination of well-established procedures, a responsive communication system and a technology framework in place that can circumvent potential power outages and network failures.

In emergency situations, communication among healthcare workers becomes absolutely critical to treating the injured and establishing an effective response to urgent needs. Extreme disasters, such as floods, tornadoes, hurricanes and earthquakes, often disrupt primary communication services. Even lesser emergencies, such as power blackouts, fires and personnel evacuations, can put a severe strain on normal communication channels. In these kinds of situations, emergency responders and primary staff members can benefit from specialized applications that take advantage of wireless communications and smartphones.

Applications from independent software vendors such as Wallace Wireless and Onset Technologies provide specialized capabilities tailored to business continuity planning and continuity of operations. PIN-to-PIN communication, a unique point-to-point method of communication available on the BlackBerry platform, ensures effective operation even when central servers or power lines are down. Essential information, including crisis management checklists, contact numbers of emergency response teams, facility maps, inventory lists and similar data, can be accessed during times when voice calls and computer access have been disrupted.

For more information on this topic, read Improving Communication in Emergency Situations: Mobile Business Continuity Planning Solution at www.blackberry.com/bettercomms.

Part Three of this series addresses the key issues surrounding the selection and adoption of a wireless solution within the healthcare industry. As the industry moves toward technology to counter the multiple challenges faced, mobility solutions offer proven techniques and effective methods to transform the healthcare industry. Producing a unified communication framework can set the foundation for improved efficiency and better coordinated work processes.
This four-part series examines the ways that wireless technology and mobile communications can enhance the efficiency and quality of institutional healthcare, improving the processes through which doctors, nurses, specialists and support staff members deliver medical treatment. Part Three addresses the key issues surrounding the selection and adoption of a wireless solution within the healthcare industry.
**Introduction**

How well does the current generation of wireless technology suit the specific needs of the healthcare industry? Recognizing that the healthcare industry has lagged behind other industry sectors in adopting wireless technologies—including financial services, real estate, manufacturing and government—is the problem one of functionality, reliability or suitability to the required tasks? Or, is it simply the conservative nature of healthcare, where a solution must be of proven value and unassailable virtue before investments are made and policies are changed. Part Three of this series examines the characteristics of wireless mobility solutions and considers how effectively these solutions meet healthcare industry requirements.

**Data Security**

Industry best practices and regulatory mandates place a high premium on securing electronic data and protecting it against theft or unauthorized viewing. To be effective, data security needs to be integrated into the solution—becoming an integral part of each communication channel, data storage medium and network link. To meet privacy and data integrity concerns, security should provide an umbrella of protection that extends end-to-end, from the handheld computing device across the Internet to the back-end data servers.

When comparing the features of wireless mobility solutions for healthcare applications, these factors are particularly important:

1. **Encryption:** Is encryption an integral part of data communication? In a well-designed solution, data should be encrypted throughout each stage of its lifecycle—from storage on back-end servers to information transferred wirelessly to the end-point device.

2. **Lost or stolen device management:** Is it possible to erase data stored on a device that is stolen or lost? If not, that data may fall into the wrong hands. Look for centralized management features that allow administrators to purge data remotely from a missing device.

3. **Password protection and authentication:** How effective is the solution’s approach to authenticating individuals using the device and guarding against fraud? Strong password protection, two-factor authentication, and best-practice password policies are all elements of an effective data security plan.
Privacy and Regulation in a Wireless World

Private information beamed through the air, stored on electronic devices and transferred across wires is all subject to the laws governing patient privacy. While these laws may vary by locality, they consistently emphasize one recurrent theme: private records associated with a patient’s health conditions, personal history, medical treatments and similar data must be protected from disclosure to any individuals who are not authorized to view that information. Regulations such as HIPAA and PIPEDA (Canada) squarely place the burden of ensuring data security on the institutions that collect and transmit that data. The penalties for violating the regulations can be substantial and often are directed to the corporate officers who oversee privacy policies.

The Value of Encryption

Wireless communications using the Wired Equivalent Privacy (WEP) protocol provide some degree of protection against hacking, but security can be more effectively reinforced using best-of-breed encryption algorithms as an integral form of protection. For example, Triple DES is a robust encryption technique that combats intrusion much more effectively than WEP. Messages traveling across a network—in wired or wireless mode—can be shielded from disclosure using this strong form of encryption. This layer of protection meets both the letter and the spirit of healthcare-related privacy legislation. Commonly employed at the server level as part of a comprehensive, organization-wide solution, Triple DES can substantially reduce data security threats and protect privacy. In the estimation of many IT security professionals, data security safeguards should be fully integrated into the communication framework for maximum effectiveness.

When surveyed, Privacy officers and Chief Security Officers respond that 90% of U.S. and 97% of Canadian clinical staff take issues of Patient Privacy seriously.

– Chief Privacy Officer survey, RIM April 2007
Smartphone Authentication

Regulatory compliance in many regions also mandates verifying the integrity and authentication of messages. To provide assurance that a message has not been tampered with in transit, the recipient must be able to confirm the identity of the sender and detect any modifications. Solutions that employ an encryption mechanism to ensure authenticity by relying on a known message format protected by a private encryption key help meet compliance codes. In this type of approach, the end-point device can automatically reject messages that do not adhere to the specified message format.

Two-factor authentication on a smartphone or handheld device can be accomplished by means of solutions, such as a Bluetooth-enabled smart card reader (requiring both proximity and a valid password to gain access). In environments where a nurse or physician also logs in to a COW or portable workstation, the smart card reader can similarly be used to strengthen and or streamline the authentication process.

Figure 2 summarizes the form-factor choices of Privacy Officers.

Form-factor choice of Privacy Officers who carried a mobile device

<table>
<thead>
<tr>
<th>Device Type</th>
<th>U.S.</th>
<th>CND</th>
</tr>
</thead>
<tbody>
<tr>
<td>BlackBerry® smartphones</td>
<td>53%</td>
<td>66%</td>
</tr>
<tr>
<td>Smartphone (Other)</td>
<td>15%</td>
<td>11%</td>
</tr>
<tr>
<td>PDA</td>
<td>33%</td>
<td>23%</td>
</tr>
</tbody>
</table>

Figure 2. Device preference: Chief Privacy Officer survey, RIM April 2007

BlackBerry Business Solutions and HIPAA compliance

To ensure compliance with HIPAA and similar patient privacy laws, electronic patient health information (EPhI) must be protected against inadvertent disclosure through its lifecycle. The secure message transfer protocols and strong authentication and encryption techniques used in the BlackBerry® Enterprise Solution allow BlackBerry smartphones to operate fully and effortlessly within regulatory compliant environments (such as HIPAA or PIPEDA Canada).

Storage devices associated with smartphones or handheld devices, such as Secure Digital cards, should also be protected with encryption, ensuring that if they are lost or stolen sensitive data will be protected.

For more information about this topic, view the white paper entitled *BlackBerry and Health Insurance Portability and Accountability Act (HIPAA) Guidelines* at www.blackberry.com/bettercomms.
Improving Patient Safety through Clear Communication

One clear benefit in adopting stronger communication tools for team use within hospitals or clinics is the improvement in patient safety. With doctors, nurses, and support staff members clearly conveying their intent and response in writing—through text-based messages—the likelihood of miscommunication in critical areas, such as prescription doses, treatment modalities, patient symptoms, and similar factors, can be dramatically reduced. The level of accountability, because of the message tracking, auditing, and record-keeping capabilities—in a well-designed wireless solution—provides a clear and consistent trail, recording the daily communications and minimizing miscommunication. Electronic prescription techniques, in particular, provide an extra measure of safety and an effective means of cross-checking patient prescriptions against known allergies or interactions with other medications.

Meeting JCAHO Recommendations

Improving patient safety was one of the primary goals of the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) when they issued six National Patient Safety Goals with accompanying recommendations in July of 2002. Cognizant of the dangers of medical errors, hospitals have increasingly turned to point-of-care systems employing bar codes to ensure that medication is delivered to the right patient, the appropriate drug, the correct time, the specific dose, and the approved route of administration. Other JCAHO recommendations address communication among caregivers, the effectiveness of alert systems, and similar prerogatives as a part of hospital information technology systems aligned with patient safety objectives.

BlackBerry Business Solutions and JCAHO

JCAHO recommendations can be successfully met using BlackBerry Business Solutions for healthcare. BlackBerry smartphones support a wide range of accessories that can be helpful in patient monitoring and record keeping, such as bar code readers and RFID scanners, making it possible to minimize medication errors and keep better control over inventory. The issuing of prescriptions, an error-prone and potentially deadly task if mishandled in healthcare facilities, can be more precisely controlled using leading ePrescribing solutions available for the BlackBerry Enterprise Solution.

Encouraging the use of text-based versus oral means for communicating orders, tasks and requests helps improve the accuracy of team interactions, an essential principle underlying the JCAHO recommendations.

Note: Bluetooth-enabled BlackBerry smartphones maintain a level of security consistent with robust BlackBerry Enterprise Solution capabilities, ensuring that short-distance communications of voice and data comply with privacy guidelines, as well.
Evaluating Electromagnetic Interference Risks

The electronic equipment commonly in use within hospitals and clinics often plays a significant role in monitoring and protecting patient health. Electromagnetic interference (EMI) from wireless devices can potentially disrupt monitoring equipment, interrupt the activities of devices such as heart pacemakers, interfere with alarms or warning devices, and interact negatively with other communication equipment within the facility. For these reasons, the EMI characteristics of any devices used in a facility must meet stringent standards and be designed not to interfere with the many kinds of electronic devices found in healthcare facilities. Individual healthcare organizations should independently evaluate equipment in use in keeping with industry best practices and applicable risk factors. In situations where EMI risks are significant, precautionary safeguards should be implemented. This may include establishing zones where wireless operations are prohibited. Specifying minimum distance rules to shield medical equipment from EMI-generating devices is also a recommended practice.

Concerns over EMI risks have been put into perspective by a comprehensive study performed by the Mayo Clinic. This study was commissioned to determine whether cellular phone use causes interference with monitoring equipment and medical devices in patient-care areas of hospitals. A total of 300 tests involving 192 medical devices were performed. None of the tests identified any interference. In total, 75 patient-care rooms were included in this study. The results suggest that routine use of cellular phones in hospitals (which has often been prohibited due to concerns over EMI) does not pose a risk when these devices are used in a normal manner.

Historical bans against cellular phone use in healthcare facilities are being reconsidered and, in many cases, removed in light of an expanding body of evidence that EMI emissions do not affect modern equipment and their benefit outweigh the risk. Technological advances in cellular technology and additional shielding in medical equipment have further reduced stray EMI generation, so healthcare facilities can have confidence that wireless communication in rooms and corridors will not have undue impact on other electronic equipment used for patient care. Mobile communication devices using Wi-Fi connectivity represent another option; with their lower transmission levels during communication they have never been seen as a significant EMI risk in hospital and clinic settings.

For more information about this topic, access the white paper titled Wireless Electromagnetic Interference (EMI) in Healthcare Facilities at www.blackberry.com/bettercomms.

BlackBerry Smartphones and EMI

Although no wireless device is entirely free of possible EMI risks, BlackBerry smartphones meet best practice guidelines and have been designed to minimize RF emissions during transmissions at a level consistent with minimal detectable risk.

Other BlackBerry smartphone features that target EMI concerns include:

- IT administrators maintain control over each BlackBerry smartphones Bluetooth capabilities, so that this feature can be switched off to lower EMI risk.

- Overall EMI characteristics of BlackBerry smartphones are comparable with digital cell phones, easily controlled by the same management techniques that apply to cell phone use in medical facilities.

1 Use of Cellular Telephones in the Hospital Environment. Jeffrey L. Tri, MSEE; Rodney P. Severson, CBET; Linda K. Hyberger, MA, CCRC; and David L. Hayes, MD; Mayo Clinic Proceedings, March 2007.
Wi-Fi Infrastructure

Wi-Fi capabilities in a smartphone extend the available means for information access and data distribution. Wi-Fi-enabled devices can take advantage of pre-existing IT infrastructures and reduce the overall costs and deployment complexity. As an additional benefit, voice communication by means of VoIP—linked through a PBX switch to the internal telephone network—transforms the available computer network into an inexpensive and effective way to provide in-building wireless communication. Dual-mode smartphones, with both Wi-Fi and cellular functionality, offer the best of both wireless worlds and tremendous versatility. Wi-Fi popularity is steadily increasing. Figure 3 indicates the number of respondents to a RIM survey who plan to implement Wi-Fi networking within their organization.

Providing effective Wi-Fi networking within an organization requires attention to a number of different issues given the range of Wi-Fi configurations and components that are available. Questions that IT administrators, CTOs, and CSOs should consider include:

1. What methods of wireless security are available for the proposed solution? Unsecured wireless transmissions pose both a regulatory challenge and an ethical concern. Patient data, communications among staff members, email messages with lab test results attached and similar data should be encrypted throughout their data lifecycle to prevent theft or intrusion.

2. How are the supported wireless devices provisioned? Configuring mobile equipment can present a unique challenge to IT groups, since the computing devices are often off-site, carried by traveling staff members. A means for centrally controlling and provisioning mobile devices can significantly reduce IT burdens.

3. How well does the proposed solution fit within the organization’s existing network? Interoperability, ease of integration and support for industry standards affect the use, maintenance and operation of mobile communication devices.

Current state - Wi-Fi implementation in U.S. and Canadian healthcare organizations

<table>
<thead>
<tr>
<th></th>
<th>U.S.</th>
<th>CND</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>14%</td>
<td>36%</td>
</tr>
<tr>
<td>Limited / Zones</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ubiquitous / Everywhere</td>
<td>28%</td>
<td>55%</td>
</tr>
<tr>
<td>Unknown</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Planned expansion this year</td>
<td>66%</td>
<td>54%</td>
</tr>
</tbody>
</table>

Figure 3. Wi-Fi implementation: U.S. Top 300 – Healthcare Executive survey, RIM – October 2006; Canadian Healthcare Executive survey, RIM – April 2007
In areas where cellular coverage is marginal or within shielded areas of a building where cellular signals do not penetrate, Wi-Fi can be useful as a primary or supplemental communication medium. Wi-Fi can also be very valuable in situations where very large files, such as diagnostic images or updates to drug interaction databases, need to be circulated across the network to mobile devices and servers. Over a cellular network, this would be expensive and slow. In a Wi-Fi network, it is fast and the costs relate to existing network expenses.

For more information on Wi-Fi’s role in institutional settings and campus-like facilities, read the BlackBerry white papers, *Redefining the Mobile Workforce, How and Why Organizations Are Enabling In-Building Teams and Deploying a Wireless LAN, Considerations and Questions in Planning a Wireless LAN* at www.blackberry.com/bettercomms.

**Mobile Computing Device Management**

Mobile devices present a unique challenge to IT administrators because often the devices cannot be accessed physically to perform an upgrade, install a new application, or check the batteries. In the case of a healthcare organization, devices could be distributed anywhere across a large campus. In some cases, certain staff members, such as physicians, may have purchased their own devices.

Administrators need a secure way to manage both devices owned by the organization and those that are not corporate assets, but are in use by staff members. Solutions that can implement a management strategy incorporating a range of devices ultimately prove more useful, particularly in a healthcare environment where the range of devices in use can be considerable.

Features to consider that improve the ease and efficiency of device management:

- Remote deployment and provisioning of applications globally (rather than having to configure and deploy to one remote device at a time)
- A central means of reconciling device usage for billing purposes and monitoring overall usage patterns and related costs
- Management capabilities for disabling or wiping devices clean in case of loss or theft, to avoid private information falling into the wrong hands
- Flexible security configuration that allows settings to be changed on an individual basis from a central management point
- Built-in encryption of all communication streams to ensure that no data or information is exposed during configuration or deployment processes
- The capability of changing passwords or locking devices remotely
- Features that allow the setup of unique user profiles with automated provisioning, security, and updates based on the profiles

BlackBerry solutions are noted for exceptional central management capabilities, making them very effective in healthcare settings, as discussed further in Part Four.
Enhancing Information Access

Effective healthcare depends on real-time access to information. A patient’s safety can be at risk, particularly in emergency situations where possible drug allergies, long-term patient histories, recent diagnostic procedures and similar kinds of information are necessary to inform medical practitioners during treatment.

In practical applications, many healthcare organizations find that a combination of computing devices offers the most efficient means of information entry and access. A smartphone provides immediacy and convenience in accessing records—at any time and from any location. COWS and tablet PCs, with their larger form factor, full-size keyboards, and bigger displays, are well suited to bedside and examining room scenarios. These two categories of devices complement each other well.

A Compelling Incentive for Adoption

Real-time access to patient records and medical information through a mobile device offers a compelling incentive for the adoption of wireless push technology in healthcare. Time spent hunting for information or searching for records is wasted time when that information can be quickly accessed on a mobile device in a practitioner’s possession. Instead of checking back for lab results over and over, the lab can generate an alert directly to the mobile device equipped with push technology, helping eliminate inefficiency within healthcare organizations. The mobile computing device can serve as a conduit—delivering information as needed—rather than requiring staff members to search for relevant details.

Hospital Information System (HIS) data—whether homegrown or from a commercial vendor—can be mobilized through physician portals that are specifically designed for the small screen. This data can also be conveyed through third-party vendors, such as Thompson® Healthcare’s Mercury MD™ mobile solution, PatientKeeper® or others. Additionally, key HIS vendors are expanding capabilities to provide this functionality directly.

Electronic versions of medical references have also become the standard over the past decade. Hospitals rely on a variety of providers—including ePocrates®, Lexi-Comp®, Micro Medix®, SkyScape®—to improve decision-making and enhance disease treatment methods. The kind of information provided by these solutions can be delivered effectively to COWS, tablet PCs, smartphones or other mobile computing devices. To extend access to current records and patient information from anywhere within a facility, a properly equipped wireless mobile device can also tap into information stored on the Web and databases residing on hospital servers.

Mobile computing devices or smartphones with built-in browser capabilities provide a useful means for obtaining access to applications based on Web services. This approach often complements existing IT infrastructures used in healthcare facilities relying on Web-based applications. Devices equipped with sufficient processing power and memory to handle client custom design—with strong development tools available that can securely access data stored in proprietary server databases—can be used to construct physician portals or other conduits to online information. Either form of client design opens a window to vital information that can be an essential tool for improving decision making when in the hands of doctors and nurses.
As discussed throughout this paper, wireless communication devices and smartphones come in a vast variety of packages with widely differing capabilities, some supported by a platform infrastructure, some relying on Internet communications and cellular connectivity. Certain distinguishing capabilities and characteristics may separate an effective solution from a product that marginally meets the needs of healthcare professionals.

*Part Four of this series zeroes in on the features and capabilities that make BlackBerry smartphones an ideal match for healthcare industry requirements.*
Revitalizing Healthcare Delivery with Mobile Communications

PART FOUR: Making the Case for BlackBerry Adoption

This four-part series examines the ways that wireless technology and mobile communications can enhance the efficiency and quality of institutional healthcare, improving the processes through which doctors, nurses, specialists and support staff members deliver medical treatment. Part Four zeroes in on the features and capabilities that make BlackBerry smartphones an ideal match for healthcare industry requirements.
Introduction

Unlike industries that adopted the BlackBerry® smartphone and other mobile computing devices primarily for email access during travel, the healthcare industry took a different tack. Doctors and nurses embraced these computing devices and used their PDA features for convenient access to medical and drug references, such as ePocrates®. However, they still retained their pagers for three main reasons: coverage, cost and comfort. To many healthcare professionals, email was unnecessary—one more communication tool to worry about. Receiving email required one more device to carry, in addition to the pagers, phones and other devices carried about during their rounds.

Today, a single device—the BlackBerry smartphone—has capabilities that previously required several devices. This converged functionality and connectivity (through cellular and Wi-Fi) make it possible to communicate both inside and outside of facilities and while traveling. With the growing popularity of BlackBerry smartphones within healthcare organizations, many leading application providers have taken advantage of the push data technology to deliver clinical information when and where it is needed. This, in turn, has strengthened the performance of clinical teams and given professionals the necessary tools to improve the quality of care. BlackBerry also provides an ideal means to prioritize workloads and organize tasks through a single inbox, fulfilling the promise of unified communications.

Many of the characteristics of the BlackBerry® Enterprise Solution, which universally includes features that enhance secure communication, data access and business processes, are exceptionally well suited to the healthcare industry. The benefits within healthcare environments, as they apply individually to doctors, nurses, and support staff, are outlined in the following sections.

Benefits for Doctors

Physicians using converged wireless technology in hospital environments gain unprecedented access to information and a versatile communication tool that can make them more effective in their roles. Among the benefits for doctors:

- Coordinated communication capabilities, combining email, IM, alerts, notifications, voice (cellular, VoIP) and voice-mail messages in a unified, prioritized inbox, provide the workflow advantages of paging without the associated disruption and add context to the message beyond a basic call me.

- Improved accountability in communication exchanges helps reduce errors. Written messages (rather than oral instructions) give nurses a record to which to refer.

- Referrals and social networking interaction among colleagues make it easier to pass patients securely to trusted colleagues (in comparison with pager confusion, answering service burdens, call-back delays and similar kinds of disruptive communication).

- Wireless access to information informs decision making, providing ready access to patient histories and records, pharmaceutical reference data, status and availability of hospital specialists and colleagues and procedures for handling emergency situations in the facility.

- Increased efficiency and revenue is gained during rounds through the availability of Electronic Medical Record (EMR) data and charge capture solutions at the point-of-care.

- Elimination of the need to carry and monitor multiple devices, such as pagers, cell phones, PDAs and similar devices, simplifies daily tasks.

- Improvement in system-wide processes enhances the ability of the physician to deliver high quality patient care and ensure more productive use of each physician’s time and availability.
The proven technology in BlackBerry Enterprise Solution applications has attracted numerous independent software vendors, who have crafted well-designed products for use in hospitals and clinics. One example is Mercury MD mobile solution from Thompson Healthcare, which provides access to patient data on a BlackBerry smartphone. This application is in use at INTEGRIS Health Inc., where it delivers information such as patient demographics, lab results, medication lists and radiology reports.

“The combination of Mercury MD and the BlackBerry solution gives INTEGRIS Health’s clinicians fast and easy access to comprehensive patient medical record information from any location and at any time.” – James Lynch, R.N., M.B.A., Director of Clinical Applications, INTEGRIS

Benefits for Nurses

While doctors may bear the brunt of decision-making within a typical healthcare organization, the nursing staff members face the practical issues of delivering the specified treatments, administering appropriate medications and overseeing patients’ conditions throughout the nurses’ workdays. BlackBerry solutions can provide these benefits for nursing staff members:

- BlackBerry smartphone’s single unified message inbox and organizer features provide a means to coordinate communications among nurses, doctors and other staff members, reducing the complexity of coordinating activities and improving the efficiency of hospital and clinic operations.
- Improved accountability and assurance that required tasks have been performed, as well as providing a mechanism for the assignment of responsibilities and the tracking of results.
- Nurses gain an effective communication tool for locating and discreetly querying doctors, without disruptive paging or the uncertainty of voice mail telephone tag.
- Tasks involving multiple staff members can be more effectively scheduled and carried out using the available organizer capabilities and messaging functions.
- Management of patient data can be performed accurately and in a timely manner at the patient bedside, with the data being relayed to a secure central server for immediate availability to other staff members.
- The administration of patient medications can be more rigorously managed and safely controlled, particularly through the use of barcode technologies that ensure positive patient identification and accurate drug dosing.
- In the case of serious emergencies, nursing staff members can consult checklists of essential procedures, supporting the highest level of performance when emergencies require rapid response.
- Critical alerts can be generated to physicians whenever potentially life-threatening conditions arise in patients undergoing care.
- Monitoring telemetry can be employed to keep on top of developing situations where a patient’s condition must be carefully watched.

“Gone are the days when the nurse would have had to go searching around the 26-bed ward for [the Doctor]. Gone, too, are the incessant loudspeaker messages that disrupt the ward, and the endless pager chases that follow doctors everywhere. It’s made a stunning difference in the quality of care we can give our patients…”

–Dr. Chris O’Conner, Director of Medical Informatics & Critical Care Medicine, Trillium Health Centre
Benefits for Support Staff Members and Other Clinical Workers

Support staff members at a typical healthcare facility may include porters, security team members, maintenance workers, IT personnel, food services, materials management, dieticians, social workers, pharmacists and other essential members of the healthcare team. Equipping support staff members with BlackBerry smartphones can achieve these benefits:

• Organizer checklists, access to procedure manuals, facility maps available on the handheld devices and similar features improved coordination of the activities of support staff members.

• Quick alerts generate rapid response in the case of problems within the healthcare facility, such as the breakdown of an air conditioning system in a wing, an overflowing sink in a rest room, electrical problems related to an overloaded breaker or an improperly parked vehicle blocking the emergency entrance.

• Job dispatch and ticketing, such as is performed in the IT department, can be handled in a streamlined and well-coordinated manner.

• Inventory management processes can be overseen more effectively, avoiding shortages in the supplies necessary to keep a hospital or clinic running efficiently and ensuring that patients’ needs are met.

• Prescriptions can be wirelessly transmitted to pharmacists so medications are available promptly.

• Possible hazards or dangerous conditions on clinic grounds, such as icy sidewalks, flooded parking lots, or power outages, can be noted promptly and attended to quickly by maintenance staff members.

“I think it’s true with any individual that people want to do a good job. People want to provide good services. Having the tools, like a BlackBerry smartphone, helps them do this and feel much better about what they’re doing.”

–Marcos Athanasoulis, Director of Information Technology, Harvard Medical School

Benefits to the Overall Organization and Administrators

Healthcare solutions based on the BlackBerry Enterprise Solution provide these overall benefits to healthcare organizations and their administrators:

• Through the elimination of overhead paging, a quieter, most restful environment can be created, improving the environment for both patients and staff members.

• By eliminating pager use, doctors, nurses, and other staff members can communicate more efficiently using a single, secure, wireless system, providing context, priority and response options, streamlining workflows and improving productively.

• Increased adoption of the EMR, as supported by BlackBerry technology, provides a secure, patient-centered information resource to improve healthcare responsiveness and accuracy.

• With cost-effective Wi-Fi-enabled BlackBerry smartphones, the overall costs of providing communication devices to staff members can be reduced.
From Paper to Packets

• Productivity gains for wireless mobility solutions can be significant. For example, implementation of this technology at a major Canadian health center produced these gains: nurse time, 12 percent; unit clerks, 22 percent; porters, 30 percent; social workers, 51 percent.

• Centralized IT management of BlackBerry smartphones simplifies IT processes and helps keep support costs under control.

• Safety and patient care can be improved through BlackBerry Enterprise Solution features that ensure greater accountability and record tracking, improved communication, enhanced access to information and better coordination of emergency response teams.

These examples provide only a brief overview of the improvements in work processes that can be realized through the capabilities of BlackBerry Enterprise Solution. For additional case studies and white papers related to opportunities and benefits that can be achieved in this area, visit: www.blackberry.com/bettercomms.

Growth of Wireless Technologies in Healthcare

According to the research firm Kalorama Information, as published in a study titled *Wireless Opportunities in Healthcare*, the market for wireless technologies in healthcare is increasing at a phenomenal rate, from a level of $1.8 billion US in 2005 to the expectation of $7 billion in 2010. The need for real-time data access to guide decision-making and enhanced communications to improve work processes has been demonstrated to the satisfaction of growing numbers of healthcare organizations. Momentum continues to build in this area (at a five-year compound annual growth rate of 33 percent, according to Kalorama). As BlackBerry Business Solutions are developed, including applications that take advantage of the security, flexibility, and functionality of the BlackBerry Enterprise Solution, new opportunities will continue to arise and innovative approaches to quality healthcare will be crafted around the platform capabilities.

A Robust Infrastructure Well-Suited to Healthcare Services

One reason the BlackBerry Enterprise Solution suits the needs of the healthcare industry so well is the strength and depth of the infrastructure. Design features and engineering advances underlie the fundamental processes essential to communication in a healthcare facility, including security, versatility, reliability, data integrity and interoperability. Many important capabilities of this platform stem from the engineering excellence and design forethought that streamline tasks such as encryption of data streams, application development, unified communications and coordinated work processes. This platform provides an exceptional foundation for launching BlackBerry Business Solutions for Healthcare, hardware, software and applications to empower staff members and transform healthcare delivery. The BlackBerry Enterprise Solution enables both cellular and WLAN approaches to communication, establishing a framework for the development of innovative healthcare solutions where communication is not restricted by conventional boundaries. BlackBerry Business Solutions for Healthcare built for this platform can take immediate advantage of the advanced infrastructure and built-in capabilities.
The BlackBerry Enterprise Server forms the cornerstone of the BlackBerry Enterprise Solution. The server strengthens security, supports a push communication model that delivers messages as quickly as they are issued. It also provides a versatile communication framework for exchanging data with existing systems and running mobility applications customized for the healthcare industry. Network mobile device support is not limited to native BlackBerry smartphones. Through BlackBerry® Connect™, other mobile device manufacturers—including Motorola, Nokia and Samsung—have embedded BlackBerry functionality into their equipment so they can take full advantage of the BlackBerry platform.

Extending Real-Time Information Access

Real-time access to accurate information about patients, treatment modalities and medical histories equips healthcare professionals with a powerful means to enhance decision making, which in turn leads to better patient care, improved staff productivity and greater operational efficiency. Small, lightweight BlackBerry smartphones fit conveniently into lab coats, scrubs and jacket pockets and offer a converged model for communications, replacing the need for several separate devices. The range of activities and functionality that can be handled by BlackBerry smartphones in support of healthcare services is expanding daily as independent software vendors (ISVs) target this popular platform and take advantage of the rich development environment and integrated features (such as automatic encryption of messages and push data capabilities). Error-prone, paper-based record systems are being replaced with electronic systems that reduce miscommunication, create verifiable audit trails and distribute vital information soundlessly throughout healthcare facilities, reinforcing the policies and work processes in effect within the organization.

Providing Vital Communications Reliably

Communications are vital to delivering healthcare excellence. The BlackBerry platform offers a unified and coordinated framework that combines voice communications, push messaging, backend server database access and Web service access in a lightweight, handheld package. The capabilities of this platform solidly address the requirements of the healthcare industry in helping improve staff communication, structure workflow to enhance productivity, provide custom applications tailored to organization needs and adapt to the changing day-to-day needs that arise within any organization.

For more information about the ways in which the BlackBerry Business Solutions for Healthcare can solve crucial healthcare challenges, visit: www.blackberry.com/go/healthcare.