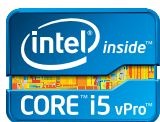


Using Mobile Point of Care to Improve Healthcare Delivery

In healthcare settings, mobile technology offers more than just convenient online access—it can enhance patient outcomes and encourage collaborative workflows.



The healthcare industry is in the midst of transformative change. It is undergoing reform through initiatives that focus on improving patient outcomes, tying provider reimbursements to quality metrics (rather than traditional fee for service), adopting electronic medical record (EMR) systems, and developing accountable care organizations (ACOs).

One reason ACOs, and similar types of healthcare models around the world, are growing is to reduce the high rate of patients returning to the emergency room and or being readmitted to the hospital. According to the Medicare Payment Advisory Commission, in the United States, the current 30-day readmission rate for Medicare patients is greater than 20 percent.¹ As a result, many hospitals are forfeiting Medicare funds, which can result in a loss of millions of dollars.

However, the long-term success of ACOs will depend on technology-supported collaboration among healthcare practitioners. A new Health IT model, mobile point of care (MPOC), is showing promise for enhanced healthcare delivery.

Patient Discharge Use Case

This hospital discharge use case demonstrates the differences between current practices and a future mobile collaborative care environment that can improve the outcome.

Imagine an elderly hospital patient...

Her vital signs are stable, so she is being discharged after a short stay due to an acute lung condition. She is, however, tired, anxious

and slightly groggy from the lingering effects of medication. The discharge nurse gathers instructions from clinicians via phone or in-person consultation. This process can take several hours.

The patient is given printed instruction sheets while the discharge nurse explains that follow-up medical appointments must be made with the pulmonary specialist, primary care physician, and physical therapist. The nurse gives the patient several prescriptions and explains how to take the new medications. The patient is told that test results will be sent to her personal physician or specialist in a few days. Unfortunately, the patient ends up in the emergency room because of confusion about home care and clinician follow-up care.

Now imagine mobile collaborative care...

The discharge nurse uses a mobile tablet to set up a video conference with the patient's nurse practitioner, clinical specialist, home healthcare manager, and a family member. Within minutes, all parties are informed of the hospital summary, the patient's current condition, and any potential warning signs. All are shown imaging, test results, and prescribed medications. The nurse gives instructions about follow-up care, pharmacy needs, medical appointments, and ongoing treatment to the patient and care team. Clear discharge instructions are sent via email to all parties and in compliance with various regulatory standards. The patient is successfully discharged and gets the care she needs without confusion, misunderstanding, or readmission.

Mark Blatt

Worldwide Medical Director
Intel Healthcare IT

Chuck Brown

Director, Emerging Compute Lab
Intel Architecture Group

Chris Gough

Solutions Architect
Intel Healthcare IT

Multitasking mobile devices that support clinician use cases improve productivity, streamline communication, and bridge the gap between inpatient and outpatient care.

BASICS OF ENABLING COLLABORATION

For a successful mobile environment, consider both device and delivery.

- Opt for secure mobile tools that handle video streams from multiple sources. Devices should also deliver a satisfactory user experience given both CPU and bandwidth parameters.
- The software delivery method should balance the computing burden between the client and the server so as not to overwhelm server capacity and inflate software licensing costs.
- A service delivery model should include multitasking mobile devices that meet the needs of end users and manageability standards for Health IT departments.

For more information, refer to the Intel Solution Brief.

[Benefits of Intelligent Desktop Virtualization for the Healthcare Enterprise](#)

Optimized IT Service Delivery for Collaborative Healthcare

During this industry transformation, Health IT departments are under scrutiny on a multitude of issues: cost control, manageability, security, regulatory compliance, and business continuity.

As new enabling technologies emerge for healthcare service delivery models, Health IT departments must determine which combination of compute model(s), security controls, and mobile devices will best meet the needs of employees and the IT organization, now and into the future.² See sidebar for more information.

A successful MPOC service delivery model addresses performance, IT management complexity, compliance, security and privacy, cost, and end-user experience. Focusing on just one of these factors, or only on IT requirements, is likely to result in a less-than-optimal solution that proves difficult for end users. Individual users need to access different applications using a mix of technologies.

In the patient discharge use case, for example, the nurse may access several applications, including video conferencing, EMR, voice control/dictation, touch handwriting, imaging of an X-ray, and web and email access. Home healthcare nurses or medical transport technicians need to access multiple applications to effectively do their jobs. Rarely does a single device or platform meet all the needs of a given group of users, let alone the needs of every user in the healthcare network.

An intelligent application of Health IT across the care continuum is one that optimizes a collaborative exchange of health information between patients, physicians, specialists, hospitals, long-term care facilities, and family members.

Mobile Technologies Hold Promise, but BYOD Presents Security Risks

Mobile devices, such as tablets and smartphones, are appealing for their flexibility and portability. More and more of them are appearing in clinical settings. However, clinicians are bringing their own devices to the workplace, often not waiting for IT departments to develop policies on their use. While bring-your-own-device (BYOD) may increase end-user satisfaction, it presents concerns in a workplace setting where protected health information (PHI) is pervasive and regulatory compliance is critical.

For example, a physician might use his personal smartphone to take a picture of an X-ray, and then text or email the patient's information and image to a colleague. Or perhaps he will upload the data to a file-sharing program, such as Dropbox, for a consult. While this may be convenient for the physician and consulting colleague, it creates security and privacy risks. In addition, if a BYOD with stored PHI is lost or stolen, a serious data breach may result, with regulatory consequences.

With the rise of mobile technology, healthcare organizations are adopting strategies for security that extend across the enterprise. A collection of security controls, including data loss prevention (DLP), encryption, mobile device management (MDM) tools, and strong authentication to endpoints and devices, can be used to secure PHI.

Developing a Mobile Technology Strategy

In developing a MPOC strategy, five factors are critical to consider:

- **Service delivery model:** creating a compute environment that enables the best possible software and application delivery for virtual and mobile technologies.
- **Device model:** choosing the right device for the right task, based on workflow use cases, to enable collaboration. Ruggedized devices withstand hazards better in the healthcare environment.
- **Device management model:** selecting robust, scalable devices that connect easily to the organizational network and can multitask without burdening the data center.
- **End-user experience:** delivering end-user satisfaction is as important as having the right device. An easy-to-use interface will support multimedia interactions and real-time collaboration.
- **Security:** extending security controls, such as DLP, encryption, and strong authentication to endpoints ensures security, compliance, and privacy beyond the data center.

These factors are further explained in the following sections.

Service Delivery Model

Having realized significant benefits with server virtualization in the data center, CIOs and IT managers piloted centralized virtual desktop infrastructure (VDI) models as an alternative to traditional distributed software deployment.² All client virtualization models abstract and separate the computing elements—OS, applications, user profiles, and data—from each other and from the underlying hardware. This helps make the clinical workspace and data more accessible and portable.

However, healthcare workflows are increasingly relying on such media-rich applications as medical imaging, patient education, video conferencing, and real-time collaboration between health practitioners and services. Standard VDI is insufficient to support a dynamic MPOC environment.

Intelligent desktop virtualization (IDV) technologies enable compute models that support performance, mobility, and multitasking capabilities users expect. The main distinction between IDV and VDI is in how virtual images are delivered to or executed on clients and where the most compute-intensive operations are performed—either centralized in the data center (VDI) or distributed to the endpoints (IDV).² Local applications can be run with media files redirected from the server to the client, and with centrally hosted EMR. IDV is similar

to a web service that allows viewers to access and view movies, games, or television episodes.

In a mobile healthcare environment, IDV is optimal. It offers many of the same benefits that IT departments find attractive in VDI, such as central management, but without compromising the end-user experience.

Device Model

Tablets and smartphones are readily available in the marketplace, but few are appropriate for the tasks of healthcare delivery. Physically, a mobile device has to withstand heavy use and often harsh conditions, such as splatters, spills, and even dropping (for example, emergency medical technicians on the scene of an accident, or physicians and nurses in emergency room conditions).

In addition, the device model must support capabilities needed in the workflow, such as EMR, medical imaging, rich telemetry, word processing, voice dictation and control, and video conferencing. And one size does not fit all. For example, a hospital-based physician might benefit from a device with a touch screen and an application to capture signatures. A hospital nurse might find a larger-screen device that accommodates peripherals, such as an Ultrabook™ device, more useful. If workflow use cases (see Figure 1) are not considered, the end-user experience is limited and collaboration will be compromised.

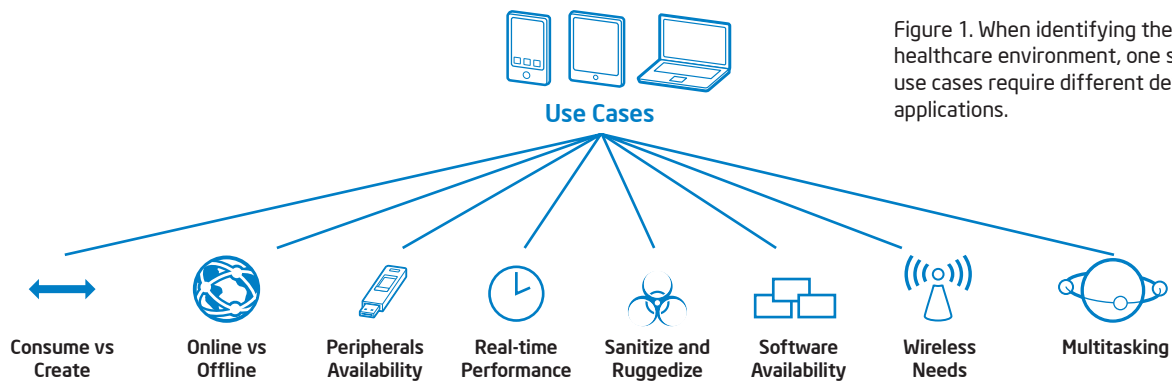


Figure 1. When identifying the best mobile device for a healthcare environment, one size does not fit all. Different use cases require different device capabilities and applications.



Device Management Model

Managing mobile devices takes special consideration in Health IT. Devices need to connect easily to the hospital or organizational network using existing applications. IT must also have the ability to easily provision devices and be able to quickly update them with application or security patches. And because IT departments are already equipped to support Windows*-based devices, Windows-based mobile tablets and smartphones can be easily integrated into IT's existing infrastructure. These capabilities are not available with most consumer-based devices.

While some consumer devices can be connected to a laptop via a USB plug to enable provisioning, this tactic is not enterprise-friendly. It doesn't scale to environments with thousands of client devices spread across multiple locations. The right device management model is one capable of operational intelligence.

End User Experience

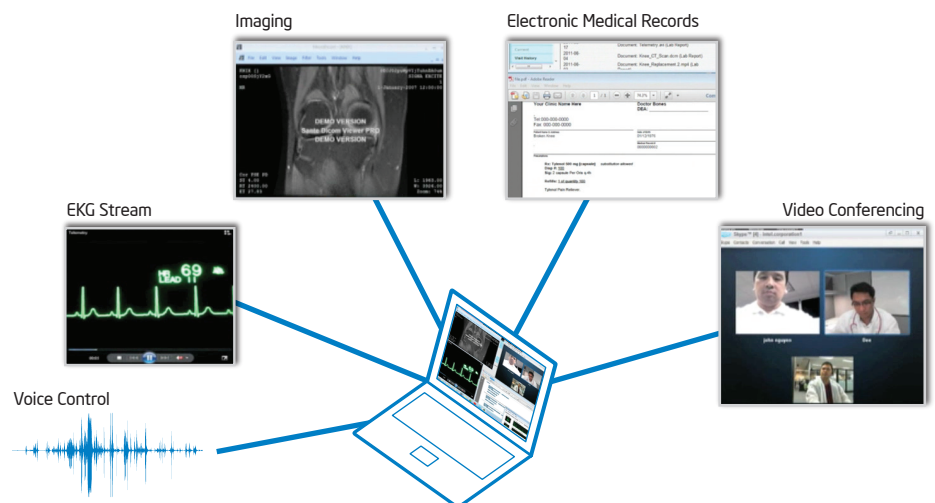
An optimal mobile user experience can improve collaboration among teams of clinicians delivering care, and better support healthcare transitions, such as during consults and discharges (see Figure 2). Two use cases illustrate these points:

A patient is scheduled for hip replacement surgery, but his EKG is not stable. The orthopedic surgeon uses a multitasking Ultrabook for a video conference consult with a cardiologist. Together, they view the EKG, surgical X-rays, and medication list in real time. They then ask the pharmacologist to join in a three-way conference and together determine that medication is the issue. A new medication regimen is ordered, and surgery is canceled until the patient's condition is stable. This reduces risk to the patient and helps ensure a positive outcome.

As previously illustrated in the patient discharge use case, workflows can be improved significantly with mobile-supported collaboration. If the discharge nurse can communicate in real time with a health practitioner in the receiving facility, such as a doctor's office or long-term care or rehabilitation facility, to review medication lists, discharge summaries, and care instructions through mobile technologies, care delivery is enhanced. This reduces the chance that the patient will be readmitted to the hospital due to someone misunderstanding the care instructions.

When applications enable a more natural human interface (such as touch and voice control), collaboration increases. And mapping applications to tasks and workflows helps achieve the goal of lower readmission rates.

Figure 2: This mobile device allows users to run multiple applications simultaneously, such as video conferencing, EMR, imaging, voice control, and document viewing. For a demonstration, watch Mobile Point of Care: Choosing Devices for Collaborative Workflows.



Security

A common misconception in IT departments is that storing data in a centralized data center reduces the need to secure endpoints. However, if security controls are not in place, users can easily move data to a personal device. A large medical university recently experienced a major data breach when unencrypted PHI was sent through unauthorized email accounts.³ It is not unusual for users to bypass policy and download private data to an unsecured laptop, or store patient contact information in a smartphone.

For mobile environments, it is important to use a multilayer approach of security protocols and practices. Consider the following policy points:

- Defend in depth:** Security policies must assess three areas of risk: administrative, technical, and physical. In the U.S., Meaningful Use standards require a technical security risk analysis to protect PHI, and to correct any found deficiencies.
- Train the organization:** Inform employees and contractors on security policies, and advise them not only on how best to follow procedures, but also the risks the organization incurs if rules are not followed. Enforce passive and active policies for data at rest, in transit, and in use.
- Encrypt data:** Wherever healthcare data resides—data center, whole disk, or endpoint—encryption adds a formidable layer of defense.
- Remote wipe:** Mitigate risk in case of a lost or stolen device by rendering it unusable until unlocked by an IT administrator.
- DLP strategy:** Detect transmitted content for any possible PHI. For example, a DLP rule can look for specific data in email, such as a social security format, and flag it or prevent it from being sent.
- Protect BYODs:** Employ MDM solutions that enforce strong passwords.

Regardless of the compute or device model, Health IT departments need to secure data in both the data center and at endpoints. Centralizing PHI and applications in the data center does not prevent data breaches associated with a lost or stolen client device.

Implementing multiple layers of security controls is a proactive approach to reduce risk at all levels.

A 21st Century Mobile Healthcare Workflow









The best combination of service delivery model, mobile device, device management model, end user experience, and security practices can transform how healthcare practitioners conduct patient care. As ACOs and similar healthcare models are adopted, improved workflows can have a significant impact on financial incentives, government reimbursements, and patient outcomes.

While many healthcare IT purchasing decisions are made in the boardroom, clinicians are the ones on the front lines using devices and software. They work in the trenches where technology touches patient care. That's why it's vital that nurses and doctors be part of the Health IT purchasing process.⁴ To achieve the goals of usability, acceptance, manageability, and security, a useful mobile technology strategy is to:

- Engage end-users early and throughout the planning process
- Define use cases, workflows, and requirements
- Jointly select the best mobile device for specific sets of tasks (see Table 1)
- Conduct a security and privacy risk analysis
- Select the best service delivery model

With IDV technologies running on devices based on the Intel® Core™ vPro™ processor family, Health IT gains performance, flexibility, centralized manageability, improved security, reduced operating cost, and support for peripherals. IDV takes advantage of a client device's CPU to execute applications locally, and new users can be added with little impact to the data center and infrastructure. With devices like Windows 8-based Ultrabooks or tablets, clinician productivity can be improved, workflows streamlined and more collaborative, and patient care enhanced. With the right mobile technology strategy, computing needs of the healthcare industry can be addressed now and into the future.

Table 1: With the Intel Mobile Point of Care Selector Tool, an organization can create several profiles that detail the needs of each user and map to optimal device models. Find the selector tool at: www.intel.com/content/www/us/en/healthcare-it/mobile-point-of-care-selector-tool.html

	RECOMMENDED DEVICE PRIMARY	SECONDARY
Hospital-based Physician	 Tablet	n/a
Office-based Physician	 Tablet	 Ultrabook
Hospital-based Nurse	 Ultrabook	 Mobile Clinical Assistant
Office-based Nurse	 Ultrabook	n/a
Allied Health Worker (PTs, OTs, etc.)	 Netbook	 Smartphone

For More Information

Visit Intel's YouTube channel for more information on Mobile Point of Care: www.youtube.com/user/channelintel

How Mobile Tools Enable Collaborative Workflows: www.youtube.com/watch?v=4iEYjFYj6t8&feature=youtu.be

Mobile Point of Care: Choosing Devices for Collaborative Workflows: www.youtube.com/watch?feature=endscreen&NR=1&v=Fh520P56wQ8

Intel Online Mobile Point of Care Selector Tool: www.intel.com/content/www/us/en/healthcare-it/mobile-point-of-care-selector-tool.html

How Cloud Computing Can Help Solve Healthcare's Looming IT Crisis: www.intel.com/content/www/us/en/healthcare-it/healthcare-cloud-computing-it-crisis-paper.html

Intel® Anti-Theft Technology: www.intel.com/content/www/us/en/architecture-and-technology/anti-theft/anti-theft-business-technology.html

Intel® Advanced Encryption Standard New Instructions (Intel® AES-NI): www.intel.com/content/www/us/en/architecture-and-technology/advanced-encryption-standard--aes-/data-protection-aes-general-technology.html



Visit intel.com for more information on service delivery models and security products.

¹ Chedekel, Lisa. August 13, 2012. High Readmission Rates Force Hospitals to Forfeit Medicare Funds. The Hartford Courant.

http://articles.courant.com/2012-08-13/health/hc-hospital-readmission-rates-20120813_1_readmissions-yale-new-haven-connecticut-hospitals

² Intel White Paper. Benefits of Intelligent Desktop Virtualization for the Healthcare Enterprise. www.intel.com/content/www/us/en/healthcare-it/benefits-of-desktop-virtualization-in-healthcare-solution-brief.html

³ Schultz, David. June 2, 2012. Medical Data Breaches Raising Alarm. The Washington Post. www.washingtonpost.com/national/health-science/medical-data-breaches-raise-alarms/2012/06/02/gJQAVPW19U_story.html

⁴ Intel video. Bringing Clinicians Into the Health IT Fold. www.youtube.com/watch?v=TBHrsw9sluM&feature=relmfu

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