BACKGROUNDER

INTEL AND MOBILE POINT-OF-CARE SOLUTIONS:
DESIGNING A REFERENCE PLATFORM FOR ENABLING BETTER PATIENT CARE AT THE BEDSIDE

Consider this scenario: A busy charge nurse in a crowded hospital unit needs to give medication to a critically ill patient. The doctor verbally orders 150,000U IM of Benzathine penicillin G, but the medication that the pharmacy delivers is for 1,500,000 IM. Is this the right medication dose?

Nurses and physicians face these types of patient safety issues constantly. More than anyone, they understand the importance of delivering the right blood type to a patient who needs a transfusion, just as they know that administering erythromycin rather than penicillin spares an allergic patient the risk of anaphylactic shock. The challenge is most acute for healthcare professionals who work on the front lines of patient care, where crisis can trump routine a hundred times in a single shift. In these environments, the workflow is often controlled chaos. One minute you're routinely taking a patient's blood pressure, and the next minute you need to drop everything and respond to a code.

For at least three decades, the healthcare industry has been trying to serve the needs of its patients and providers with technology solutions. But while most hospitals have readily deployed computing systems for back-office functions such as admissions and discharge, they've had less history employing technology to benefit the actual delivery of care. The reason: a lack of computing tools designed specifically for use in clinical settings.

Meeting the Needs of Front-Line Clinicians

Caregivers need technology solutions that help them address the "five rights" throughout the continuum of patient care. This means making sure that the right patient gets

the right medication at the right time, in the right dose and via the right route — from the time a doctor's order is created to the time that order is satisfied at the patient's bedside. Patient safety should be paramount, but technology must also properly fit into the caregiver's workflow versus requiring that the workflow change to accommodate the technology.

An assortment of mobile hardware and software products are available to clinicians today, ranging from large computers on wheels (COWs), with their automotive-size batteries and bulky carts, to more compact laptops and personal digital assistants (PDAs) that bring technology to the bedside. However, these products don't fully satisfy the healthcare community's need to enhance patient safety and improve clinician workloads.

Research has uncovered three key usage barriers to adoption of technologies by nurses and residents. First, the tools must last through an entire shift (8 hours, but typically more). Second, tools must be able to be repeatedly disinfected since clinicians move from room to room and patient to patient. A tertiary point is that the tools cannot add more steps or time to the care delivery process because caregivers are already overburdened. Tools that fail any of these points will likely end up on a shelf gathering dust.

The Promise of Mobile Point-of-Care Solutions

Mobile point-of-care solutions offer a better way to address the needs of healthcare professionals in clinical settings. Mobile point-of-care solutions can improve the quality of care by providing up-to-date information when and where it is needed. Extending secure access to medical records and patient data in emergency rooms, satellite clinics and ambulances, as well as at the typical hospital room bedside, will likely translate to fewer errors and delays, faster turnarounds, and an overall improvement in patient safety.

Technologies such as wireless networking and specially designed mobile PC solutions can extend the reach of healthcare information systems by making a consolidated view of a patient's clinical data securely available to authorized care providers — enabling more informed and immediate decisions at the point where care is delivered.

The advantages quickly become evident. In clinical settings where mobile point-of-care solutions have been put in place, nurses and physicians find that there is less margin for error, plus their documentation workload is reduced. With immediate access to accurate, up-to-date medical information, clinicians can spend less time chasing paper and duplicating

efforts, and spend more time with patients. The bottom line: patients get better care more quickly.

Studies conducted by Intel's Digital Health Group show that deploying a combination of electronic medical records (EMR) and mobile point-of-care technologies can yield workflow optimization improvements with clear benefits for patients. For example, a wireless network and mobile point-of-care system helped Alfred Hospital in Melbourne, Australia, achieve a time savings of 18 minutes per day per clinician in terms of faster decisions and access to resources. Meanwhile, at El Camino Hospital in Mountain View, Calif., a pilot implementation of a mobile point-of-care solution contributed to a thirty percent (30%) reduction in medication errors.

Defining a New Platform Technology

Since 2004, Intel has been exploring ways that new mobile technology can improve the delivery of healthcare. Based on extensive ethnographic research, hospital workflow studies and thousands of conversations with healthcare professionals worldwide, Intel concluded that nurses and doctors in clinical settings need a new type of product designed specifically for them.

Behavioral observations by social scientists led Intel to determine that, first and foremost, technology must be packaged to accommodate an "interrupt-driven" workflow if it is to be useful in a clinical environment. For example, research showed that a typical 8-hour nurse's shift consists not of eight blocks of hour-long activities, but of a series of spontaneous two- to six-minute activities — all of them urgent — repeated throughout the day.

Informed by these and other findings, Intel took a clean-sheet-of-paper approach and developed a reference design for a new mobile clinical assistant platform. Two fundamental imperatives drove its development — enable improvements in patient safety and fit them seamlessly into the clinician's workflow. Designed in collaboration with clinicians, the mobile clinical assistant platform is purpose-built to bring electronic records technology and all its associated benefits to the patient's bedside. Intel envisions its mobile point-of-care solution as a portal that gives clinicians wireless access to up-to-the-minute patient care records and enables them to document a patient's condition in real time, at the point where

decisions are made and care is delivered.

The reference design also takes the interests of hospital IT departments into account. The standards-based platform is built on mobile Intel architecture technologies, runs on a Microsoft* Windows* operating system, and supports Windows-based clinical applications. Because these same building blocks are common to existing computing environments, IT professionals are spared from having a new architectural model that they must learn to manage, maintain and secure.

Prototype and Pilot Study Demonstrate Successful Concept

Intel's proof of concept platform, which is like a clipboard in form factor, features a lightweight design (2.9 pounds) and an integrated, ergonomic handle that makes it easy for clinicians to carry and use continuously during a work shift. A rugged design makes the unit drop-and spill-tolerant, and the casing can be wiped clean with disinfectant to reduce the spread of germs as nurses and physicians move among patients. Shift-long use is made possible by enabling the user to switch to a new battery pack without shutting the unit down, much like a cordless drill or other power tool.

The prototype system also integrates three reference platform technologies that Intel considers key to safeguarding patients — a barcode scanner, a radio frequency identification (RFID) scanner and a digital camera. As barcoding becomes an increasingly common way for the healthcare industry to identify medications and patients (via wristbands), a barcode scanner becomes an indispensable tool for matching each patient with the treatment being delivered.

Similarly, RFID technology is becoming more widely used for clinical identification. Nurses can use RFID scanning to identify patients unobtrusively, as well as to verify themselves as the authorized caregivers. The camera offers clinicians an additional resource for patient charting and progress notes. For example, a picture could demonstrate definitively that a bruise shows less swelling or redness.

Prototype units based on the Intel mobile clinical assistant platform have been live-tested in a real clinical environment. Based on usability feedback from hospital staff and ethnographic evaluation, this new solution category shows every sign of satisfying the need to have a powerful clinical tool on hand during critical moments with patients. Intel is highly

encouraged by these results and is working with hardware and software vendors to develop and refine products and applications based on the reference design. First-generation products are expected to be available from Motion Computing in the first half of 2007.

Intel's Commitment: Working to Deliver Better Healthcare

Intel recognizes that its work in the healthcare industry is not about solving technology problems; it's about solving people problems. The challenge inspires Intel to pursue technology definition and product development, as well as to serve in an advisory role. A prime example is guiding hospitals through the process of deploying key technologies such as wireless networking. Intel does so by lending hospitals the design expertise of its solutions specialists, as well as by engaging the solution delivery expertise of third-party service providers.

These efforts align with the company's overall Digital Health initiative, which draws on Intel's heritage of technology innovation to help usher in improvements in the fundamental areas of healthcare quality, access and cost.

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