



White Paper  
Digital Health  
Mobile Point-of-Care  
Value Model

# Assessing the Value of Mobile Point-of-Care Solutions for Three Clinical Workflows

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# Executive Summary: Streamlining Clinical Workflow

Saint Clare’s Health System used Intel’s mobile point-of-care (MPOC) value model in a small-scale pilot to identify the business value of investing in MPOC solutions. Two clinical workflows demonstrated broad and significant value from the use of MPOC technologies: bedside charting by rounding respiratory therapists, and dictation of progress notes and other clinical documentation by a select group of physicians who were mandated to use dictation. Rehabilitation therapists had a more static workflow and did not demonstrate business value from the MPOC solution.

The optimized workflows:

- Saved 55 minutes daily per respiratory therapist, producing a 13 percent productivity increase
- Enhanced productivity for administrative staff by 12 percent and for physicians by 2 percent
- Reduced the cost of certain external dictation services by 52 percent
- Improved records compliance by 22.5 points
- Improved staff satisfaction with their tools by 20 percent

Positive impacts were also noted for quality of care.

Analysis with the MPOC value model showed that the increased productivity and reduction in dictation costs would generate significant monetary benefits. The pilot would save \$51,000 annually prior to expenses, yielding a three-year net present value (NPV) of \$103,000. Large-scale deployment would save over \$347,000 annually prior to expenses (see Table 1), yielding a three-year NPV of \$619,000. Factoring in expenses, payback would come within one year.

As a result of the pilot and the value model analysis, Saint Clare’s is moving rapidly—and with greater confidence in the benefits to be achieved—toward broader MPOC deployment.

<b>Physician productivity</b>	\$56,965
<b>Dictation expenses</b>	\$130,604
<b>Administrative productivity</b>	\$9,359
<b>Respiratory therapist productivity</b>	\$150,150
<b>TOTAL</b>	<b>\$347,078</b>

1. Net present value analysis brings forward all costs and savings, and values them in the present day, enabling comparison of projects with different time scales.

# Data-Driven Decisions to Enhance Clinical Workflows

Would mobile technologies help Saint Clare's enhance care? Would they be a sound investment? What workflows would benefit?

Saint Clare's Health System is northwest New Jersey's largest community health system. A Catholic faith-based organization, Saint Clare's provides compassionate, high-quality care through four hospitals and healthcare facilities. It is a member of Catholic Health Initiatives, a Denver-based ministry with health organizations in 19 states nationwide.

Beginning in November 2006, Saint Clare's Health System successfully deployed a broad suite of Cerner Millennium\* electronic medical records (EMRs), including 17 healthcare information technology (HIT) solutions, across all disciplines at its four New Jersey facilities. Since the initial rollout, Saint Clare's physicians and other staff have gone from pre-deployment jitters and uncertainty, to enthusiastic acceptance and growing awareness of the many ways in which HIT can improve the quality, cost, and accessibility of Saint Clare's healthcare services.

With that awareness have come frequent requests for added functionality, including easier access to digital information at the point of care. Saint Clare's had implemented wireless networking at all facilities, and provided access to digital information via stationary PCs and wireless computers on wheels (WOWs). But space and contention created ongoing headaches. Theoretically, WOWs are mobile devices, but in practice, they can be cumbersome to maneuver through crowded hospital rooms and corridors. As a result, many clinicians take handwritten notes at the bedside for later entry into the computer. This creates redundant work, introduces transcription errors, and causes delays in making information available to other members of the care team. In addition, clinicians often had to line up to access a PC, which impacted productivity and satisfaction and added further information latency.

A solution that relieved contention and offered greater mobility was clearly in order—but which workflows would benefit? Would mobile technologies actually help Saint Clare's deliver higher-quality, more cost-effective care? Would MPOC technologies be a sound investment?

Too often, such decisions are based on instinct and intuition. To take a more informed, data-driven approach, the Saint Clare's leadership team collaborated with Intel Corporation on a small-scale pilot to:

- Evaluate the use of mobile technologies in three clinical workflows.
- Identify and measure the potential business value of investing in MPOC solutions for these workflows.

# Identifying Business Value: The Intel MPOC Value Model

Investments in MPOC solutions should improve value dials such as quality of care, staff productivity, cost optimization, and staff satisfaction.

Saint Clare's used Intel's mobile point-of-care value model, a patent-pending tool designed to help healthcare organizations build a quick business case for proposed MPOC investments without having to engage a finance expert and carry out exhaustive ROI analysis. The value model can also be used to identify post-deployment benefits.

The value model is based on an approach that Intel developed to analyze its own IT investment strategies. Intel later used the model with a range of companies and organizations. More recently, clinicians and financial analysts in Intel's Digital Health Group have collaborated with healthcare leaders to adapt it to the needs of the healthcare industry. Intel offers a free, interactive tool, as well as advisory services for organizations wanting to conduct a customized analysis.

The value model starts from Intel's core belief that all IT investments must support strategic goals. Investments in mobile point-of-care technology should improve value dials such as quality of care, workflow optimization (staff productivity), cost optimization, and staff satisfaction.

As a starting point for discussion, the Intel model provides a set of key performance indicators (KPIs) for each value dial. KPIs are observable, quantifiable, operational metrics that can be used to measure meaningful changes. Additional value dials and KPIs can be established to suit institutional priorities.

To use the value model, relevant KPIs are established and a baseline of current performance is measured for each indicator. After pilot or production deployment, changes are measured against the baseline, and the monetary impact is established where possible. Even when institutions do not gather data on actual use, the discussions needed to identify hoped-for business value can be extremely fruitful in aligning IT purchases with important value drivers.

The model emphasizes quantifiable benefits for which a financial impact can be determined, while acknowledging that investments in mobile technologies can also produce many intangible and important gains. Many performance indicators can be applied to multiple value dials, but for determining financial value, each KPI is counted only once.

Respiratory therapists, physicians, and rehabilitation therapists were interviewed and observed as they went through their daily routines—with and without a technology-enabled optimized workflow.

## Pilot Overview

Saint Clare’s identified three clinical workflows as candidates for a mobile point-of-care solution:

- **Respiratory therapists.** These clinicians conduct rounds to monitor patients with pulmonary difficulties and to administer inhaler and/or respiratory medication and treatments. A mobile device might save time by enabling them to do real-time charting at the bedside.
- **Physician dictation.** Some physicians are mandated to use an external dictation service to document their care. Voice recognition software might provide a more efficient and economical alternative.
- **Rehabilitation therapists.** Rehabilitation therapists deliver physiotherapy and other care. They might be expected to see benefits similar to those of respiratory therapists.

For the pilot, one respiratory therapist and one rehabilitation therapist were equipped with an innovative mobile device called the mobile clinical assistant platform (MCA). Larger than a PDA but smaller and lighter than an ordinary tablet computer, the MCA (Figure 1.) was developed by Intel’s Digital Health Group in collaboration with clinicians to meet the unique needs of medical

professionals in acute care settings. The MCA provides a sure-grip handle for easy carrying, and a sealed case that’s designed to be easy to wipe off with disinfectant and shock-resistant if dropped. The device also has built-in capabilities that add value in clinical settings, including a microphone, digital camera, and barcode or radio frequency identification (RFID) reader.

Three physicians participated in the pilot, using Nuance\* Dragon\* NaturallySpeaking\* Medical Edition software. Due to temporary technical difficulties, they used ordinary tablets rather than the MCA. However, the dictation workflow would also be a candidate for the MCA once those difficulties are resolved.

The pilot was conducted at Saint Clare’s Hospital, Denville, New Jersey. Workshops were held to identify key performance indicators that could be affected, and to choose those for which it was feasible to collect relevant data. Table 2 summarizes the relevant values and KPIs for these workflows.

Participating physicians and therapists were interviewed and shadowed as they performed their jobs, and workflows were modified to incorporate the MPOC solution. Baseline data (the “before” workflow without MPOC technologies) was collected October 15–16, 2007. Participants were trained on the use of the device and software, and data on the MPOC-enabled workflows was collected December 10–11.



Figure 1. A Mobile Clinical Assistant

Table 2. Relevant Value Dials and Key Performance Indicators for Saint Clare’s MPOC Pilot		
Value Dials	Key Performance Indicators	Comments
Staff productivity (via workflow optimization)	Respiratory therapist time savings*	Time savings through eliminating duplicate data entry and PC contention
	Physician time savings*	Time savings on dialing the dictation service, dictating, re-dictating, clearing rejections, correcting records, etc.
	Administrative staff time savings*	Health Information Center staff saved time on dictation-related quality assurance tasks
Quality of care	Increased compliance with regulatory mandates	Avoidance of problems stemming from lack of compliance
	Reduction in time spent on administrative tasks	Ability to spend more time on clinical care
	Reduced length of stay	Potential ability to improve clinical decision making, leading to earlier patient discharge through faster information availability
Cost optimization	Reduction in costs for dictation services*	Avoidance of costs for dictation services
	Increases in charge capture	Improvements enabled by real-time documentation
Patient/staff satisfaction	Increases in patient and staff satisfaction	Improvements in the quality and efficiency of care can enhance staff satisfaction and potentially increase staff retention.  Patients generally report greater feelings of satisfaction as clinicians spend more time at the bedside.

\*These indicators were measured and used to determine the solution’s business value.

# Pilot Impact

The optimized workflow saved respiratory therapists 55 minutes per day per therapist by eliminating duplicate tasks. The increased productivity delivered a daily financial impact of \$83 per therapist.

## Respiratory Therapy Workflow

Respiratory therapists (RTs) have a highly mobile workflow, and they achieved huge gains in business value from the mobile point-of-care solution. These therapists conduct patient visits throughout the day, monitoring patients, reading and charting data from clinical equipment, and performing and documenting respiratory treatments. The rooms of pulmonary patients are often crowded with clinical equipment, so rather than maneuvering a PC cart to the bedside, RTs in the pre-pilot workflow made notes on paper and entered them into a PC later.

With the MPOC solution, therapists used the MCA to chart at the bedside (Figure 2). This

technology-enabled change allowed RTs to eliminate duplicate data entry and avoid the need to search for a free PC. The time savings for any given patient visit were small, but because RTs see numerous patients, the productivity gains had large multiplier effects. Observations showed that eliminating duplicate data entry saved an impressive 55 minutes per therapist per shift.

In addition to saving time and steps, the optimized workflow meant that status information was entered into the EMR system sooner. By making the data immediately available, the MPOC solution thus enabled more informed decision making.

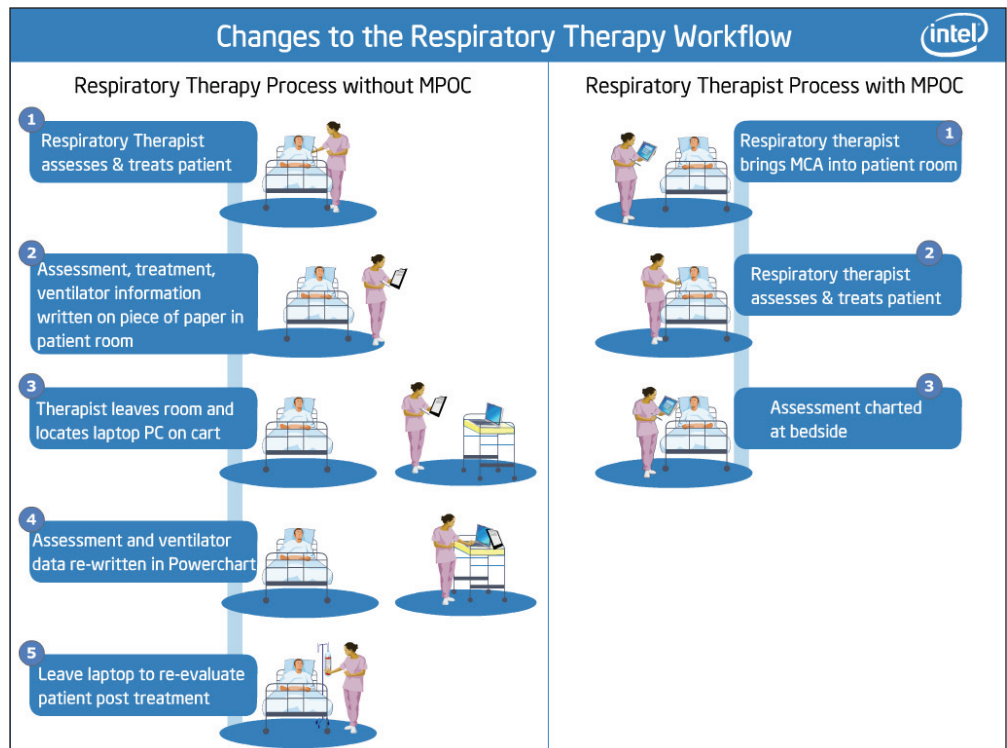


Figure 2. Changes to the Respiratory Therapy Workflow

The MPOC solution reduced dictation costs and provided significant productivity gains for the administrative staff managing patient records. Physicians achieved a modest productivity gain that should increase as the environment becomes more fully electronic.

### Physician Dictation Workflow

Saint Clare's has system wide dictation expenses of over \$600,000, with the Denville facility accounting for more than \$300,000. A portion of that cost comes from physicians who, for legibility reasons, are mandated to dictate their patient notes, including discharge summaries, progress notes, and consultation notes.

In the pre-pilot workflow, these physicians captured notes on paper or in memory as they conducted rounds, returning to phones at the nurses' station to call into an external dictation service. The hospital paid a premium for two-hour turnaround, and the transcribed notes were generally returned well within the two-hour limit. Often, however, there were significant gaps in the information.

With the MPOC solution, physicians dictated their notes directly into voice recognition software on a laptop PC. This change created business value in a variety of ways.

### Physician Productivity

Physician benefits came from time savings enabled by mobility gains, as well as from the use of the mobile devices rather than the dictation service for dictation. Using a laptop PC, physicians could dictate their notes anywhere—they didn't have to return to the nurse's station to conduct their dictation.

In reality, since many Saint Clare's processes are still paper-based, physicians still returned to the nurse's station for other tasks, so this productivity gain was a modest but significant 2 percent. Physician productivity savings are expected to grow as more processes become fully electronic. Meanwhile, the laptops gave physicians the freedom to input data and view patient record details in the cafeteria, doctor's lounge, or other locations in and outside of the hospital.

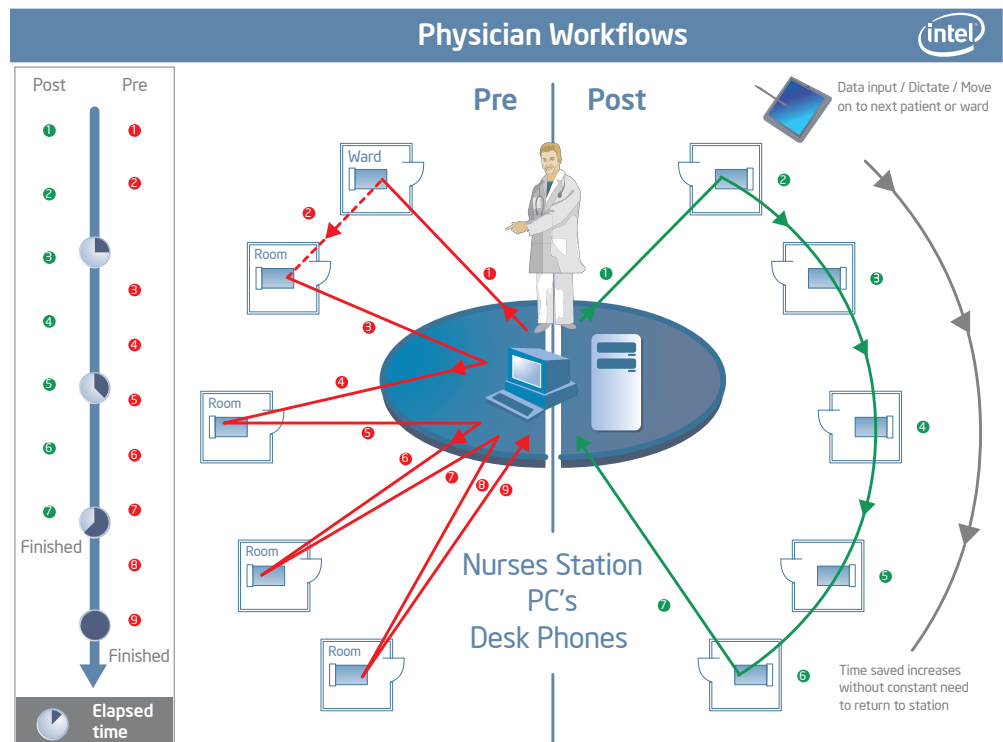


Figure 3. Changes to the Physician Dictation Workflow

**Quality of Care**

The MPOC solution had several indirect impacts on clinical outcomes. The productivity savings enabled physicians to increase the time spent on clinical tasks. The ability to document progress notes immediately, rather than relying on memory and handwritten notes, can also improve the quality and timeliness of clinical information, which in turn can indirectly affect quality of care.

In some cases, dictation transcribers were not able to capture all data spoken by physicians. This produced “blanks” in the transcription where speech was not clearly understood. Saint Clare’s physicians reported that they were impressed with the quality of medical language data

captured by the Nuance Dragon medical dictionary. In addition, physicians could monitor the transcription as it took place and immediately repeat words or phrases that were not captured correctly. This increased the overall quality of clinical data.

Compliance with Joint Commission guidelines is an indicator of high-quality care. Lack of compliance can have clear cost implications, as well as influence a hospital’s prestige and reputation. The voice recognition solution on mobile technologies improved the ability of Saint Clare’s to conform to Joint Commission guidelines on dictation by an average of 22 points (Table 3).

Table 3. Change in Regulatory Compliance			
Compliance Aspect	Pre-Pilot	Pilot	Improvement
Unapproved abbreviations	99%	100%	1%
Date/time entry recorded	83%	100%	17%
Corrections made as needed	29%	100%	61%
Progress note legibility	89%	100%	11%

**Administrative Staff Productivity**

Administrative personnel in Saint Clare’s Health Information Center (HIC) are responsible for managing patient records and ensuring compliance with Joint Commission guidelines. This includes verifying patient numbers, clearing rejected dictations, and obtaining time stamps and physician signatures if those are required but were not provided.

The MPOC-enabled dictation solution enhanced HIC staff productivity 1 percent in the pilot as a result of the higher quality of data and a reduction in rework. This figure would scale to a very significant 12 percent on large-scale deployment.

**Cost Optimization**

Pilot results indicated a drop in dictation expenses of 4 percent from the use of the mobile solution, rising to 52 percent on large-scale deployment.

**Rehabilitation Therapist Workflow**

The rehabilitation therapists’ experience in the

pilot reinforced the importance of matching the technology to the workflow. Rehabilitation therapists loved the MCA, but their workflow is relatively static and did not in fact benefit from the use of an MPOC solution.

In contrast to respiratory therapists, who conduct rounds and see large numbers of patients, rehabilitation therapists see patients in the therapists’ rooms for treatment, and they see fewer patients in a day. In addition, rehabilitation therapists do not administer medications, so there is less risk from delays in charting. Since so much of rehabilitation therapy is hands-on, therapists tended to put the MCA aside while they interacted with patients, thus losing the benefits of a device that enabled face-to-face conversation and charting.

In short, the MPOC solution produced minimal changes in the rehabilitation workflow and had little impact on the business value dials. The impact of these changes was not formally analyzed or included in the analysis.

# Business Value Summary

The pilot team used the Intel mobile point-of-care value model to determine the solution’s business value based on four key performance indicators: productivity increases for respiratory therapists, physicians, and Health Information Center staff; and cost optimization on the dictation service. Based on the pilot results, the pilot team extrapolated the results of full-scale deployment. Figure 4 summarizes the identified business value.

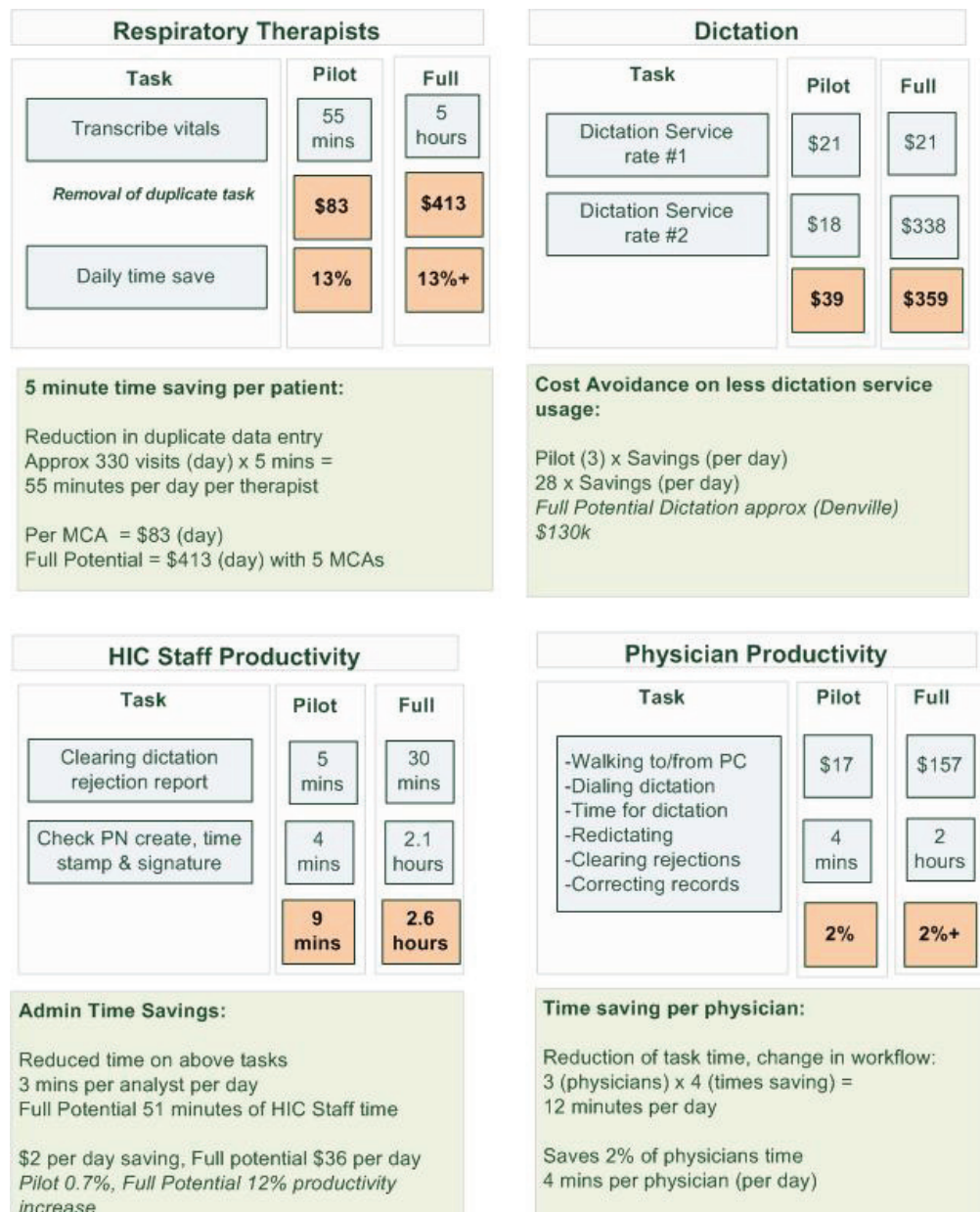


Figure 4. Business Value Summary

Net present value analysis showed a value of \$57,000 without dictation and nearly \$103,000 with dictation. NPV for the large-scale deployment was nearly \$619,000. (See Table 4.) Net present value analysis was used because it can account for recurring maintenance and support costs as well as the initial investment. NPV analysis brings

forward all costs and savings and values them in the present day, enabling comparison between projects of different time scales. The analysis used a 12 percent hurdle rate (minimum rate of return) over a three-year period, and all productivity savings were cut in half to guard against overstating the expected benefits.

Table 4. Net Present Value Analysis				
Scenario	Annual Gross Benefit	Initial Investment	Average Annual Ongoing Expense	3-Year Net Present Value
Pilot—no dictation	\$30,030	\$8,394	\$5,516	\$57,013
Pilot with dictation	\$50,802	\$11,379	\$5,516	\$102,722
Large-scale deployment	\$347,078	\$114,440	\$79,263	\$618,800

## Further Gains

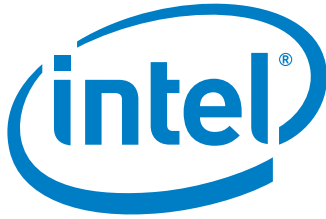
Saint Clare's Health System is moving forward with MCA and MPOC deployment, and expects to gain significant economies of scale and additional business value as larger numbers of staff adopt MPOC solutions, and more core processes are brought into the digital environment. For example, lack of information often prevents physicians from discharging patients and leads to longer than necessary patient stays. As more physicians use electronic charting and/or voice recognition software, they'll have more accurate, timelier information that may improve discharge and average length of stay, and enhance both patient throughput and quality of care.

Respiratory therapists are excited about using the MCA in production deployment and are working with IT leaders at Saint Clare's to incorporate it more fully into their workflow. The MCA has a built-in Bluetooth\* wireless interface that, along with appropriate software, enables automated reading from diagnostic bedside equipment, further improving workflow and data accuracy. Also of benefit are the use of the MCA's barcoding and RFID reading capability to reduce errors and increase efficiencies in patient identification and medication delivery.

Saint Clare's IT department is being inundated with requests from other groups that see benefits from incorporating the mobile clinical assistant into their workflows. Wound care specialists want to use the MCA and its built-in

digital camera to enhance their mobile workflow and improve the charting of wound progression. Admissions staff expect the MCA to help them focus on the patient during the intake interview; they can also use the MCA to take digital photographs for easier patient identification and fraud reduction. Many nurses who now use laptops or WOWs are interested in using the MCA, particularly for workflows where charting is primarily menu-based rather than narrative.

In all cases, the experiences Saint Clare's has gained through piloting the MCA and using Intel's MPOC value model will enable it to proceed with greater understanding of the business value of MPOC solutions and greater insights into how to achieve that value.



## Learn More

Intel delivers research-based innovation for health and healthcare. Informed by nearly a decade of ethnographic studies, Intel develops new health technologies and collaborates with healthcare professionals to enable seamless interaction and high-quality information exchange throughout the healthcare system.

Learn more about Intel in Healthcare. Talk to your Intel Digital Health representative, or visit us at <http://www.intel.com/healthcare/>.

For more about the Intel Healthcare IT Value Model, download the paper, *The Value of Healthcare IT*, [http://www.intel.com/healthcare/hit/providers/hit\\_value\\_model\\_whitepaper.pdf](http://www.intel.com/healthcare/hit/providers/hit_value_model_whitepaper.pdf).

For more about the business value of IT, see the whitepaper, *Measuring IT Success at the Bottom Line* at <http://www.intel.com/it/pdf/measuring-it-success-at-the-bottom-line.pdf> and David Sward's *Measuring the Business Value of Information Technology* (Intel Press, 2006, [http://www.intel.com/intelpress/sum\\_bvm.htm](http://www.intel.com/intelpress/sum_bvm.htm)).



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## Saint Clare's Health System

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