

# IT Integration in the OR

## A CASE STUDY FOR IMPROVED EFFICIENCY AND QUALITY OF PATIENT CARE

By  
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Image courtesy of Beaufort Memorial Hospital

OR Nurse at Beaufort Memorial Hospital using the Pyxis ProcedureStation system with ORIS Integration.

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aced with increasing demands from the public and private purchasers and payers of healthcare, clinician and administrative leaders in hospital organizations are moving forward to address issues of operational efficiency, clinician workflow, patient safety, and care quality.

Not surprisingly, leaders at some hospitals are beginning to focus on operating room (OR) and perioperative care areas that account for both a very large percentage of most hospitals' operating revenues and a large percentage of most hospitals' supply costs. Meanwhile, issues around charge capture, supply chain management, medical device and supply standardization, physician and nurse staffing efficiency, and patient safety are coming to the forefront in the OR. What's more, the lack of interoperability between systems for supply management and for clinical documentation in the OR continues to pose a significant barrier to process optimization nationwide.

One hospital that is moving quickly to create an environment of improved efficiency, cost structure and patient safety is Beaufort Memorial Hospital, a 197-bed community hospital in Beaufort, South Carolina—a city of approximately 12,000 located in South Carolina's low country, about halfway between Charleston, South Carolina, and Savannah, Georgia.

Beaufort Memorial has for some time been progressive in its use of information technology. The hospital was named one of the "Most Wired" hospitals in the small and rural category, by *Hospitals & Health Networks* magazine for the sixth time in 2008. That award recognizes the exceptional use of information technology to address five key areas: safety and quality, customer service, business processes, workforce and public health and safety.

Clinician and administrative leaders at Beaufort Memorial have experienced a first-ever technology breakthrough for operational improvement—a bridge between two processes with disparate supporting information systems: the OR supply automation/utilization system and the OR clinical documentation system. As the first hospital in the United States to implement the ORIS integration solution, which creates interoper-

ability between the hospital's supply dispensing solution (Pyxis® ProcedureStation™ system with ORIS integration) and its OR information management system (Picis® OR Manager), Beaufort Memorial has seen significant progress in a number of areas. After intensive work across a range of functional areas, working groups at Beaufort Memorial can report a variety of measures of performance improvement in the 60 days following go-live. Some of the key performance indicators measured pre- and post-integration reveal the following:

- 62% reduction in overall process time (the amount of time it takes for a supply item to be obtained or dispensed and documented in the OR clinical record) from a year ago, down from 42 minutes to 18 minutes.
- 33% reduction in implant documentation time (the amount of time for a clinician to document the supplies, implants, and staff time required for a surgical procedure), down from 39 to 26 minutes per case.
- An average reduction of 10.9 minutes per implant case in the amount of time spent by nurses charting implant and supply usage in the OR.
- 50% reduction in the time required for back-end reconciliation of items used in surgical procedures, from 40 minutes to 20 minutes.
- An initial substantial improvement in the timeliness and efficiency of charge capture in materials management.

Each of these metrics speaks to a different aspect of improving efficiency and clinician workflow, therefore helping to improve the quality of patient care in the OR. For example, reducing by just 10.9 minutes per case the amount of time nurses spend charting implant and supply usage in the OR means that they have more time to spend with the patient. With some 6,000 surgical procedures performed at Beaufort Memorial each year, this equates to a total savings of over 1,000 clinician hours annually. The 62% reduction in overall process time also frees up nurses to spend more time with patients or discuss patient cases with fellow clinicians.

This metric also speaks to a shift toward the optimization of supply management processes by integrating revenue cycle management with the perioperative supply chain, which is the largest hospital cost center next to labor, accounting for 15 cents of every hospital dollar spent. The reduction in back-end reconciliation that has been achieved at Beaufort Memorial means that OR staff are spending far less time tracking items down, uncovering ordering and use discrepancies, and resolving discrepancies that can impact reimbursement. Most importantly, it is the

combination of this information technology integration with work flow process improvement that has led to these breakthroughs at Beaufort.

### **A Multidisciplinary Approach, Over Time**

So how have all these performance improvements (which the Beaufort Memorial team continues to optimize) come about? All the improvements made to-date have emerged out of a concerted, multidisciplinary team-driven effort over the past 2 years.

The OR management team at Beaufort Memorial began a comprehensive process of assessing and optimizing its operations back in early 2007. Working closely with CareFusion (formerly Cardinal Health) who integrated the automated supply dispensing unit with the OR information management system, Beaufort Memorial's OR management team saw several opportunities to create new efficiencies once the two systems were successfully integrated.

"In the OR, we move very quickly; so anything that takes you away from the patient focus feels like a distraction, even though the documentation is clearly necessary," says Marylee Riggio, RN, Beaufort Memorial's director of surgical services. "Initially when the hospital implemented the OR information management system, the surgeons and the anesthesiologists

## **THE VALUE OF VALUE STREAM MAPPING**

The initiative that has driven the successful ORIS integration project at Beaufort Memorial Hospital in Beaufort, South Carolina, has required intensive workflow process optimization—as well as intensive software development. One major element of this has been the involvement of the Beaufort clinicians, IT professionals, and materials managers in an ongoing value stream mapping process.

Value stream mapping is a process commonly used in conjunction with Lean management, and has widely been applied to manufacturing (most notably on automotive assembly lines) and service industries, including the supply chain arena. It is now increasingly being applied to healthcare.

Essentially, in value stream mapping, a work team identifies the core product or service (the Value Stream) and draws a current-state value stream map showing the precise steps in the current process—including time estimates to complete each step and information flows required to deliver that product or service. After the team has assessed the current-state map for opportunities to eliminate waste, redundancies and reduce delays, the team then creates a future-state value stream map eliminating inefficiencies and begins to implement that future state by redesigning workflow processes.

In the case of the OR supply chain and documentation process at Beaufort Memorial, Value Stream Mapping uncovered numerous challenges and obstacles. One area that the team spent a fair amount of time on was the implant utilization and documentation process. Among the key areas that have been addressed have been the optimization of preference card management, the optimization of barcoding processes, the flow of data from the Pyxis ProcedureStation system to Picis OR Manager, the optimization of the processes around the use of surgical implants, and the amount of rework uncovered due to delays in identifying and documenting implant use in the electronic record.

were concerned about electronic documentation taking nurses' attention away from the immediate demands of patient care and working with the physicians in the OR. It was a process just begging to be streamlined, especially in terms of waste," Riggio says. "There's so much running around in the OR." And, she quickly adds, "The whole situation also speaks directly to patient safety considerations."

What's more, says Andrea Zeman, RN, CNOR, Beaufort Memorial's surgical services staff development manager and former team leader of the ORIS project, the implementation of the integration project "is saving time for the team in the OR. While the room is getting turned over for the next scheduled surgery, the system is helping us save time in closing out the billing for the outgoing case. In short, we can get out of the room faster, achieve a lower level of OR supply returns and, ultimately, achieve greater throughput in terms of the volume of surgeries per day." If even one additional surgery per day can be added, she notes, "The effect on the hospital's bottom line is improved."

Those involved in the Beaufort Memorial initiative agree that this is a situation where efforts to improve efficiency, supply cost-optimization, the streamlining of workflow, and to help improve patient care all dovetailed perfectly. But to achieve success, this initiative required a very strong multidisciplinary, multidepartmental effort; an effort that came to involve clinicians and administrative staff from the OR, IT, materials management, and the incumbent vendors, CareFusion and Picis.

### Initial Goals for the OR Facilitated by the Integration Project

Prior to the "go live" of the ORIS integration project, Beaufort Memorial identified four key areas for improvement:

- Optimization of the overall supply process.
- Reduction in nurses' documentation time.
- Elimination of supply identification errors.
- Optimization of the surgeon preference card system.

Documentation efforts with surgeon preference cards and case-costing are a perfect example of where many of the challenges lie for hospital organizations. Kathryn Charles, an information systems analyst for the hospital, who has been involved in the project since its inception, notes that prior to the ORIS integration project, "I had recommended the move to Picis OR Manager so that this integration could take place." Before Picis OR Manager was implemented, Charles notes, case-costing (determining the total cost of a surgical case) had been complicated, difficult, and time-consuming.

"From the preference card worksheet, I would export the list of supplies and quantities needed to an Excel spreadsheet. Then I would look up each supply item in the materials management information system in order to get a unit cost," she recalls.

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"Then I would update the spreadsheet with the cost information, calculate the extended costs per item, and total cost for the case, based on the supplies *expected* to be used."

The challenge in working within this cumbersome, manual system, she notes, is that "it didn't take into account all the variations possible." In other words, Charles says, the potential number of specific cost variables that might be used to help decipher any set of case costs was daunting. Because of this, she says, using data on specific case costs to build a broader picture of costing trends and issues was a cumbersome and complicated process. For an average hip replacement, for example, the case-costing process required 3 to 4 hours and would involve multiple data-pulls and data-analysis tasks. Case-costing of implants were particularly burdensome involving the examination of data from multiple sources, including materials management. This was all challenging even for Charles, whose professional training was in accounting. And the bottom line for Charles was that she was spending many hours every week on case-costing, a necessary but exceptionally complicated set of tasks that cried out for automation.

Now, with the ORIS integration mechanism in place, Charles anticipates that she will be able to run a variety of reports on any particular procedure, and the process should be nearly automatic.

On the nursing documentation side, Zeman notes that a great deal of work had to take place with regard to the surgeon preference card system in order to lay the groundwork for the process optimization that the ORIS integration could provide.

In fact, Zeman sat down with other members of a team that analyzed initial-state workflow for nurses in the OR. One important aspect of that work involved looking at the existing preference card system, and working towards greater standardization of vocabulary in that area. She and her group of OR professionals working on the preference card issue—essentially a preference card committee—met with Beaufort Memorial's IT professionals to create a standardized approach to vocabulary. "For example," she says, "we had the item 'hernia repair: ventral' in the system; but it was all over the place in terms of naming." So Zeman and her team developed naming protocols. Then they went to work on the preference cards themselves, and worked on the process of developing a fully electronic set of preference cards. "What we did," she explains, "was to build a new electronic preference card, eliminating the old cards, so the case would be pulled correctly."

Zeman sees multiple benefits from the system. In addition to the very significant efficiency gains made in standardizing preference card vocabulary and the preference card system, the time savings based on the automation, barcoding, and ORIS

integration are very meaningful, she says. “I’m probably saving 10 minutes per case, based on scanning items in the system,” she reports. “It’s so quick and easy. And one thing that made it very easy is that the OR information management system provides default settings that can be applied to individual physicians’ cases. If I know that Dr. X does this type of case the same way every single time—the same positioning, dressings, prep, for example—I can save a huge amount of time.” The case default option, made possible by extensive protocol development on the part of the OR staff and the leveraging of the ORIS integration, has been responsible for this breakthrough. Not only can nurses significantly improve their efficiency in case preparation, Zeman notes, they will simultaneously be saving time in ordering supplies for those cases with standardized preparation protocols, creating a double time savings.

### Gains in Materials Management Efficiency

The power inherent in the integration of systems has become clear not only to the OR staff, but to Beaufort Memorial’s materials management professionals as well. The interaction between OR nursing and materials management is a critical link in the supply chain optimization process at Beaufort Memorial.

Indeed, the relevance of that connection can be attested to by Donna Armstrong, assistant director of the materials management department. Armstrong is acutely aware of the long-term evolution of processes that have created improvements over time. “When I first started at the hospital 10 years ago,” she notes, “everything was 100% manual, and everything was written down in notebooks and on pieces of paper.” Then, 8 years ago, the hospital went live with the OR information management system, taking a major step forward in process optimization.

Still the hospital, like virtually all hospital organizations nationwide, continued to face cost challenges prior to the ORIS integration initiative. For example, before the integration initiative optimized the tracking of surgical supply use, it was necessary for materials managers to go through complicated retroactive work in order to fully track actual supply usage. As Armstrong puts it simply, “Now, it is easier for the OR nurses to push a button” in the Pyxis ProcedureStation system “than to pull a sticker [for an item], and have to carry a piece of paper around all day long. To me, the new lot and serial tracking process is similar to scanning a barcode” and much quicker than the old system.” Inevitably, she notes, some items are pulled from the dispensing system and then if they are not used, these items must then be tracked later in order to optimize charge capture.

Manufacturers’ requirements differ tremendously, but what is important to know is that the system for linking lot and serial tracking numbers to surgical supply items is now more complete and comprehensive. This means that, along with the use of bar-coding on all surgical supply items, it has become far

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easier and less time-consuming for materials management professionals to prepare items for return to manufacturers whenever needed.

Furthermore, past inaccuracies created by OR staff members—who might have entered an incorrect surgical supply item into the system when that item was either used or reshelved—are now far less likely to occur, as the addition of a supply automation system on top of the ORIS integration provides a notification if a nurse scans an incorrect item when using or reshelving that item. While the barcoding-based verification at the point of use only went live early this spring, Armstrong says she is convinced that this added innovation will add further verifications into the system—further reducing the need for materials managers to investigate supply use discrepancies. “The integration is now driving this,” she notes. “It’s forcing us to scan everything,” dramatically decreasing inaccuracies in the system.

Of course, it is in the dovetailing of processes and intelligent IT deployment that the greatest gains can be made. Armstrong and her colleagues already do monthly inventory of all the Pyxis supply technologies in the OR, with the items of most concern being inventoried weekly. The resulting decrease in inaccuracies in surgical supply use documentation is significant, she says.

The potential for such gains is obvious to David Kelley, the patient charge specialist for Beaufort Memorial’s OR. Kelley’s job centers around optimization of charge capture for surgical cases; as at any hospital that performs surgeries, optimizing charge capture is of major importance in an increasingly challenging reimbursement climate in which both public and private payers are increasing their documentation demands on hospitals. Discrepancies over correct charging to the correct accounts typically crop up at the time of refilling in the dispensing system, Kelley notes. “With the new integration,” he says, “there’s less paperwork. It’s helped a lot.” In fact, he notes, the expanded automation makes it more difficult for nurses to make utilization documentation errors.

What’s more, the ORIS integration has made it possible for Kelley to view any discrepancies or problems nearly in real-time, versus weeks later as it was with the old system. All the relevant data is also now in front of him in one central database. The resulting time-savings is very significant, he notes. With ORIS integration, whenever the use of a supply is logged into the Pyxis ProcedureStation system, it is now automatically entered into Picis OR Manager, as well. As for the implants, he notes, “Now, any implants in the Pyxis ProcedureStation system need only to be scanned in, in order to appear in Picis OR

Manager,” whereas in the older, pre-integrated world, the nurse needed to type in a lot and serial number for each implant being used.

### Multiple Benefits

All the above innovations speak to advances in multiple areas, namely:

- Clinical efficiency.
- Quality of care.
- Documentation error reduction.
- Nursing satisfaction, with broader staffing implications.
- Integration of materials and revenue cycle management.

As articulated above, those involved in the ORIS implementation initiative believe that clinical efficiency has been dramatically improved.

“This integration is terrific,” says Riggio. “Everyone should do this. The bottom line is that because of ORIS integration, nurses in the OR can do their jobs more effectively, more efficiently and with more accurate documentation. That means they become more efficient at their jobs, they save time, and ultimately, they can spend more time at the patient bedside. And there is definitely a patient safety aspect because of all the checks against incorrect documentation.”

What’s more, she says, “There will always be a nursing shortage and anything, such as this, that allows the nurse to spend more time at the bedside is helpful in that respect.”

At the executive nurse level, such benefits are quite clear says Karen Carroll, RN, chief nursing officer and vice president, patient care services at Beaufort Memorial. “From the pure patient care standpoint, this innovation is putting the nurse at the bedside where she or he belongs—and relieving the nurse of some of those additional burdens of having to be a de facto biller, coder, and materials manager.” What’s more, says Carroll, “This initiative is helping give us a clear idea of what a surgical case costs us—and that’s something that’s excruciatingly difficult to figure out right now.” Carroll relates a recent situation involving a dentist affiliated with the hospital who wanted to determine a per-case cost for a dental procedure he had been performing regularly at the facility. And it was essentially impossible, she notes. Going forward with the help of projects like ORIS integration, case-costing will be fast and readily available, she notes.

Furthermore, Carroll says, the impact of the ORIS integration on nurse staffing could be meaningful. For one thing, she points out; staffing the OR with regard to nursing is always a challenge. “In the OR, the consistency [of nurse staff quality] is extremely important in terms of team performance in surgery. It’s what makes everyone in the OR have a good day or a bad day. And the surgeons are very demanding of consistency in terms of the quality of support they get from the nurses. In order to get that consistency, we need to

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retain our OR nurses long-term. To achieve that, we need to provide them with job satisfaction. By providing powerful information technology tools to help them do their jobs better absolutely improves the kind of job satisfaction that keeps nurses here,” she says. In fact, Carroll notes, nurses from across the region have become aware that Beaufort Memorial is a technology-progressive hospital that provides an excellent working environment for nurses. This focus on automation has helped in both the recruitment and retention of OR nurses.

What’s more, patients are increasingly aware of the technology environment of the region’s hospitals. “When we did our recent patient loyalty survey, asking all of our patients and employees about our technology, they were very positive,” Carroll notes. “They see us as a current and progressive hospital, partly based on our embrace of up-to-date technology.”

### Conclusions

Those involved in the ORIS integration project at Beaufort Memorial agree that what has been achieved so far involves significant advances in the following areas:

- Improvement in the OR preparation and supply utilization and management processes.
- Improvement in OR nurse and clinician workflow.
- Optimization of the surgeon preference card system, a key element in OR operations.
- Optimization of documentation processes in the OR.
- Enhancement of OR charge-capture and materials management processes leading to the integration of materials and revenue cycle management.
- Overall improvement in OR operations.

As the implementation continues to mature over time, Beaufort Memorial clinicians and staff expect to further optimize their OR and associated processes. And they plan to continue to leverage gains from the system to make the OR and surgical patient care even more efficient, effective, and of higher care quality. Being the first to demonstrate this kind of supply management/OR information management integration means that new opportunities for improvement should continue to emerge over time—at a hospital organization that remains committed to process and information technology innovation. **IPSQH**

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