BY BRITA BELLI

How healthcare systems are using tech tools to make ORs more efficient

Most hospitals agree that they can better harness the data they are collecting from registration through discharge in order to streamline patient turnovers, reduce wait times, and improve patient and staff satisfaction, but there is still uncertainty about how best to turn massive quantities of data into better patient outcomes.

Now, hospital systems are increasingly turning to "healthtech" startups to implement new systems that can be seamlessly integrated into their existing operations. And many are finding that rather than requiring added training, or creating new burdens for staff, these tech innovations are pulling from existing data—and video streams—and providing information to staff via screens and cellphones in real-time so they can better focus on patient care.

If solutions are not intuitive, says Jane Kuhn, MSN, RN, CNOR(E), NEA-BC, consulting editor at OR Manager, they are not going to work. "These are very hard systems to change," Kuhn says. "A hospital is made up of many people with many different belief systems, with varied backgrounds and educations."

Jane Kuhn, MSN, RN, CNOR(E), NEA-BC

And, adds Kuhn, a hospital's primary priority is its patients, whose immediate needs can fluctuate for any number of reasons. So, while addressing delayed start times is important, she says, it can never be the highest priority in an OR. "We can aim to improve on-time start from 35% to 85%, but we can't expect 100%," she says. "There are too many variables. The patient is late. The patient needed extra reassurance."

Thomas Feo, CEO and cofounder of Healthcare Control Systems (HCS), says the unpredictability of patient care and constant disruptions—from unexpected case cancellations to sudden influxes of patients—is what makes a whole-system approach necessary when implementing new tech-driven efficiency measures.

HCS provides an automated coordination system called ORControl that manages the movement of patients, physicians, staff, and equipment in real time, allowing hospitals to improve start times, increase procedures, and reduce overtime. Tablets in each OR, cell phones of key stakeholders, touchscreens throughout the facility, and staff workstations simultaneously display information from a wide variety of existing data sources allowing healthcare workers to make adjustments on the fly.

Thomas Feo

The system draws data not just from the electronic health record (EHR), but all procedural areas and out-of-departments, says Feo, a computer engineer who first designed facility-wide coordination systems for the manufacturing industry in the 1980s, and later for the transportation Industry. The ORControl System coordinates catheter/epidural, endocrinology, gastroenterology, anesthesia, surgery, and sterile processing—over 20 departments and groups in all. "If it's a real control system, it has to coordinate a very wide scope," he says.

The data feeds are immediately clear and actionable. For example, staff are alerted when a patient is wheeled in, how long the case is expected to last, when the room is ready to be cleaned, and when the patient is expected in the PACU. The alerts (over 50 in all) can be manually turned on and off as needed.

> **ORs should maintain separate patient flows for elective and emergency procedures.**

Whether it is a hospital, factory, or transportation center, say Feo, there will always be last-minute disruptions that must be immediately addressed by frontline personnel. "Our largest hospital has 83 ORs. Imagine the logistics of getting even 70 cases off at exactly 7am. On top of that, no matter how good your scheduling or planning system, or your process improvement consultants, or your AI forecasts, staff still has to deal with constant last minute exceptions. That is why an automated minute-by-minute coordination system is so loved by frontline staff. If a procedure gets canceled, the system can seamlessly put another case and team in that room."

ORControl is deployed in healthcare systems across the US and Europe, including the top four systems in the U.S. Benefits documented by these medical centers range from 95% on-time first starts to 50% reduction in room turn times, including a 35% increase in case volumes during prime time.

Why efficiency matters

"Patient flow" describes the way patients move through a healthcare facility, and it has a lot of components – including care, resources, and systems needed to properly process and treat them. Improving patient flow not only improves the hospital's efficiency, and allows healthcare systems to handle more cases and improve revenue, but it also directly impacts patient health and wellbeing.

A report in NEJM Catalyst found that poor patient flow is associated with increased readmittance and even higher mortality rates. In one study of Ottawa Hospital between 2012 and 2014, researchers looked at over 15,000 non-

Streamlining minimally invasive surgeries

Artificial intelligence and robotics are playing an important role in the surgical suite, providing both clinical insights and guiding surgical tools during procedures such as minimally invasive lumbar fusion surgeries. These tools provide accuracy and precision over manual surgeries, including 3D imaging and the ability to place screws with microlevel precision.

The startup Kaliber has developed an AI-powered surgical toolkit that includes preoperative communication tools; surgical assistance, feedback and analytics in the OR, a personalized post-op report with AI-labeled surgical imaging and videos that patients can refer to when communicating with their surgical team and physical therapist; and shareable intraoperative imaging and videos that physical therapists can use as they develop and adjust their patients' rehabilitation protocols.

The Mazor X robotic surgical system provides surgeons with 3D software to pre-plan spine surgeries and guides the surgeon's tools following a blueprint that allows them to safely and accurately place implants. The software's sophisticated visualization capacity means less risk of exposure to radiation, fewer complications, less pain, and reduced need for repeat surgeries.

Intuitive's da Vinci platforms have been part of minimally invasive surgeries in the OR for over 21 years. The system involves a surgeon's console which guides the robotic parts and a cart with three to four robotic arms that can operate as surgical instruments such as scalpels and graspers. There are also 3D cameras. Da Vinci's software gives on-screen notifications to guide surgeons through procedures as well as analytics and training opportunities.

Asensus Surgical uses data to drive a laparoscopic AI robot that relays information like tissue size to surgeons. Now the company has taken feedback received from over 10,000 digital laparoscopic procedures to create its next generation digital surgery platform, the LUNA Surgical System. The system involves advanced minimally invasive instrumentation, a digital interface between the surgeon and the console, and clinical intelligence tools.

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specialist for Thomas Jefferson University Hospitals. "Once you analyze data you realize it's a cumulation of steps along the way."

Stephen Kucinski

Kucinski began as a supervisor in the hospital's Department of Nursing, on the ground floor managing prepping rooms and turnover, before moving into data collection and informatics. Now, he is leading a pilot initiative in the Thomas Jefferson healthcare system, which includes 18 hospitals in total, to understand where inefficiencies lie and use the data to help to drive improvements. One of the first issues they addressed was late start times.

Monica Young, DNP, MSN, MHA, VP of perioperative services at Thomas Jefferson University Hospitals, says they switched from having nurses manually enter delay codes—of which there were 80 options which were often not being entered or entered correctly—to using

Monica Young, DNP, MSN, MHA

time stamps. Surgeons were given 15 minutes before being considered responsible for a delay; anesthesiologists had 10 minutes, and nurses had 5 minutes.

"We saw the biggest jump in first case on-time starts when we switched to time stamps," Young says. She adds that, ultimately, they found that there was not one group that was more responsible for delays, but rather a fairly even split between the three.

The team provides morning reports around 9:30 am each day to let managers know where they fell short and which areas are responsible—preoperative, postoperative, registration, etc— aiming for 75% of procedures to be on time. Each month, they look at the numbers, and the most reported issues to see where they can improve.

cardiac emergency surgery patients and found that delays ranged from 45 minutes to up to 24 hours. Some 2,820 patients experienced a delay. Mortality increased from 3.2% for patients without delays to 4.9% for patients with delays, and delays led to thousands in cost increases as well.

And poor surgical planning in particular, including scheduling the bulk of elective surgeries earlier in the week, can cause excess burden on postoperative services and staff, which in turn accelerates burnout and lowers job satisfaction.

OR suites need to maximize efficiency by maintaining separate patient flows for elective and emergency procedures, notes an Institute for Healthcare Improvement whitepaper: "Delays in instituting care for urgent or emergent OR cases may lead to increased risk of progressive disease, complications, and poor outcomes." They advise hospitals to increase OR workflow efficiencies, first by identifying key processes, then implementing best practices.

Making data useful

"Everyone has a perceived notion of what they think the problem is," says Stephen Kucinski, an OR informatics

Technology

"If it's a surgeon issue, we tell them everything that's happening," says Kucinski. "If you can logistically tell them this is still lacking, if you can visually show them, they believe it." They are now beginning to address turnover times in addition to start times. Ultimately, they say their goal is 30-minute turnovers.

Kucinski says that one of the trickiest issues is changing mindsets. "It only takes one bad day for everyone to lose hope," he says. "And it's always the most experienced staff who are hardest to turn around."

Implementing startup solutions

Elizabeth Orr, MS, RN, CNOR, CSSM, director of nursing at Houston Methodist Hospital, says that managing the day-to-day operations of an OR is "like a game of tetris." Her hospital was eager to implement the latest artificial intelligence (AI) into hospital rooms in order to streamline operations. They have partnered with a technology startup called Apella that utilizes video and combines ambient intelligence with AI to inform staff in real-time without requiring any human input.

Elizabeth Orr, MS, RN, CNOR, CSSM

Four cameras capture what is happening inside rooms and are able to interpret it with 99% accuracy and display it in real time—for example, it can accurately assess when the patient is undraped, or patient wheels in and out, when the back table is open or the back table is draped. That real-time information is shared over the live video with annotations, such as "patient left room 11 minutes ago," or "turnover started 8 minutes ago." And it all happens without any human intervention.

"This is ambient intelligence," says Orr. "And we found that this ambient intelligence is 24% more accurate at predicting case lengths and times than

the EHR." Like all AI systems, this one is constantly learning and improving—but Orr says they are already seeing improvements in turnover time since they implemented the system in June 2022.

When they relied on manual input, there was inevitably a delay, says Orr, because nurses need to focus on patients. "Of all wheels out, 59% is not documented for at least 10 to 15 minutes because the nurse doesn't have time," she explains. "The technology refreshes every minute. And the live gallery with annotations helps the charge nurse to know where to intervene proactively."

While EHRs can often be difficult to interpret and utilize, these intuitive technology solutions are easier for staff to embrace. "The charge nurse loves it," Orr says. "It keeps the flow of the day progressing efficiently, highlights any barriers way in advance, and allows the OR charge nurse more time to round on the staff in the OR rooms." In turn, she adds, "it decreases frustration of staff and surgeons and increases patient satisfaction."

What is clear is that between existing data management systems and new technologies, there is a new opportunity to identify roadblocks to efficient time management and improve the experience for both the provider and the patient.

And there are many companies large

and small taking on the challenge. Other companies who use data and analytics to help streamline operations include Vizient, a healthcare consulting company that uses data to provide actionable insights to improve cost and efficiency, and LeanTaas, an AI and machine learning platform used by 188 health systems that helps to manage surgery and cancer care backlog, automate patient flow, and improve OR access.

"It's not a problem of getting data but knowing what to do with it," says Kucinski. **ORM**

—Brita Belli is an award-winning writer and PR professional with published stories in the New York Times, National Geographic, MSN.com, and Alternet.

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New tools to drive OR efficiency

Mednition: Mednition uses AI to compare anonymized EHR data with a massive data set to detect and flag anomalies. The technology learns continuously to create greater levels of clinical data accuracy and identifies larger trends and patterns to help clinical teams learn and deliver increasingly safer levels of care. Their AI tools include KATE Triage, which provides 24/7 real-time clinical risk guidance for emergency nurses, and KATE Sepsis, real-time, accurate and early sepsis detection. https://mednition.com/

Pieces: Using data from EHRs, Pieces provides AI-generated clinical summaries, produces insights for clinicians, and predicts patients at high risk. The app is also intended to improve efficiency and increase caseloads, by accurately identifying discharge barriers and predicting discharge dates. https://piecestech.com/