

OR of Future speeds patient throughput

If you could design an OR to make the most of patient throughput, what would it be like?

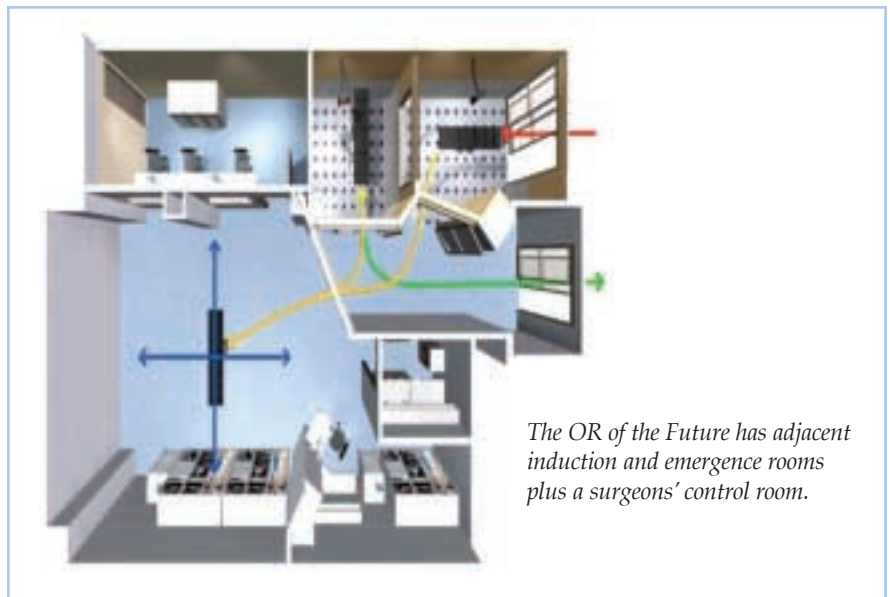
Massachusetts General Hospital (MGH) in Boston is experimenting with a new model in its OR of the Future.

A patient comes into the OR of the Future already anesthetized and lying on a special OR table-transporter bed that docks to a platform in the floor. Anesthesia has been administered in the adjoining induction room. After surgery, the patient is wheeled on the same table to a small adjoining emergence room for early recovery.

Already, the next patient has been prepared for anesthesia. As soon as the first patient has been handed off to the cross-trained perioperative nurse, the anesthesia provider is free to induce the next patient. While waiting, the surgeon can go into the attached control room to dictate, prepare for the next case, or make calls while watching the OR through a bank of windows.

Ideally, three patients can be in the space at once—one being prepared for anesthesia, one having surgery, and one emerging from anesthesia.

A project of the Center for Integration of Medicine and New Technology (CIMIT, www.cimit.org) and the U S Army's Telemedicine and Advanced Technology Research Center (TATRC, www.tatrc.org), the OR of the Future is a lab for new staffing models, workflow, and patient care processes as well as new technology.



The OR of the Future has adjacent induction and emergence rooms plus a surgeons' control room.

More time operating

"One goal is to make sequential processes parallel," says Marie Egan, RN, MS, project manager for the OR of the Future.

The emergence room serves for early recovery only until the patient can be transported by the perioperative RN.

"That increases efficiency for the anesthesia personnel because they are not required to accompany the patient to the recovery room," Egan notes.

Having an adjoining room where surgeons can work between cases is an advantage because it "prevents surgeons from leaving the environment," notes Keith Isaacson, MD, a surgeon and a leader of the OR of the Future project. "But you have to give them the tools so they can continue working," such as phones and computers.

Surgeons have told him they like the OR of the Future concept because it enables them to spend more time operating. They also can more easily see their patients before and after surgery. And because they can watch the turnover activities from the control room, they have voiced more appreciation for the work of the OR team, Egan notes.

A lab for new technology

In one example of new technology, personnel and patients wore clip-on radiofrequency ID tags to track their activities. The tags are part of a system developed by MGH and a startup company, Radianse, that allows tracking of people and objects within the coverage area. Using the system, researchers have

recorded times activities take place (eg, when the patient entered the room) and intervals between activities (eg, time spent in induction). Then they use the data to analyze the efficiency of processes. The data was validated by human research assistants using handheld devices.

The activity data could be useful in several ways, notes Dawn Tenney, RN, MSN, associate chief nurse for perioperative services at MGH.

For example, the project team could learn how many times circulators have to leave the room to get missing items, where they have to go, and how long it takes to find the items. That might suggest ways to improve the supply function.

A human speed limit?

The project is using satisfaction surveys and team feedback to learn whether there is a “human speed limit” for the OR staff—a speed beyond which something important is lost. In other words: “Is there a speed over which people feel that events are controlling them?” Tenney says.

For instance, turnover time might be reduced to 10 minutes. But nurse dissatisfaction and staff turnover might rise because nurses would not feel they had enough contact with patients. Or the staff might suffer from “cognitive overload” from trying to absorb information about many patients too quickly.

With the accelerated pace, the circulating nurses have commented that they miss the contact with patients before surgery. There also is a trust issue for RN circulators, who must accept a handoff from the preoperative nurse in the induction room. On the other hand, nurses do handoffs all the time, so this is an issue that might be overcome in time, says Egan.

The OR of the Future requires more nursing staff because the induction and emergence rooms are staffed by a cross-trained RN. But the added labor cost could be offset by the gain from doing an additional case, Egan notes.

At this stage, the data indicates nonoperative time has been reduced by 50%, and patient throughput has increased significantly on specific days.

“You would need the right case mix for this to work cost-effectively,” Egan notes. She thinks the concept would work best for high-volume cases of 60 to 70 minutes, such as arthroscopy and laparoscopic cholecystectomy or hernia repairs, where enough time might be saved from turnover time to allow additional cases to be done. But she thinks it would not be effective for longer cases because not enough time would be saved during the day to add another long case. ❖

A team from MGH will present a session on the OR of the Future at the Managing Today's OR Suite meeting October 6 to 8 in Chicago. A brochure is at www.ormanager.com

OR of the Future project

The project aims to improve patient care and operating room efficiencies. Specific goals are:

- improving patient flow and patient comfort
- reducing turnover time and improving productivity
- enhancing anesthesia efficiency.

The OR of the Future space uses an efficiency model adapted from Europe that includes dedicated induction and recovery spaces adjacent to the OR.

Source: Center for Integration of Medicine and New Technology (CIMIT). www.cimit.org

OR of the Future

The OR of the Future at Massachusetts General Hospital

Purpose:

To apply advanced technology, changes in OR layout, and reorganized work processes to enhance safety and respond to cost pressures.

Physical design:

OR has adjacent induction and emergence rooms, similar to the European model. The suite is about 970 sq ft. The OR itself is 541 sq ft, compared with 400 sq ft for a standard MGH OR.

Specialties:

The suite is used by general surgery, gynecology, and urology services.

Equipment

- Mobile OR table with a transporter top docks to a column in the OR floor, eliminating the need for lateral transfer.
- Monitors attach to the bed, enabling continuous monitoring during the patient's stay in the suite.
- OR is equipped with integrated equipment for minimally invasive surgery.

Preliminary outcomes

- Patient flow in OR of the Future took about 50% less time compared with control ORs.
- Enough time was saved to allow as many as 10 cases (laparoscopic and open) to be performed during

- regular hours.
- Increased throughput put strain on preop and postop resources.

Sources:

Sandberg W S, et al. *Anesthesiology*. 2003;99: Abstract 1350.
 Stahl J E, et al. *Anesthesiology*. 2003;99: Abstract 1347.



Above, top: The nurse's workstation in the OR of the Future features touch-screen controls.

Bottom: A special OR table-transporter bed docks to a platform in the floor.

U of Maryland's OR of the Future

The University of Maryland opened its 52,000 sq ft OR of the Future in June 2003. The facility combines advanced video and other communications equipment with information technology.

"While a few other hospitals have installed some of these new technologies, we are unique in that we have tied them all together throughout the new facility," Stephen C. Schimpff, MD, executive vice president of the University of Maryland Medical Center, said when the facility opened.

Deb Cooksey, RN, BSN, patient care manager for the general OR and minor surgery, says the staff appreciates the flexibility of the new rooms and their ability to be upgraded for new technology.

Some equipment was funded by the U S Army's Telemedicine and Advanced Technology Research Center (TATRC).



University of Maryland surgeon Roger Voigt, MD, in its OR of the Future.

Photo credit: Marc Laytar.

OR of the Future facts

- 19 ORs and 2 minor procedure rooms in new building
- Surgical volume: 15,800 a year
- 23-bed surgical prep area
- 28-bed postanesthesia care unit (can house patients for 23-hour recovery).

Operating rooms

- ORs are arranged in three pods.
- All ORs are at least 600 sq ft with 650 sq ft for the most complex cases (liver transplant, cardiothoracic, and minimally invasive general surgery).
- ORs are equipped with high-flow ventilation systems at 25 air exchanges per hour.
- Department has its own pharmacy and laboratory.

Technology

- All ORs have anesthesia and equipment booms with docking stations; some also have perfusion booms.
- Touch screens enable staff to

- access images and lab results.
- Video images can be directed to flat-panel screens in the rooms; 9 rooms have touch panels (router) for advanced video.
- ORs are equipped for radiology imaging using PACS (picture archiving and communication system).
- Wide-view video cameras in each OR beam images to a secure control room. A grant from Verizon will allow video to be downloaded to personal digital assistants (PDAs) so OR and anesthesia coordinators can view and coordinate room activity.
- Four ORs have telemedicine capability with live, two-way audio and video feeds allowing surgeons to train physicians in other locations.
- Some rooms have voice-activated equipment for adjusting lights and other equipment.
- Wireless phones allow staff to communicate directly, though

coverage does not extend beyond the OR.

- Digital phones are installed in many locations, including on booms. Phone numbers identify the OR and location: The first two digits designate the phone's location in a room (eg, 94 is for phones on equipment booms), and the second two digits designate the OR number. Thus, 9426 would call the phone on the boom in OR 26.
- One OR has galvanized steel and copper-lined walls to house an MRI scanner.

Supply management

- Sterile reprocessing department and perioperative distribution center for supplies report to perioperative services.
- Case cart model is used.
- Sterile reprocessing department is in the basement, connected to OR by separate clean and contaminated elevators. ❖