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A Superior Operation... By Definition



Sony high-definition video products help California Pacific Medical Center build a clinically advanced, streamlined OR and advanced surgical training center.

"At California Pacific Medical Center, our goal was to create an operating room and training center that were new, exciting and could be found nowhere else—with state-of-the-art high-definition video and advanced surgical visualization," says David Razavi, hospital director of media services, who also manages video in clinical settings. "So, we worked with world-class equipment vendors like Sony Electronics, which provided many products and Karl Storz Endoscopy, which was responsible for the system integration, and we pushed the boundaries of traditional medical technology to incorporate consumer and professional equipment to create cutting edge results."

As California Pacific Medical Center (CPMC) was pushing boundaries in its surgical system design, at the same time, it was pushing the boundaries of the operating room (OR) itself. Taking advantage of the realism and immediacy of cutting edge video, its new OR 10 transcends the barriers of space and time to bring every member of the surgical team center stage at the operating table, while turning the OR into a unique interactive classroom without walls.

The first end-to-end HD OR in the nation, OR 10 serves as a laboratory for advanced applications of high resolution video in a surgical setting. Linked through HD video to the OR, CPMC's newly opened SimSurg Education Center is designed to bring the immediacy of the real-time surgical procedures into a teaching environment through HD technology and includes an array of Sony LCD 24-inch HD surgical monitors.

"The detail and clarity of HD images provide multiple times more medical information than standard definition video technology. The difference is like an old-fashioned rabbit-ear television picture, compared to the detailed, sweeping panoramas of today's large screen home theatre. Which would you rather your physician use?" says Stephen Lockhart, MD PhD, an anesthesiologist and CPMC Medical Director of Surgical Services, who helped spearhead the project. "Whether for clinical procedures or educational training, presenting healthcare professionals with HD video is really quite similar to giving them a front row seat at a surgical procedure, while providing surgeons themselves with a crystal clear window on the body."





Redefining the OR.

Today in CPMC's new HD OR 10, a Sony video camera glides effortlessly on a steel boom above the patient to capture the precise movements of skilled surgeons manipulating complex equipment. At the same time, HD endoscopic imaging systems reveal unprecedented details that can help guide physicians past the glistening edge of an organ to pinpoint the optimal site to make a cut. All the while, another Sony camera pans the room to provide a broader perspective as the mutually dependent activities of anesthesiologist, nurses and surgical support staff proceed like clockwork, when precision and time matter most. To keep the OR team apprised of the entire surgical scene, all these images can be displayed in real time throughout the OR as needed.



Fast forward to the future.

With these advanced new HD OR cameras, as well as monitors, video recorders, conferencing systems and other HD technology—more than two 8-foot racks of it, to be precise—the term operating theatre takes on dramatic new meaning, as the future of surgery is put on fast forward at CPMC in a variety of important ways.

With enhanced detail, color and clarity, according to Dr. Lockhart, HD images of the surgical field make a significant difference in the precision, speed and safety of procedures. This is particularly true of minimally invasive surgeries (MI) because, without HD technology, the small window of an endoscope typically obscures the detail seen in procedures. However, HD's subtle color gradations reveal the difference between muscle and bowel tissue, for example, while boosting clinical confidence about where to make an incision by visualizing small, significant shadows.

Additionally, with real time HD technology capturing and displaying the precise movements of the surgeon and the entire OR team, these specialists can function as a group much more effectively and anticipate what may be needed next, wherever they are stationed.

To chronicle this information for future use, as part of the system, HD data also can be stored automatically on a variety of digital media using Sony HD recorders and image capture systems.

"I have long relied on Sony recorders to deliver the highest quality images of my surgical procedures in standard definition," says Andrew Brill, MD, CPMC Director of Minimally Invasive Gynecology and Reparative Pelvic Surgery. Dr. Brill is another internationally recognized surgeon who has been instrumental in shaping the HD project and who joined the hospital specifically for this opportunity. "Because medical video is frequently copied and distributed to other doctors, starting out with the best recording possible is essential. Sony HD technology significantly enhances the quality."

California Pacific Medical will realize these benefits also in the SimSurgery Education Center, where high resolution images from the OR will be delivered through an HD video feed. These images will bring the immediacy of the surgical suite to the Education Center's conference room as well as to individual students operating in a mock OR. And this same video signal potentially can be transmitted in native HD to any location worldwide with Internet connectivity.



Surgeons hail the benefits.

The impact of this futuristic HD environment has already been significant for the highly skilled, specialized surgeons who have experienced it in CPMC's OR 10.

"With a large flat-screen monitor and high-quality HD endoscopic images, you can truly see color and textural variations not apparent through conventional technology," says Michael D. Black, MD, CPMC Chief of Pediatric Heart Surgery. Dr. Black developed and utilizes minimally invasive "touch-free" surgical techniques for pediatric heart surgery on patients as young as 22 weeks. The HD OR was developed, in part, to support his specialized requirements.

"In my procedures, the entire surgical field is shades of red," explains the surgeon, who works through minute incisions. "Precise color display is particularly vital to differentiate anatomy on tiny infants, as is seeing the full details of the plane where you are cutting. The color differentiation in our HD OR is truly spectacular."

Additionally, he notes that in any MI procedure, accurate color display will help surgeons identify various tissue types and tissue vascularization. "HD images displayed on a screen are often much better than what I see looking at the patient with an unaided eye," he says.

Speaking about his gynecological surgeries, Dr. Brill notes, "When surgeons see more, they simply perform better, safer and more efficient procedures. HD reintroduces much of what scopes take away. The ability to differentiate between normal and abnormal tissue is key to my specialty and is markedly improved with high-resolution images. The technology helps physicians deliver superior surgeries under difficult conditions."

Pointing out that higher quality images minimize physician fatigue, he adds that HD allows doctors to spend less energy filling in the blanks on lower quality images and more on the surgery itself. "The difference can be dramatic," he says, "particularly for lengthy procedures."

In his role as an anesthesiologist, Dr. Lockhart comments, "The delivery of anesthesia demands an up-to-the-minute knowledge of the patient's condition and the surgeon's actions. With a nearby visualization of the surgical field, I can become part of the rhythm of the procedure and anticipate and prepare for any difficulties that might arise."





The integrated OR.

To coordinate and streamline the use of all this technology, CPMC's OR 10 has been designed as an integrated surgical suite, according to David Razavi, whose dual role at the hospital makes him uniquely qualified as both an expert on cutting-edge multi-media electronics and on its application in a clinical setting and who played a key role in the project. In this case, CPMC may be reinventing the term because the integration will extend well beyond the OR environment itself with the completion of the Education Center.

Integrated surgical suites, which are typically used for technology-driven procedures, place most equipment under the control of a single interface to simplify use and maximize potential. At CPMC, a simple touch screen serves as the command center that guides ceiling cameras, endoscopic systems, lighting and more, while eliminating wires, carts and other clutter from the environment.

"In our OR, with a the flick of a switch you can send a real time endoscopic video, diagnostic CT scan and detailed view of nursing activity to one monitor," says Razavi. "This can be configured as a split screen or picture-within-picture as desired. Meanwhile, we can present anesthesiologists their own customized image selections on another screen."

Professional by design.

"In OR 10, we incorporate a extremely high-end devices supporting truly superior image quality," Razavi continues. "The entire project was a comprehensive two-year process from start to finish."

After conducting extensive due diligence at other integrated high-tech ORs, Razavi found that most were still working with standard definition video. In hospitals with some HD technology, Razavi always identified a weak link in the imaging chain beyond which HD benefits were lost."

"Even the most technology-forward hospitals weren't looking outside of healthcare to take advantage of cutting-edge technology," he says.

Accordingly, CPMC built a range of innovative and premium features into their HD system. This includes a lightweight, exceptionally mobile equipment, flexible infrastructure that will streamline hardware reconfiguration and enable the addition of special equipment on-the-fly, the sophisticated audio-video control built into its user interface—and, naturally, superior image quality. "Sony clearly supports our vision with today's most advanced equipment that, at the same time, is fine-tuned for the special demands of medical use. Sony cameras produce the best images I have ever seen," he says.



HD in education.

CPMC will utilize this technology to play a key role in the new SimSurg to Education Center (SSEC), where physicians will benefit from HD today as well as learn about its applications in their future careers.

Comprising a surgical laboratory with a mock OR and sophisticated conference center, SSEC will have HD interactive communications capabilities throughout, as well as four live video streams from OR 10. The conference area will support interactive lectures and demonstrations, with up to four remote presenters located anywhere in the world communicating almost as if they were all in the same room. Moreover, live feed from the OR will put students front and center at complex surgeries.

In the SSEC's mock OR, while students perform procedures on cadavers or human simulator robots, the Center's HD system can deliver live video of surgeons utilizing the same surgical techniques on genuine OR 10 patients. Students will have the ability to record their work to take with them for future review and analysis.

"The potential is unlimited," says Dr. Black. "And if a picture is worth a thousand words, when it comes to medical education you'd better choose your picture carefully. At CPMC, we can."

Acknowledging the uniqueness of the entire HD project, Dr. Brill notes, "Throughout, we have been extremely fortunate to have supportive technology partners dedicated not only to meeting CPMC's specific needs, but also to exploring the value of HD technology and helping to forge new paradigms in surgical care."

"The relationship with our technology partners has been one of the most important pieces of this endeavor," Dr. Lockhart adds. "We're absolutely working as a team to find new ways to leverage what we both bring to the table for the future of medicine." ...Pushing yet another boundary.



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