



The UPI moment in Surgical Care

by Ameya Shete

We all know what UPI has done to financial transactions in this country with its sheer scale. We now draw similarities and projected outcomes in the Operating Rooms.

The operating room is humanity's greatest paradox: a place we are grateful that it exists but pray we never visit it. But having said that, some of us land up there fortunately or unfortunately.

It would therefore be worthwhile for us to delve deeper into this complex subject of Operating Room & Operating Room Integration.

The operating room has long been the epicentre of surgical excellence, where precision, skill, and life-saving decisions converge. Even as our daily lives are undergoing a certain digital transformation, this critical space is seeing a paradigm shift as digital technologies reshape how surgeries are performed.

Operating Room Integration represents a fundamental reimagining of surgical care that promises enhanced patient safety, improved outcomes, and operational excellence for hospitals across India.

What is Operating Room Integration?

Operating Room Integration refers to the seamless connectivity of medical devices, imaging systems, surgical equipment, and information systems within the surgical environment.

An integrated OR creates a unified digital ecosystem where real-time data flows effortlessly between devices, visualization systems, and hospital networks.

At its core, OR integration connects surgical lights, anaesthesia machines, endoscopic cameras, patient monitoring systems, and imaging equipment to a central hub that displays critical information on high-definition screens optimally positioned for the surgical team.

Finally, it is all about the patient!

For patients, OR integration translates directly into better care and outcomes. Integrated operating rooms enable surgeons to access comprehensive patient information instantaneously during procedures. Pre-operative scans, laboratory results, and medical histories appear on command, allowing for informed decision-making at critical moments.

High-definition imaging systems provide surgeons with unprecedented clarity, enabling smaller incisions, reduced blood loss, and faster recovery times. Patient safety receives a substantial boost through integrated checklists and protocol reminders displayed in real-time, alerting teams to potential drug interactions and ensuring all safety protocols are followed systematically.

Most importantly, patients can experience shorter hospital stays and a faster return to normal life through the precision these systems provide.

How are Indian hospitals reacting to this transformation?

India's healthcare sector has demonstrated remarkable enthusiasm for embracing OR integration technologies.

Indian Hospitals are increasingly realizing the benefits of OR Integration from recording surgeries to creating repositories that can help them tackle even Medico legal issues. Safer surgery transmissions within the Hospital to a Doctor' lounge or a patient waiting area or even outside the Hospital for CMEs, Education has become easily possible with advent of OR Integration. OR Integration provides access to all relevant information from a single interface, surgical teams spend less time searching for equipment, coordinating devices, or waiting for images to load.

During surgery, surgeons have benefitted from:

- Instantly switch or combine video sources (endoscope, microscope, C-arm, room camera) without cable changes or staff leaving the sterile field.
- Pull PACS images or reports onto large displays now of decision —e.g., checking tumour margins, fracture patterns, or vascular anatomy mid-procedure.

Technology for a better life

Several key technologies form the backbone of modern integrated operating rooms.

Artificial intelligence algorithms analyse real-time imaging data, identifying anatomical structures and predicting potential complications. Advanced 4K and 8K visualization systems provide extraordinary detail, while three-dimensional systems offer depth perception crucial for complex reconstructive and cancer surgeries.

Voice-activated OR assistants allow surgical teams to control room functions through verbal commands, maintaining sterility while accessing critical capabilities.

Modern robotic surgical systems provide tremor filtration, motion scaling, and enhanced dexterity with seven degrees of freedom in instrument movement, enabling surgical manoeuvres impossible with traditional laparoscopy.

Real-time integration with Electronic Health Records ensures that surgical data—vital signs, medications administered, procedural notes—flows automatically into patient records, eliminating manual data entry and reducing errors.

So much data! How do we protect so much sensitive data?

The DPDP Act and Patient Privacy

As operating rooms become increasingly digital, the Digital Personal Data Protection Act of 2023 establishes critical frameworks for patient information handling. Under the DPDP Act, patients are designated as the “data principal” while hospitals serve as the “data fiduciary,” placing explicit responsibility on healthcare institutions to safeguard patient information.

For integrated operating rooms generating vast amounts of sensitive data including surgical videos and real-time physiological monitoring, the Act mandates explicit, informed consent before collecting or processing patient health data. Patients must understand what data is collected during surgery, how it will be used, who accesses it, and retention periods.

The Act grants patients’ fundamental rights including access to surgical records, correction of inaccurate information, and deletion requests once medical purposes are fulfilled.

Security measures—encryption, strict access controls, and comprehensive audit trails—become essential components of OR integration infrastructure.

Hospitals must report data breaches promptly to authorities and affected patients. Given that healthcare institutions experience thousands of cyberattack attempts weekly, robust cybersecurity measures including network segmentation, penetration testing, and staff training are practical necessities.

The DPDP Act creates a framework where technological advancement and patient privacy protection advance together, demonstrating that innovation can occur without compromising fundamental rights.

The bumpy road ahead

Despite its promise, OR integration faces challenges in India. Initial investment requirements remain substantial, though operational efficiencies and improved outcomes can justify costs. As technology matures and local manufacturing develops, costs are expected to decrease significantly.

Training represents another consideration, requiring surgical teams to develop digital literacy alongside clinical expertise. Successful implementations involve extensive pre-launch training and ongoing support

Interoperability challenges arise when equipment from various manufacturers must communicate seamlessly. India's National Digital Health Mission promotes standardization and interoperability, creating market incentives for manufacturers to build compatibility into products.

Cybersecurity cannot be afterthought. As ORs connect to hospital networks, robust security measures, regular updates, and

comprehensive backup systems protect both patient data and surgical service continuity.

The future is bright

The trajectory of OR integration in India points toward integrated operating rooms becoming standard even in district hospitals and smaller facilities. The democratization of this technology has profound implications for healthcare equity, potentially narrowing quality gaps between metropolitan hospitals and regional centres.

The potential for telesurgery and remote mentoring could address India's uneven distribution of surgical expertise, bringing specialist capabilities to patients in smaller cities. Integration with artificial intelligence will deepen, with systems predicting complications, suggesting optimal surgical approaches, and assisting through advanced robotics.

For medical education, integrated ORs will revolutionize surgical training through immersive review of recorded surgeries, virtual reality simulations, and augmented reality guidance during actual procedures. This could dramatically accelerate skill development, enabling surgeons to reach competence faster and more safely.

Adopt, adapt & absorb

For the medical fraternity, embracing OR integration fulfils our fundamental commitment to patient wellbeing through the best available care.

Professional societies must develop guidelines, share best practices, and facilitate knowledge exchange.

Individual surgeons should approach these technologies recognizing that they enhance rather than replace clinical judgment.

Every patient who benefits from safer surgery, every hospital operating more efficiently, and every life saved through improved outcomes affirms that this transformation is essential.

The operating room of tomorrow is being built today—a space where technology serves humanity, data enhances decision-making, and precision amplifies skill.

For India's medical fraternity, the invitation is clear: to lead this transformation with dedication and excellence, ensuring that integrated operating rooms benefit not just the privileged few but every patient who walks through our hospital doors.

A surgical strike (pun intended)

A decade ago, if someone suggested that a vegetable vendor in rural India would accept payments through a smartphone app, we might have ridiculed that person or even made fun of him. Today, UPI processes billions of transactions monthly, and that same vendor has the best digital payment infrastructure in the World. We did not just adopt technology—we made it uniquely ours, accessible, and transformative. Now imagine applying that same audacious spirit to our operating rooms, where the stakes are not rupees but lives, and the returns are not measured in GDP but patients returning home to their families, hale & hearty.

If every nook & corner of India has gone digitally savvy, surely, we can make every Operating Room in India go the same way.

We are right at that inflection point where the OR space organically travels into a different orbit in terms of technology & surgical outcomes – making it more connected & safer!

Esbee Dynamed specialises in OR integration and connected surgical instrument tracking solutions. To learn how we can support your operating theatre, contact our team.

Write to us at info@esbeedynamed.com for more info.