The Power of Hybrid Operating Rooms
How to best advance surgical capabilities and competitive position in today’s healthcare community.

By Robert Poploch

For many healthcare providers, the long-term success of their surgical services may depend on being able to provide advanced surgical capabilities and maintain a competitive edge in their regional healthcare community. This typically requires that providers successfully address a number of quality and satisfaction indicators while simultaneously navigating a more challenging reimbursement environment and rapidly evolving standards of care.

At the local/regional level, reputation and referring physician loyalty are key factors influencing patients to select a particular surgical service. Given that there is redundancy in surgical offerings in most communities (such as two or more hospitals that perform vascular surgeries for abdominal aneurysm repair or coronary bypass grafting), providers need to drive both internal and external surgical consumer mind share in order to be successful. So, the question becomes; why should a surgical consumer choose one facility over another?

The answer is often related to the ability of the surgical service provider to offer the most advanced surgical and procedural therapies. However, achieving this level of sophistication requires leaders to deal with numerous factors, such as the rapid evolution of technology, the complex merging of surgical and imaging sciences, and financial sensitivities associated with maintaining and advancing practice standards, all while continuing to drive daily operational excellence.

Setting the Metrics
Start by developing a process to assess surgical service line needs and ensure an implementation that meets surgical/procedural objectives and measurable outcomes. This often focuses on establishing, benchmarking and achieving procedural, workflow, and quality metrics.

Healthcare facilities typically compete for patients in a common catchment area. In order to compete for the mindshare of patients and physicians, providers rely on their surgical reputation, which is often a key factor when attempting to expand market presence. In the past, reputation was primarily related to having the best surgeons and interventionalists. Today, it is a combination of the best human resources and the ability to deliver the most advanced levels of care.

For example, the ability of the institution to deliver favorable outcomes such as reduced hospital stay, limiting unintended complications, and infection prevention for a given patient population (such as those requiring a thoracic or abdominal endograft) can be related not only to surgeon experience, but also to the tools available to that surgeon.1,2 The medical challenge can be exacerbated when patients present with concomitant conditions such as obesity, chronic obstructive pulmonary disease and renal compromise, which add complexity to traditional management models and surgical approaches and can compromise outcomes. Leadership must determine what level of surgical advancement will help maintain desired outcomes in the face of more complex patients.

Advancing Surgical Care & Productivity
One current business challenge for surgical services is related to recent reimbursement models and cost-of-service realities that are resulting in lower average revenues and margins. This typically drives the need to increase surgical service utilization by improving efficiencies. For this reason, many hospitals are seeking to advance surgical care and improve their competitive edge by implementing a hybrid operating room.

The term "hybrid operating room" conjures a diverse set of definitions depending on the audience. However, at the core of the hybrid operating room is the merging of radiologic and surgical sciences. These spaces are essentially sterile environments in which the traditional diagnostic functions of the cath lab are combined with the traditional surgical functions of the operating room, and are then applied along with real-time intra-operative image guidance to evaluate, intervene, and assess the results of minimally invasive procedures (MIP), complex MIP, and open surgical cases.

This creates an environment where interventional approaches can be performed under the most complex conditions and for the most challenging patient populations. Everything is done under a so-called “surgical safety net” and helps enable the delivery of improved outcomes and safer procedures.3,4,5,6 In the hybrid OR environment, the improved outcome measures would be a shorter hospital stay and faster rehabilitation, because of a less invasive approach that results in less patient trauma.

Hybrid ORs also support a multi-disciplinary approach, bringing together (for example) thoracic and endovascular surgeons to treat multiple disease points in a single episode of care for a complex patient. Here, too, the metric is improved outcomes through a holistic approach designed to limit additional procedures and ultimately reduce hospital stay and possible complications or infections.
It is important to define minimally invasive techniques in more detail, and to explain why they are an essential component of the hybrid operating room. As the name suggests, less can be more when attempting to drive favorable outcomes. In fact, at many hospitals, a growing number of patients are being managed using minimally invasive techniques in the treatment of cardiac, renal, neurological, oncologic, and other diseases. These types of procedures are enabled by technologies such as endoscopes, imaging systems and robotics, which are all designed to look into the body without creating large open portals.

Physicians use endoscopes to view the inside channels (digestive system, blood vessels) and surfaces (abdominal structures, organs) of the body, and use the same entrance to insert catheters capable of excising, ablating, and stenting. Imaging equipment such as c-arms and ultrasound systems allow physicians to assess the size, location, and extent of disease, to discern anatomical or functional compromise, and to locate catheter and needle-based instruments. Robotic devices enable extremely precise removal of diseased tissue and repair of compromised organs through small incisions only a few millimeters wide, using miniature robotic hands remotely controlled by the surgeon.

**Proactive Guidance**

Investment in hybrid rooms and their associated technologies is made to achieve specific strategic imperatives related to advancing care (efficiency, outcomes and quality metrics), to retain surgical and specialist talent, to differentiate the hospital from other service providers, and ultimately to achieve positive financial results for the health system. These are complex yet highly flexible, functional and efficient spaces that offer a variety of patient management and case scheduling possibilities. However, if they are to be successful, they must be flawlessly planned and seamlessly integrated to ensure the ability to meet the facility's established service line objectives.

In order to assure successful implementation of these sophisticated rooms, it is important that executives consult hybrid OR planning experts in addition to their key internal stakeholders. It is not enough to assume that the individual expertise of each facility stakeholder will be all that is needed to create an ideal room design. For example, cath lab and OR directors contribute views on imaging and surgical requirements that need to be integrated in the design of the hybrid OR. However, the subtleties associated with the physical integration of radiologic and surgical equipment, and the planning that will ensure uncompromised use of each technology, requires the support of planning experts who have a history of hybrid OR design and implementation, and who have working relationships with the many equipment/technology vendors that serve this space.

By evaluating and deciding first which types of advanced procedures will be supported by a particular hybrid room, stakeholders will facilitate the equipment selection and layout. Some of the procedures commonly performed in hybrid rooms include:

- AAA endografting
- Aneurysm coiling
- Coronary artery bypass surgery (CABG)
- Complex peripheral angioplasty/stent
- Intracranial and carotid stenting
- Neuro cyst aspiration
- Neuro tumor resection
- Percutaneous coronary interventions (PCI)
- Peripheral bypass
- Transcatheter aortic valve implantation (TAVI)
- Transplants
- Ventricular assist device insertion

In order to define the high-frequency usage case for a hybrid room, planners need to identify the clinical intent (room focus) and perform a thorough analysis of past and forecasted utilization for each type of procedure they expect to perform. This is an important step in creating a thoughtfully designed and clinically functional room. It also requires a word of caution: planning a room that is too procedurally diverse can result in compromised circulating pathways, patient access limitation, and challenging movement of both the imaging and surgical equipment.

Since "an ounce of prevention is worth a pound of cure," it is recommended that diagrams be drawn to include: who will be in the room for each type of procedure, which equipment each of them will use during the procedure, and what the preferred approach is to the patient/surgical field. This proactive planning step will help to ensure that circulating pathways, collision points, ergonomics, and workflows are optimized for best use of the room. Essentially, it will help create a room that is clinically relevant and a joy to work in.

**Considerations for Optimal Use & ROI**

The return-on-investment in a hybrid suite will rely on consistent and successful utilization and appropriate investment to bring the hybrid OR to life. A primary investment consideration concerns the imaging equipment. Planners will need to decide which imaging modalities are required, and in the case of magnetic resonance imaging (MRI), computed tomography (CT) and robotics, whether the equipment will be permanently installed in the room, mounted on a track system that allows it to be brought in and out as needed (MR, CT), or in a portable configuration (robotics). If robotic systems are part of the plan, they require additional thought and planning to accommodate diverse surgical approaches (foot, side, or head) and the required footprint for each.

Another important planning activity impacting ROI is related to video integration and routing. Since the imaging information, whether endoscopic, radiologic, or from a surgical microscope, is meant to provide real-time access and support dynamic decision making, it is important to consider the ease of displaying a diverse set of image signals and optimizing lines of sight. Once all these aspects are accounted for in the planning process, the design and costing of the room can be more accurately estimated.

**The Potential of Hybrid ORs**

Healthcare reform, with its potentially declining reimbursement, requirements for quality metrics and changing competitive...
forces, is altering paradigms with respect to the treatment of patients. This shift is also driving local healthcare strategy towards the delivery of advanced care, which benefits patients most of all, but can also help facilities gain a competitive edge and retain highly trained staff. The clinical role of the hybrid operating room in this environment is to improve decision making and efficiency, and to limit and manage outcome variability and unintended complications. With the technologies, equipment and consulting resources available today, these benefits are no longer pie-in-the-sky; they have moved towards becoming a best practice.

Hybrid operating rooms are being designed with targeted specialty interests in mind and outfitted to allow the most advanced standards of care today and in the future. Key metrics to document success include the number of less invasive procedures performed, tracking of reduced procedure times, data on shorter hospital stays, and statistics showing faster rehabilitation for specific types of cases. These data all influence care standard metrics, which in turn have the ability to increase the mind share of physicians and patients.

**References**

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