Hybrid Operating Rooms
with a focus on Endovascular Hybrid ORs
Planning guidelines, pricing, and procurement trends powered by ECRI Institute’s SELECTplus® Market Analytics

What is a hybrid OR?

Should your facility have one?

A hybrid operating room is an OR equipped with a large fixed imaging system that supports high-quality interventional imaging and complex open and minimally invasive surgeries.

A revolutionary alternative to conventional operating rooms, the hybrid OR allows physicians to perform procedures using real-time image guidance, and to assess effectiveness and manage perioperative complications, all in a single encounter.

Industry experts predict that by 2018, 75% of cardiovascular surgeons will be working in a hybrid operating suite. To help hospital leaders make the “hybrid” decision, this paper focuses on implementing an endovascular hybrid procedure room with an angiographic imaging system, as this type of room generates the most interest among ECRI Institute member facilities. We address:

- Clinical trends and planning challenges
- Costs and configurations of imaging systems and other equipment
- Estimated project costs
Planning the Endovascular Hybrid OR—What You Need to Know

**Trends Driving Hybrid OR Interest**

- Growing market pressure to have a hybrid OR even if an OR-capable cardiac catheterization lab may suffice
- Physicians desire to perform new combinations of endovascular, laparoscopic and/or open procedures in the same OR using advanced angiography image guidance
- New and emerging endovascular procedures becoming more complex and higher risk
- Patients want benefits of reduced trauma/faster recovery associated with minimally invasive surgery and interventional procedures

The endovascular hybrid OR is the ideal setting for high-risk minimally invasive cardiovascular procedures that require advanced imaging and that may necessitate transitioning to open surgery. Hybrid ORs can also accommodate cases which have traditionally been done in the cardiovascular OR and the cath lab.

**Challenges**

- **High Cost**
  About $3-4 million on average, so short-term ROI is questionable

- **Implementation Time**
  1-2 years from planning to implementation

- **Space Requirements**
  900-1,400 sq. ft.—close to double the size of a standard OR

- **Staff Training and Team Development**
  Essential for safety, efficiency, and effectiveness

- **New Credentialing Criteria**
  Must be developed for all procedures to ensure quality and competency

**Room Requirements**

- Ceiling typically 15’ to 16’ high (floor to floor)
- Lead-lined walls for required radiation protection
- Separate control and equipment rooms
- Increased ceiling support for equipment booms
- Positive pressure and laminar airflow for OR-level sterility
- Adequate space for all support equipment and supplies

**Equipment Needs**

Hybrid OR suites are comprised of up to 100 different medical devices and systems from multiple vendors. Some key technologies include:

- Fixed angiographic imaging system
- Hybrid operating table
- Wall and boom-mounted video display monitors
- Surgical and interventional lighting
- Anesthesia machine
- Heart-lung bypass machine
- Physiologic / hemodynamic monitor
- Contrast injector
- Transthoracic and intravascular echo
- Surgical carts and storage systems
- OR integration system (optional, but recommended)
**Market Intelligence on Hybrid Imaging Systems**

Provided by ECRI Institute’s SELECTplus Market Analytics

### Most Popular* Angiography Imaging Systems for Hybrid Rooms

- **GE**: 42%
- **Philips**: 31%
- **Siemens**: 27%

Interest among SELECTplus member hospitals and health systems, based on SELECTplus Market Analytics. The database does not show interest in Toshiba systems for Hybrid OR use over the last three years.

### Average Cost of Top 5 Angiography Imaging Systems for Hybrid Rooms*

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Model</th>
<th>Average Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philips</td>
<td>AlluraClarity FD20 FlexMove</td>
<td>$1.60m</td>
</tr>
<tr>
<td>GE</td>
<td>Discovery IGS 740</td>
<td>$1.51m</td>
</tr>
<tr>
<td>Siemens</td>
<td>Artis zeego</td>
<td>$1.41m</td>
</tr>
<tr>
<td>GE</td>
<td>Discovery IGS 730</td>
<td>$1.34m</td>
</tr>
<tr>
<td>Siemens</td>
<td>Artis Q</td>
<td>$1.30m</td>
</tr>
</tbody>
</table>

### A Closer Look at the Top Angiography Imaging Systems

**GE**
- Model: Discovery IGS 730
- Vendor Partnerships: Philips, GE
- OR Table Compatibility: GE
- Configuration(s): Floor-based
- Single Plane/Biplane: Single Plane
- Advanced Positioning Features: Laser-guided mobile gantry
- Flat Panel Detector Size(s) (cm): 31 x 31
- Quoted Price Range: $1.13M - $1.53M
- Average Annual Service Fee: $83,000

**PHILIPS**
- Model: AlluraClarity FD20 FlexMove
- Vendor Partnerships: Philips, GE
- OR Table Compatibility: GE
- Configuration(s): Ceiling/Floor
- Single Plane/Biplane: Both
- Advanced Positioning Features: Specialized ceiling track
- Flat Panel Detector Size(s) (cm): 41 x 41
- Quoted Price Range: $1.36M - $1.70M
- Average Annual Service Fee: $95,000

**SIEMENS**
- Model: Artis zeego
- Vendor Partnerships: Siemens, Philips
- OR Table Compatibility: Siemens, Maquet, Trumpf
- Configuration(s): Ceiling/Floor
- Single Plane/Biplane: Both
- Advanced Positioning Features: Robotic arm
- Flat Panel Detector Size(s) (cm): 30 x 40
- Quoted Price Range: $1.37M - $1.82M
- Average Annual Service Fee: $74,000

**TOSHIBA**
- Model: Infinix-i
- Vendor Partnerships: Toshiba
- OR Table Compatibility: Maquet, Steris
- Configuration(s): Floor-based
- Single Plane/Biplane: Single Plane
- Advanced Positioning Features: None
- Flat Panel Detector Size(s) (cm): 30 x 40
- Quoted Price Range: $1.04M
- Average Annual Service Fee: $108,000

### Where the Money Goes

- Imaging Equipment: $2M
- Construction: $1M**
- OR Equipment: $0.4M
- Life Support Equipment: $0.3M
- Audio/Visual Equipment: $0.2M
- Surgical Equipment: $0.1M

**Typical construction costs can range from $0.5M to $2M. Imaging equipment is the largest expense when building a hybrid OR—typically at least half the total cost.**

Systems specifically designed for the hybrid OR include the Siemens Artis zeego which features a C-arm mounted on a fixed robotic arm, the GE Discovery IGS 730/740 with a C-arm supported by a mobile robotic stand, and the Philips FlexMove ceiling mount system. These systems provide more positioning flexibility compared to conventional angiographic systems without compromising imaging and guidance capability.

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*SELECTplus market interest and pricing information is based upon data submitted to ECRI Institute from Q3 2014 to Q2 2015.*

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**ECRI Institute Recommendations**

Most facilities conducting high-risk endovascular procedures in conjunction with vascular and cardiothoracic surgeries should have or should be planning to have an endovascular hybrid OR.

As a short-term measure, it may make economic sense to use an existing cardiac catheterization laboratory for some high-risk minimally invasive cardiac procedures. But increasing emphasis on quality, safety, and credentialing will strengthen the case for a hybrid OR. Image-guided minimally invasive surgery is the future, so most healthcare facilities will benefit from long-term planning for a hybrid OR.

Funding, planning, designing, and implementing a hybrid OR is a complex and error-prone undertaking. In the current environment of healthcare reform and cost containment, healthcare executives are advised to carefully assess the technology marketplace and cost, the typical procedures, and space requirements before making procurement and installation decisions.

Below is a checklist of some essential planning and design steps ECRI Institute has followed in helping healthcare facilities to plan and implement a hybrid OR.

**Checklist for Successful Implementation**

- Solicit input from clinical and non-clinical experts from all related areas, including interventional cardiology, and vascular and cardiac surgery.
- Perform site visits to help determine best room placement, technology options, and procedures.
- Select vendors early for each major system and use their expertise in room design and planning.
- Carefully consider transitions from interventional to surgical procedures. Talk to all stakeholders, especially anesthesiology.
- Obtain one final construction drawing that shows imaging system, OR table, booms, and all other equipment. Review it carefully with all anticipated users before signing off.
- Define which procedures require a hybrid OR and which do not to ensure cost-effective care delivery and promote more accurate future growth planning.
- Consider working with equipment vendors who have an existing relationship with an imaging system vendor for maximum efficiency and compatibility.

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**Is a hybrid OR on your horizon?**

We can help.

Let us help you with the decision-making and planning process. ECRI Institute provides expert, objective technology assessment and procurement advisory services to more than 5,000 healthcare organizations worldwide, as well as comprehensive, integrated, and systematic medical equipment planning. We've planned and procured over $1 billion in medical equipment.

**Start planning today.**

Contact Jennifer Myers at jmyers@ecri.org, (610) 825-6000, ext. 5287, or www.ecri.org/select

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Market data charts in this paper are based solely on price points submitted to ECRI Institute in a 15-month period by members of the SELECTplus advisory service for capital equipment and information technology decisions. This time-sensitive data is not intended to represent actual market shares.