MANUAL 3:
Renovations of the OR

Design & Construction

AORN | TOOL KIT

The original tool kit was updated by the team below in 2024:

Annette Couvillon, AIA, EDAC, LSSYB, Medical Planner HKS

Scott Bales Registered Architect, EDAC, AIA, DBIA, NCARB, Medical Planner Cuningham

Mary C. Fearon RN, MSN

LarriJo Boone, RN, LSS Greenbelt Certified Design Researcher & Clinical Nurse Expert

Ramon Hilberink, Manager SuiteSurgery

Troy Savage Manager, Strategic Projects and Innovation Mazzettii: MEP

Shilpa Bhardwaj, Doctoral Candidate, Texas A&M

Beverly Kirchner, MSN, RN, CNOR, CNAMB, Compliance Office & Clinical Resource Director

Lisa Spruce, DNP, RN, CNS-CP, CNOR, ACNS, FAAN Sr. Director of Evidence-Based Perioperative Practice

Russ Olmsted, MPH, CIC, FAPIC

Michelle Boos-Stone – Five Elements Consulting Group, LLC- Illustrations

Introduction

Renovating hospital spaces is a critical undertaking, and focusing on an operating room renovation is particularly crucial for improving patient care, safety, and overall efficiency within healthcare facilities. Operating rooms play a central role in medical interventions, necessitating careful planning and execution during the renovation process.

This manual serves as a guide for healthcare professionals, facility managers, and construction teams, leading them through the intricate steps and phases of renovating an operating room. The goal of these renovations is to ensure that these critical spaces are equipped with cutting-edge technology, adhere to regulatory standards, and provide an optimal environment for medical procedures.

The manual begins by providing an overview of the validation phase, highlighting the importance of assessing the current state of the operating room, setting renovation goals, and engaging key stakeholders. It offers detailed guidance on conducting feasibility studies, budgeting, and obtaining necessary approvals.

Moving forward, the manual delves into the criteria design and detail design phases, exploring considerations such as workflow optimization, infection control measures, and compliance with healthcare regulations. It provides insights into selecting appropriate materials, integrating technology, and creating a patient-centric environment.

During the construction documents and construction administration phases, a critical juncture, the manual addresses the coordination required among construction teams, medical staff, and facility management. Safety protocols, risk mitigation, and contingency planning take center stage to ensure a smooth transition from the old to the new.

Finally, the manual concludes with occupancy activities, including testing and commissioning, staff training, and ongoing maintenance. Stakeholders can confidently navigate the complexities of operating room renovation by following the step-by-step guidance, contributing to an enhanced healthcare infrastructure and improved patient outcomes

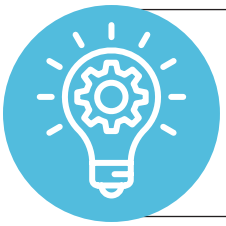
MANUALS IN TOOL KIT:

1. How we begin - Developing the Team
2. Design in Depth - building codes, room types, terminology.
3. **Construction Projects Steps**
4. Reading construction Documents
5. Design Guide for SPD
6. Infection control and prevention

"No one can whistle a symphony. It takes a whole orchestra to play it."

- H.E. Luccock

Phases of a Project

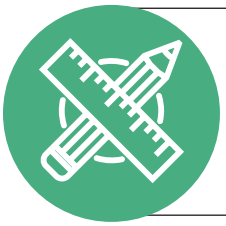


VALIDATION

Big Picture
- Define high-level space program
- Review future state process maps
- Detail space planning
- Align needs/wants with schedule and budget

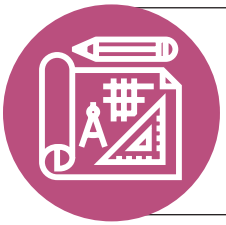
CRITERIA DESIGN

Key Adjacencies and Critical Flows
- Department adjacencies and locations
- Critical flows (review and improve)
- Site plan layout
- Building footprint/massing
- Capture future space needs
- Confirm scope and costs
- Opportunities for innovation



DETAIL DESIGN

Focus on Details
- Room-specific requirements
- Furniture, fixtures, and equipment (FF&E)
- Review mechanical, electrical, IT, security
- Coordinate code requirements
- Discuss site details and landscape
- Reconfirm scope and cost
- Finalize and sign off interior/exterior design & signage



CONSTRUCTION DOCUMENTS

Prepare Documents
- Final coordination with each discipline
- Confirm constructability with Construction Manager (CM)
- Final documentation and coordination (“blueprints”)
- Final review with regulatory agencies

CONSTRUCTION ADMINISTRATION

Break Ground
- City and State Reviews
- Shop drawing Reviews
- On-site observations
- Review and Process change orders

OCCUPANCY

Grand Opening
- Change Management
- Transition Planning
- Supply/stage space
- Trial/practice runs
- Open Doors!

Post Occupancy Evaluation
- Evaluate performance to the original design intent

The icons on this page are distributed throughout the manuals and provide a quick reference to the phase of the project. Each icon will provide the reader with a quick reference and understanding of the current phase of the project and what decisions should be made or should have been made leading up to that moment.

The six phases of a construction project begin with **Initiation and Concept**, where initial planning and stakeholder discussions define the project’s purpose and feasibility. This is followed by **Planning and Design**, involving the development of detailed plans and blueprints, and securing necessary permits. **Pre-Construction** includes site analysis and finalizing contracts, setting the stage for **Procurement**, where materials and labor are acquired. **Construction** is the phase where the building takes shape, with site preparation and the installation of systems and finishes. Finally, **Close-Out and Handover** ensures the project is completed to specifications, with a final inspection and transfer of the completed project to the client.

Design Process

Validation:
Rough outlines of spaces—functional program and space program. Opportunity to imagine new care models. Goal: Space Program and Functional Program

1. Gather the support team
2. Hire the external team
3. Determine the communication plan
4. Determine the number of ORs

Criteria Design:
More detailed and easily changed. This phase is a time to dream about the ideal Operating Room Platform. Consider the environment from multiple stakeholders perspectives to design the built environment to suit ideal work process and flows. Sign off on departmental plan.

5. Determine nonstructural components that have structural implications.
6. Determine Areas: types, sizes, # patient care stations
7. Conduct a site visit
8. Determine the manufacturers for architecturally significant equipment.

Detail Design:
Final version that will be submitted to the contractor for bid purposes

9. Determine procedure and process-related equipment needs
10. Identify and review requirements and standards
11. Reconcile the applicable regulatory and accrediting organization requirements and professional practice standards
12. Perform safety risk assessments and identify risk categories.
13. Build a mockup/simulation/model.
14. Modify and adjust the design.
15. Determine the initial budget.

Construction Documents:
Building permits issued & Bids for construction compiled and confirmed. Final Coordination with each discipline. Confirm constructability with Construction Manager (CM). Final documentation and coordination ('blueprints"). Final review with regulatory.

16. Hire the general contractor.

Construction Administration:
City and state reviews. Shop drawings review. Onsite Observations. Review and Process Changes.

17. Start the construction process.

Occupancy:
Transition Planning / Change Management-Training for new care models and logistics planning for the actual move and maintenance of schedule. Move in and adapt to the space. Post Occupancy Evaluation-1 year post-occupancy, evaluate the performance of the environment to the original design intentions and compile wins, changes made and lessons learned.

18. Create an occupancy plan.
19. Perform initial punch-list inspection
20. Continue inspections until all punch-list items are completed
21. Move all mobile equipment into the new area.
22. Provide education on the new environment.
23. Terminally clean the entire area.
24. Move all supplies into storage areas
25. Begin performing surgical procedures in the new area.

Overview of OR Construction and Renovation Projects

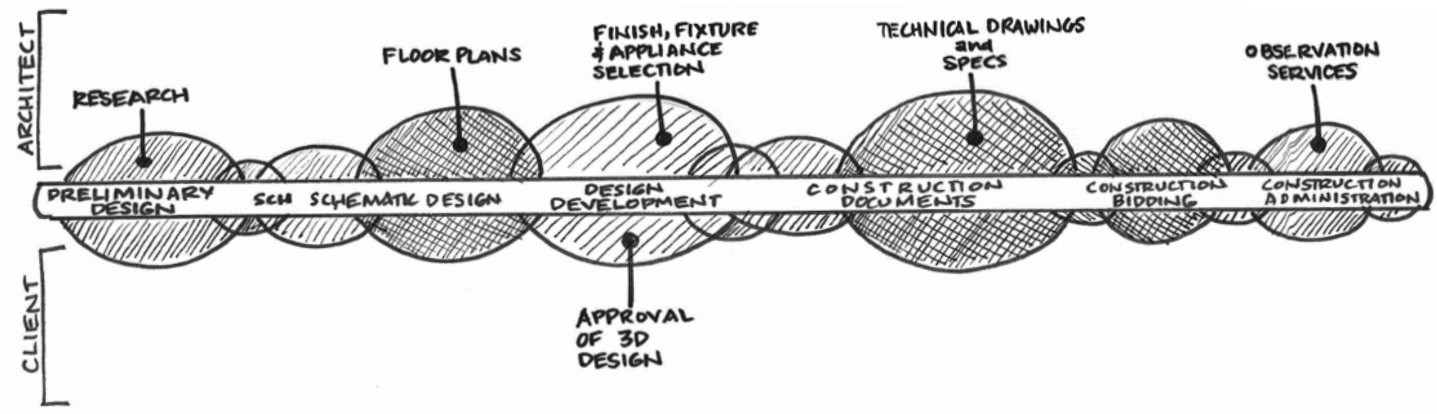
If your facility is following the national trend, you can expect to experience some type of construction or expansion project over the next few years. The reasons for construction are numerous and may include:

- Aging infrastructure
- New building standards
- Insufficient capacity
- An aging population that requires more health care
- Advances in minimally invasive surgery
- New technology (eg, hybrid rooms, robotic integration)
- Addition of safety, security, privacy, and infection control practices and requirements
- Higher standards for handicap access for patients and employees
- The need for workplaces to become more efficient and ergonomic
- The growing number of persons of size

The design and construction of a surgical department is a complex, ever-changing assignment. With the continued development of new equipment, need for integration of equipment, advancement of information technology (IT), development of new procedure techniques, and demands to complete projects within budget and on schedule, the challenge can be daunting but is not impossible to achieve.

The time for a construction project can range from a few months to several years, causing you to wear many hats—from architect liaison to problem solver, from design team facilitator to celebration planner. With the basic understanding of the design and construction process you will gain from this tool kit, you will be able to wear each hat with confidence. So, fasten your hard hat and prepare to learn ways to make the construction and renovation process as painless as possible. (Suggestion: Obtain your own hard hat, as you will be needing it during many steps in the process.)

When you begin, it is important to understand the phases of the design and construction process. Although these steps occur in sequence, they can overlap at times for clarification on use of space and encountering constraints. They have goals that are achieved at the end of each phase. Team members will be involved in varying capacities at each stage and it's important to understand what is necessary to discuss in each phase. Whether it is a renovation or a new construction these phases will still occur.



Validation

Consider the physical, operational, and technological impacts of the built environment. Listed below are questions that are intended to be thought starters for the design process and are not all inclusive. This phase of design is an opportunity to perform a deep investigation of the current state of your system to understand the inefficiencies you are trying to address with the new build. Evidence-based design research is a crucial aspect of this phase as it ensures that best clinical practices and the spaces to support them are built into the future state of the facility. Consider creating a set of guiding principles to refer to, to ensure that the design is facilitating the experience of care that you desire in your future perioperative project. Understanding future processes, the correct space and workflow relationships in this phase saves many change orders further on in the project. During this period of time, the people who begin planning the project may not be the same people who will use the space years out. Documentation of this phase also allows future users to understand the intention of use that was decided upon when technology and care models inevitably change and flexibility is needed.

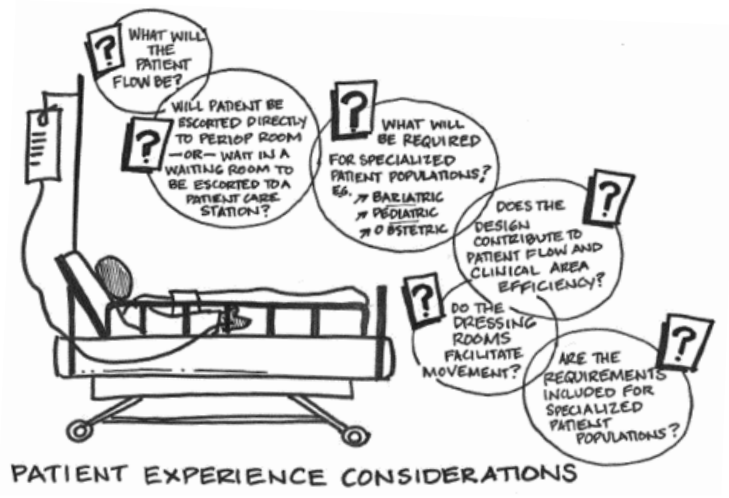
Framing these questions around the term experience reminds the stakeholders to think critically about the things you love and things you'd want to change to carry forward into the future state. Our feelings about certain processes can provoke novel ways to imagine a future that reinforces quality communication, reduces frustration and creates that high flexibility in the future space. By reducing the focus acutely on the physical constraints of space, one can better hone in on imagining and innovating better processes that future care models and technologies for the new build. Manual 2 provided an overview of the various components for consideration when creating a new build, this section highlights ways to consider how those components may fit together to meet your facility performance goals in the future state.

PATIENT EXPERIENCE

- What will be the patient flow?
- Will the patient be escorted directly to the preoperative room or wait in a waiting room to be escorted to a patient care station?
- What will be required for specialized patient populations (eg, person of size, bariatric, pediatric, obstetric, disabled)?
- Does the design contribute to patient flow and clinical area efficiency?
- Will there be dressing rooms or changing areas and if so, do the dressing rooms facilitate ease of patient movement across the episode of care?
- Will there be opportunities for positive distraction while waiting?

ADMITTING | PRE-PROCEDURE PREPARATION

- Admitting area: will this area be shared among multiple procedural, diagnostic services or dispersed for service throughput nuances?
- Where will the admission process be (agent behind a counter, kiosks)?
- Waiting room: will this be a shared waiting room experience or will this also accompany service-based distribution?
- Where will public toilets be located for convenience to waiting area?
- Will private consultation rooms near the waiting area for surgeons to talk with family members?
- Will there be preoperative patient care stations? Where will they be located?
- Will placement of consult rooms allow for discretion of surgeon movement? (allowing surgeons to consult with one family post op, while the next family's loved one is being prepped for surgery with said surgeon).
- What amenities will be offered to enhance the waiting experience of guests and patients?



- What will the patient & family experience feel like? Single check-in or service focused? How will families receive communication updates and experience other amenities while waiting?
- Is the proximity of public toilets convenient to the waiting area?
- Are there toileting options with enhanced accessibility features such as floor mounted toilets, toilets/sinks for persons of shorter stature, gender inclusivity, variety of changing tables for adults and children?
- Are there lactation spaces for persons who breast feed?

FAMILY EXPERIENCE

- Will the family wait in the patient care station or in a waiting room? Is there an opportunity to allow the family to wait in the patient room during the procedure?
- What is the degree of family involvement e.g. Caregiver role (elderly, disabled, pediatric population)? Note: If a family is to be heavily involved there will need to be extra square footage to allow for them to sit and wait.
- Where will the physician speak to the family after the procedure? Will this space accommodate more than one family member? Persons with disabilities? Will this space be capable of showing images for explanations?
- What will be the method of communication between the clinicians and the family?
- Are public toilets located in proximity to waiting areas?
- Are private consultation rooms located near the waiting area?
- Does the design enhance the experience of family members and patients?

PRE/PACU/POST EXPERIENCE

- Where will the postoperative Phase I recovery patient care stations be placed? What style of space will be used? (room with a door, cubicle, bay with curtain)
- Where will the postoperative Phase II recovery patient care stations be placed? What style of space will be used? (room with a door, cubicle, bay with curtain)
- Will there be a separation of Phase I & Phase II recovery patient care stations?
- Documentation/workstation (eg, between private rooms): Where will documentation areas be located? Corridor,strictly in room, centralized desk?
- Where will hand washing stations be located (in consideration of guidelines)?
- Where will storage for clean and soiled laundry be located for rapid turnover of spaces?
- Where will supply and equipment storage areas/ rooms be located for equal unit access and rapid replenishment of spaces?
- Where will environmental services rooms be located for equal unit access and rapid turnover?
- Where will soiled storage room/waste holding room in consideration of clean to dirty traffic flow?

PROCEDURAL EXPERIENCE

- Where will procedures be performed that do not require a restricted environment?
- Will the support areas (eg, blood bank, pharmacy, laboratory) be centralized or decentralized?
- Will patient care support areas be shared or department specific?
- Will a pneumatic tube system be used?
- Does the door to the recovery room provide access to the surgical suite without crossing public hospital corridors?

OPERATING ROOM EXPERIENCE

- What will be the case mix of the operating platform: strictly surgery, IR, endoscopy, cardiac catheterization lab?
- Will rooms be created with a pod layout, centering a sterile core around several procedural rooms?
- Will there be universal rooms that allow for maximum flexibility of case assignment? Will there be a mix of rooms to facilitate throughput for a variety of cases within a service? For example, small procedure room, hybrid room, operating room around a sterile core.
- If creating a new facility, which procedures will be performed in the hospital environment and which ones will can be decanted to the outpatient and ambulatory surgical setting?
- If there are a mix of inpatient/outpatient services performed on this platform, what will the arrival, prep and recovery spaces of both patient populations look like to facilitate throughput?
- How will the surgical platform communicate & connect with other key departments? Adjacencies to the emergency department, ICU and L&D platform?
- What disaster preparedness measures will be taken to ensure operational flexibility will be capable of adapting to increased or specialized demand? Surges in infection, mass casualty, environmental disaster, etc.?
- Which services will be maintained behind the redline and how will that impact their service throughput and ability to cross-collaborate between services for complex cases?

PACU | POSTOPERATIVE RECOVERY EXPERIENCE

- Postoperative Phase I recovery patient care stations
- Postoperative Phase II recovery patient care stations
- Extended Postoperative Phase II recovery patient care stations
- Will there be an opportunity to bypass PACU altogether?
- Will there be a need for direct-to-ICU pathway(s)?
- Centralized, decentralized or hybrid arrangement for nursing work stations (eg, between private rooms) Where will documentation areas be located?
- Where will hand washing stations be located (in consideration of guidelines)?
- Where will storage for clean and soiled laundry be located for rapid turnover of spaces?
- Where will supply and equipment storage areas/ rooms be located for equal unit access and rapid replenishment of spaces?
- Where will environmental services rooms be located for equal unit access and rapid turnover?
- Where will soiled storage room/waste holding room in consideration of clean to dirty traffic flow?

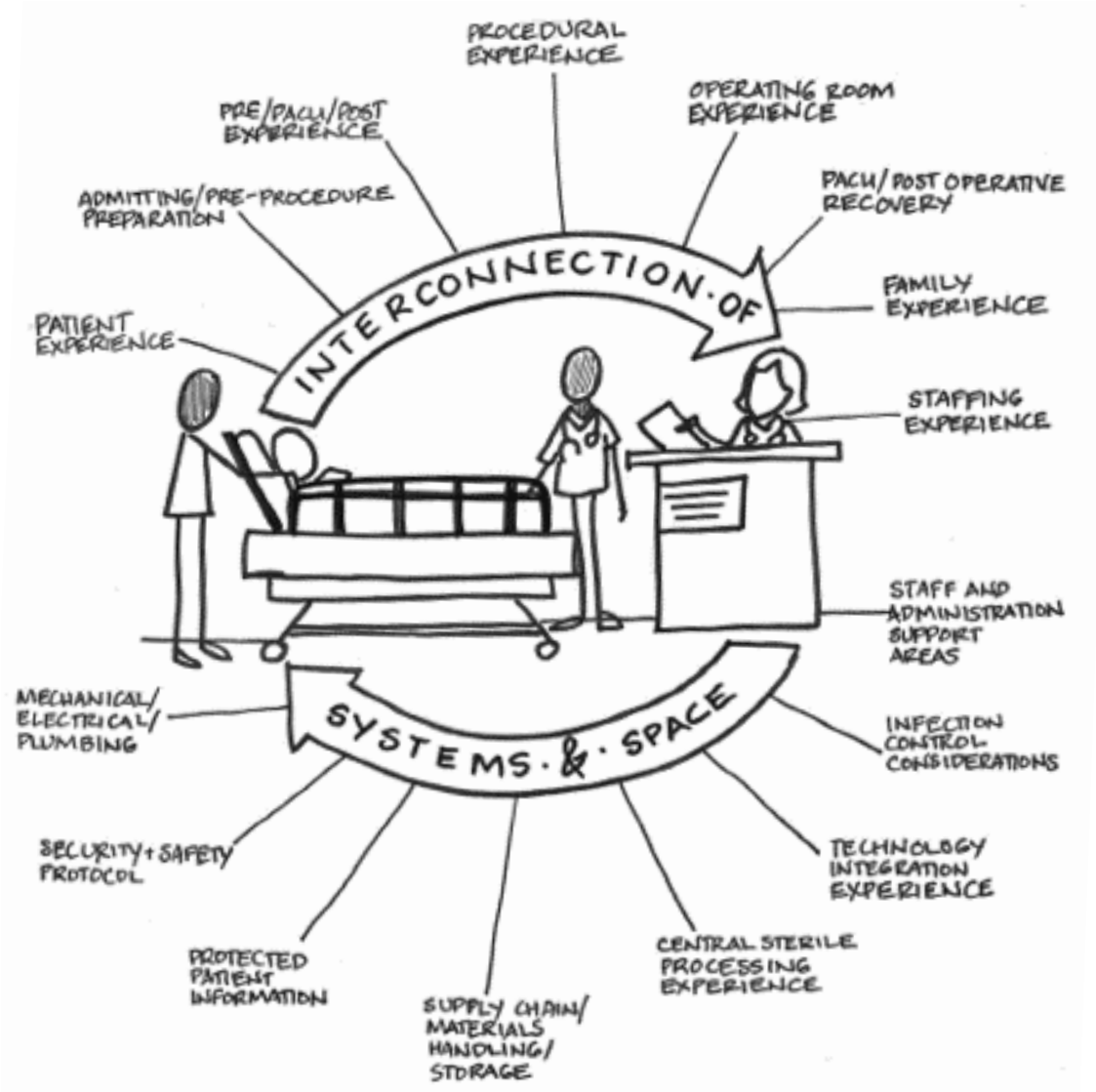
STAFFING EXPERIENCE

- What will the staffing model be (eg, number of personnel, presence of support personnel)?
- Will the staff support areas (eg, locker rooms, lounges, staff bathrooms) be shared or departmentspecific?
- Are there opportunities for respite rooms and lounges behind the redline?
- Are there locations for lactation rooms behind the redline for breastfeeding clinicians?
- Are telecommunication systems/integrated systems (ie, PACS) included with an adequate number of interfaces?
- Is the location of the pneumatic tube system convenient to users?
- What is the supply access to support the individual surgical suites?
- What is the pathway for surgical personnel?
- Is the pathway convenient for transporting equipment, specimens, supplies, linen, and waste in and out of the OR?
- Are offices located for convenient access to members of the perioperative team?
- Are hand washing stations conveniently located for users?
- Are scrub facilities located appropriately for each operating room?
- If required, is there a soiled workroom/storage room?

MECHANICAL/ELECTRICAL/ PLUMBING

- What will be the required capacity of utilities (eg, boilers, water, sewage, steam generators, air handling systems, IT infrastructure, medical gas, emergency power systems)?
- Is a universal power source required? *This is especially important for large equipment installations such as surgical robots and hybrid single plane, bi-plane systems
- What will be the method of fluid management (eg, an integrated system, vacuum with canisters, a mobile suction system that requires docking stations for discharge, a combination)?
- Is the plumbing for the integrated fluid management systems located in the soiled workroom or other soiled area (eg, decontamination in sterile processing)?
- Are the connections for air-powered equipment present if required?
- Is the capacity of utilities (eg, water, sewage, boilers, steam generators, air handling systems, IT infrastructure, medical gas, emergency power) greater than the demands of the new equipment?
- Does the design include provisions for the separation of existing functioning areas and construction areas (eg, barriers, negative air pressure on the construction side)?

ADDITIONAL CONSIDERATIONS



Project Steps

When the concept for a construction project starts in surgical services, a justification plan should be developed. The details of this plan can vary from high level to very detailed. The plan can include as many steps of this process as needed to convince the administration that construction or remodeling is necessary.

The steps described here can also be used for new construction and, in this situation, will be used for justification of the needs of the surgical services area. The justification plan for the scope of the project may include:

- Utilization: current and future projections
- Description of what may happen if the project is allowed to proceed
- Description of what may happen if the project is not allowed to proceed
- Description of the solution (eg, remodel existing space, build a new addition onto the current building, build a new building). The justification plan may be created by the surgical services management team or preferably by the team assembled in Step 1.These steps listed here are suggested; many may occur simultaneously. The examples listed are not all inclusive.

STEP 0:

The perioperative leader has initial "meeting of the minds", outlining responsibilities for each major stakeholder:: architects bringing their understanding from previous healthcare projects (understanding of critical adjacencies, codes, etc.) and multidisciplinary team (potential members of this team listed in Manual 1) for kick-off meeting.

STEP 1: Gather the support team.

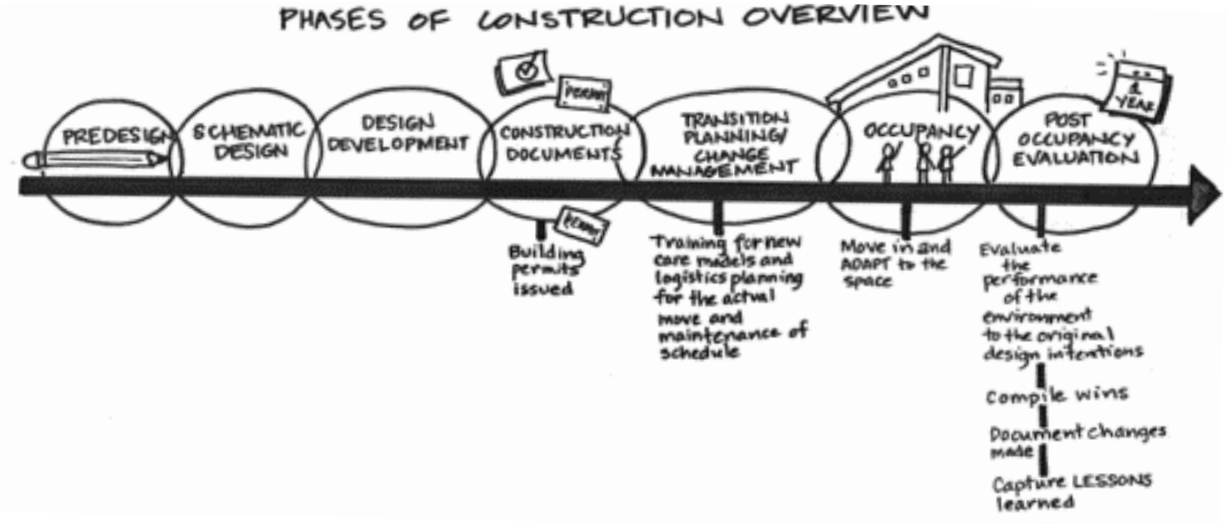
The support team should consist of the surgical services manager, representatives from the anesthesia department, the physicians who practice in the area, infection prevention personnel, sterile processing personnel, perioperative personnel, and personnel from other areas that will be affected by the construction (eg, PACU, preop admission, radiology, pharmacy, environmental services, information technology, units receiving postoperative patients, purchasing, clinical laboratory, safety/security, biomed).

The team is responsible for performing all of the following steps in the process. Not all of the team members will be involved in every step of the construction process, but they should be called on for their expertise as it is needed. At strategic points (eg, schematic design, design development), obtain sign-offs from these stakeholders on the design. This will ensure everyone has been given equal opportunity to participate and give feedback. It also provides documentation of approval to mitigate later requests for changes in the design.

The patient perspective should also be included, and this can be accomplished by having a patient and family focus group. This can occur any time between Step 1 and Step 12, but it is best to consider the patient experience earlier in the design process as they provide a unique perspective of the built environment that can lead to improved patient satisfaction in the future design.

These teams of end users may be involved in decisions covering topics such as defining logistics, the control desk, the pharmacy, family areas, high-tech needs, and equipment to be included inside the rooms.

to discuss in each phase. Whether it is a renovation or a new construction these phases will still occur.



Stakeholders

Departmental leadership

Administrative leadership

Frontline users

Patients and family members

Provide input on the development of the built environment. Good sources for these members are unit practice councils, shared governance bodies, and departmental leaders who collaborate well with others and have a deep understanding of frontline needs, future trends and advocates for quality performance.

It is important to bring in frontline users as early as possible in the process as they provide unique insight into the current problems to address, current solutions to bring forward and what ways the unit can support staff and patient experience.

Bring your key stakeholders to discuss the future of the new space. Understand operational successes to bring forward and build upon. Understand operational inefficiencies that are created due to space constraint and built environment design. Think critically about current and future state processes to avoid bringing assumptions of operational inefficiencies to the new plan to prevent overbuilding.

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STEP 2: Hire the external team.

Having a design team to help with the predesign validation phase provides assistance in understanding design trends, design elements to support care models, and makes it easier to facilitate a variety of design iterations to consider early on in the visioning process. Please refer to Manual 1 How We Begin for more information on this process.

This team may be employees of a specific company, or the individual positions may be hired separately. The members of the team will fluctuate depending on the size of the project. This team may consist of:

- Project manager
- Architect
- Engineers
- Clinical planner
- Civil engineers
- Medical equipment planners
- Cost consultant
- Interior designers

When choosing an architect and general contractor consider:

- The person or the company's experience on similar projects
- Evidence of health care knowledge
    - Architect's involvement with the AIA Academy of Architecture for Health Healthcare–specific certifications
    - Architects: American College of Healthcare Architects (ACHA)
    - Contractors: Certified Healthcare Constructor (ASHE-CHC)
    - The stated ability to meet schedule and budget requirements
    - Previous project references related to:
        - » Ability to problem solve
        - » Ability to collaborate with the OR
        - » Difficulty going through the chain of command (eg, steps required to have a change order performed)
        - » Communication skills
        - » Compliance with infection prevention measures
        - » The plan and process for onboarding of personnel (eg, classes for new personnel and subcontractors).

STEP 3: Determine the Communication Plan.

A dual-level communication plan should be created to communicate what is occurring. The first level provides detailed information to all members of the perioperative team and to all portions of the facility that are directly affected by the construction. The second level provides high-level information to persons in the portions of the facility that are not directly affected and to members of the community. A public relations or marketing person may be added to the team to facilitate communication. The person responsible for the communication plan should attend construction meetings to stay informed.

The communication needs to be shared broadly because, unless the construction is a new facility, the construction effort will affect everyone in the existing facility due to things like loss of parking space used for construction staging, increased noise, and construction traffic in the facility.

A variety of media (eg, posters, newsletters, posted notices, OR committee meetings, OR logistics meetings, nursing management meetings, nursing council meetings, department director meetings, all electronic means available) should be used to distribute the information. One method of communication is to hold regular meetings with all key players including the entire perioperative team (eg, surgeons, anesthesia professionals, OR nurses, scrub persons); radiology, lab, and sterile processing personnel; and everyone who supports and uses the OR services.

Key points to be communicated are regular construction progress reports and construction-caused interruptions to the normal workflow (eg, patient flow diversions, surgical schedule demands, construction phasing, hours of operation). One activity to help with the communication is to anticipate staff inconvenience and resistance. Taking these into consideration can assist with maintaining positive staff morale.

STEP 4: Determine the number of ORs.

Key component of this volume determination is making sure that the process itself doesn't need to be evaluated for efficiency. Sometimes the issue is not the space but processes that are inefficient. It is beneficial to ensure that a process evaluation methodology is used and once confirmed as the most efficient (addressing bottlenecks, technology hiccups, etc.) then confirm number of ORs/Procedure Rooms necessary.

The following formulas may be used to determine the number of ORs needed and the potential number of procedures that can be performed per OR per year.

Formula: Total OR time per procedure = The average minutes per procedure (may be based on historical data) + average turnaround time.

Hint: Average turnaround time can vary significantly from minor to more complex cases. The average for minor procedures may be 15 minutes and for more complex cases may be 25 to 30 minutes.
Total OR time/year = Total OR time per procedure x number of procedures per year (may be based on historical data).

Hint: When estimating the number of procedures, a decision needs to be made concerning where obstetric services will be performed—in a designated operating room, in the labor and delivery unit, or in the surgical services area. Considerations include who will be staffing the cesarean delivery OR, the kind and number of other procedures that will be performed there, and what special equipment is required. If obstetric services will be performed in the surgical services area, be sure to include these numbers in the estimate.

Number of ORs needed = Total OR time per year ÷ available operating hours per OR per year ÷ goal utilization rate.

Available operating hours per OR per year is the preferable number of hours available per OR for scheduling a procedure.

- 2,000 hours = 8 hours/day x 5 days/week x 50 weeks/year
- 2,500 hours = 10 hours/day x 5 days/week x 50 weeks/year
- 3,000 hours = 12 hours/day x 5 days/week x 50 weeks/year) Using 50 weeks/year assumes ORs are closed for 10 holidays/year. Goal utilization rate is the goal for the amount of time the ORs are in use. (Average = 65% – 85%) Be sure to allow a fractional allowance for unexpected increases in volume.

Criteria Design:

The hospital establishes the main goals and budget of the project. A floor plan is created with a general placement of the department spaces and adjacencies are established. Allocation for equipment, interior and exterior design (if required). Please see Manual 4 for more information on reading drawings, understanding layouts and making changes to the plan.

STEP 5: Determine nonstructural components that have structural implications.

The presence or absence of the nonstructural components will determine the types of unrestricted and semi-restricted areas (eg, waiting rooms, preoperative/postoperative areas), size, and quantity of areas or patient care stations within the area. Items that may affect the nonstructural components include the number of ORs, the culture of the community, the culture of the facility, and the types of procedures performed (eg, ambulatory, inpatient, or some combination).

The questions below will assist you in determining the nonstructural components required:

- How many operating rooms are planned?
- What types of operating rooms are planned?

In modern ORs, one must also account for the use of hybrid/interventional radiology operating rooms and their relationship to the procedural platform. The programming must consider the number behind or beyond the red line for functional/efficiency purposes. Nonsurgical procedure rooms (eg, endoscopy) should also be considered as part of the larger surgical flow as many services can overlap for a variety of complex clinical needs.

- What will be the number and size of the areas that are semi-restricted or unrestricted? (Note: These areas can be either semi-restricted or unrestricted based upon the entry points. Entry points should be close to the area being served.)

Consideration for the pre/PACU/post should also consider the patient volume ratio for procedure to recovery. Consider patient flow and case turnover to optimize patient flow and supply logistics.

- What will be the number of and size of the areas that are unrestricted?
- What will be the number and size of the areas that are semi-restricted

How much flex space is needed for future growth?

STEP 6: Determine the types of areas (eg, waiting room, ORs, preoperative/postoperative areas), size of the areas, and number of areas or patient care stations within the areas.

To determine the types, sizes, and quantities of areas or patient care stations within the areas, use the information from Steps 1 through 5 and the answers to the following questions (Note: If one of the areas is not needed, do not forget to determine where the functions that should occur in that area will be performed or if these functions are not needed):

STEP 7: Conduct a site visit.

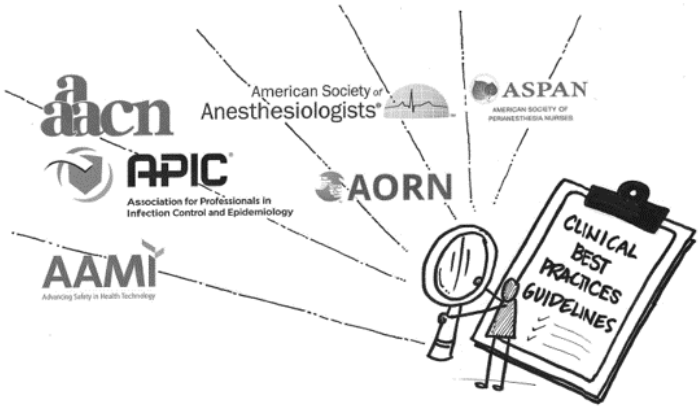
This step is optional, but many feel it is an important step that should occur before planning begins. In this step, the team members may tour similar facility construction sites or recently completed renovation projects. These site visits provide an opportunity to ask questions that will help the team understand the demands of a construction project and to discuss with personnel at other facilities what did and did not work well.

STEP 8: Determine the manufacturers for architecturally significant equipment.

After compiling the list of architecturally significant equipment, select the equipment manufacturers. After choosing a manufacturer, add the manufacturer's representatives to the team as applicable. They will play a critical role to plan layout for large scale device installations.

Detail Design:

Refinement of the schematic design that specifies the design, furniture and installed fixtures of each room. The individual internal workflows of each room are considered and assessed for the placement of equipment, elevations (heights of items in the room) and other integrated systems components. At this stage feasibility and cost will be analyzed to ensure the design is within budget. You will do this along with the design team on the construction documents, please see Manual 4 Reading Construction Documents for more details.



STEP 9: Determine the procedure- and process-related equipment needs.

During the design phase, the internal team should determine the non-fixed or mobile equipment needs for the entire area. These may also have an effect on the size of the space (eg, a bariatric table occupies more space than a regular-capacity table).

- Anesthesia equipment (eg, anesthesia machines, stools, supply/medication carts)
- Endoscopy towers
- Radiology equipment (eg, digital x-ray, C-arm, robotic equipment)
- Gurneys
- OR bed
- Instrumentation
- Storage systems (eg, mobile, fixed shelving units, movable but on a track system, combination)
- Mobile equipment (eg, back tables, anesthesia machines, anesthesia medication carts, ring stands,stools, chairs)
- Emergency supply storage systems (eg, code carts, MH carts)
- Lasers and laser supply carts
- Case carts
- Seating (eg, waiting room, front desk, offices, operating rooms, other workstations)
- Medication dispensing systems
- Method of fluid management (eg, an integrated system, vacuum with canisters, combination)
- Other furniture (eg, desks, cubicles, file cabinets, bookshelves, computer stands)

STEP 10: Identify and review the applicable regulatory and accrediting organization requirements and professional standards.

As the clinician you will not be responsible for knowing all of the building codes and regulatory standards that the design firm knows, just understand their impact on your design project. Thoroughly informing the design team on the healthcare activities performed in each space, the clinical care model (both current and future processes) and the best practice clinical guidelines help to create a shared language across the table. Bringing an in depth understanding of current state built design barriers and facilitators and a plan for the future state model guided by best practice standards (while remaining flexible as technology, market forces, and any variety of factors can change the plans) will bring forth the best design outcomes.

Use these documents to determine the requirements or recommendations for the size and defining features of the areas and for assistance in interpreting the requirements and recommendations from:

Clinical Best Practice Guidelines

- American Academy for Ambulatory Care Nursing
- American Society of Anesthesiologists
- American Society of PeriAnesthesia Nurses
- Association for Professionals in Infection Control and Epidemiology
- Association of periOperative Registered Nurses
- Association for the Advancement of Medical Instrumentation

Built Environment Codes and Regulations

- Americans with Disabilities Act
- Facility Guidelines Institute
- International Code Council
- National Fire Protection Association

Healthcare Safety and Security Guidelines

- International Association for Healthcare Security & Safety

Regulatory Accreditation & State Governing Bodies

- The Joint Commission
- The DNV
- Occupational Safety and Health Administration
- State Department of Health (for state licensure requirements)
- Department of Defense VA TIL guidelines
- Does the design meet the requirements or recommendations from professional organizations, accrediting bodies, and governmental agencies?

STEP 11: Reconcile the applicable regulatory and accrediting organization requirements and professional practice standards with the requirements determined in Step 10.

STEP 12: Perform safety risk assessments and identify risk categories.

Safety risk assessments include the following:

- Infection control risk assessment [ICRA]
- Patient handling and movement assessment [PHAMA]
- Fall prevention assessment
- Medication safety assessment
- Behavioral and mental health risk assessment
- Patient immobility assessment
- Security risk assessment
- Electrical wet location assessmentIdentify risk categories for spaces and equipment per NFPA 99. (See NFPA Categories in the Glossary).

STEP 13: Build a mockup/ simulation/model.

3D computer renderings are effective tools for a general visualization of the rooms, but it is suggested that where possible, physical mockups of the room with cardboard to replicate equipment, walls, doorways, and other items be created. Actual equipment can be moved into the room and arranged to determine optimal room layout. It also may prove helpful to tape out ceiling and ceiling-mounted equipment layout on the floor before actual construction of the ceiling. Scenarios should be developed to test the usability of the space; the tests should be conducted by personnel who are and who are not members of the support team.

STEP 14: Modify and adjust the design.

The design should be carefully reviewed by the entire team for functionality and to determine the presence/adequacy of various systems. The plans will include details that fully describe the quality and specification of materials, including finishes for walls, ceilings, and floors. The plans will also show the elevations (front, rear, sides), electrical layouts, plumbing, mechanical systems, and other items.

STEP 15: Determine the initial budget.

This is a preliminary budget and is a starting point for estimation only. This budget must be refined, and the final budget will be determined before or just after the hiring of the contractor.

The overall budget is determined by additional factors, including but not limited to, the square footage of the project, in addition to the FFE (equipment), design fee, construction costs and additional budget for miscellaneous costs.

Construction Documents: The design has been finalized and sign off has been obtained. Construction can begin if a general contractor has been selected.

STEP 16: Hire the general contractor.

The general contractor usually hires the sub-contractors, including:

- Electricians
- Plumbers
- Painters
- Finishers
- Tile installers
- Flooring installers

Construction Administration:

Break ground and begin construction process. There will be regular meetings to provide updates on construction progress, potential change orders (hopefully none if validation/predesign is done thoroughly) and ensuring all things go to plan.

STEP 17: Start the construction process.

The construction process begins with the turning of the first shovel of dirt and ends at the time of occupancy.

Key elements to a smooth construction administration process are:

- Assign specific roles and share tasks.
- Ensure fair and open bidding processes for contractors and materials.
- Communicate clearly and in real-time.
- Keep detailed records of everything.
- Use policies and tools to track progress and quality.

It is important to maintain consistent references to the original plan for maintaining an on-time construction schedule. Often, it is minor setbacks that accumulate over time. Other critical elements of this process are:

- Establishing a consistent construction phase plan with milestone markers to address timely performance and anticipate any potential setbacks that may need to be addressed to maintain scheduled delivery.
- Required resources, milestone work products, and assurance that the project plan is being followed
- Consistent confirmation and maintenance that project scope is understood and stays within the specified parameters upon completion of the design.
- Thorough and regular review of financial transactions to ensure budgetary scope is protected, facilitating review, auditing, and asset management. This step will be performed over the lifespan of the project.
- Ensuring the capital budget and cashflow support the continued project deliverables.

Occupancy/Transition Planning / Change Management:

Begin planning for occupancy, ideally 9 months to 1 year before planned move-in date. A time to determine the smoothest transition for operations while promoting care models and culture that support the planned use of the new space.

STEP 18: Create an occupancy plan.

Create a plan for occupancy that includes:

- Identifying all occupancy milestones
- Educating personnel on the use of new equipment
- A process for moving from the existing location to the new location
- Services that will be available during the move
- Cleaning of the new areaCommunicate the plan to all involved parties. Remember: Communication is a key component of the plan.

STEP 19: Perform a punch-list inspection of the environment and of all structural related systems and installed equipment.

This is performed by the support team, external team, manufacturers' representatives, and contractors. This includes testing:

- All utilities (eg, water, sewer, natural gas, steam)
- Utility hookups
- Medical gases
- Instrument air
- Surfaces and finishes
- Emergency systems
- Installed equipment
- Security systems
- Integrated systems (eg, PACS)
- Life safety systems
- Communication systems
- HVAC systems
- Electrical systems
- Emergency power systems
- Biologically test all installed equipment that requires testing (eg, sterilizers).

STEP 20: Perform a punch-list completion inspection.

This step is repeated until all the punch-list items have been completed.

Project Punch List:

Project: [add project name/number]

Todays Date: Sunday, 20 August 2023

Issue ID	System Type	Priority	Status	Days Live	Responsible Party	Equipment/System ID
001	BMS	1	Open	62	Owner	[add ID]
002	BMS	2	Ongoing	58	Facilities	[add ID]
003	BMS	3	Closed		CxA	[add ID]
004	EE	1	Ongoing	58	MEP Designer	[add ID]

STEP 21: Move all mobile equipment into the new area.

STEP 22: Provide education on the new environment.

- Conduct an employee orientation to the unit.
- Conduct employee training on new equipment.
- Present an open house for physicians, personnel, volunteers, and the general public.
- Conduct a "mock surgery" procedure with all personnel present.

STEP 23: Terminally clean the entire area.

STEP 24: Move all supplies into storage areas.

STEP 25: Begin performing procedures in the new area.

Post Occupancy Evaluation:

Usually performed one year later, the goal of a Post Occupancy Evaluation is to understand the design solutions that worked well and design solutions that may have been barriers to efficient care. This process will help understand building project design, future transition planning, and flexibility of the environment to adapt to emerging/evolving clinical practice standards.

Resources

AORN Tool kit. (2019). AORN

FGI 2022 Design Guidelines for Design and Construction of Hospitals

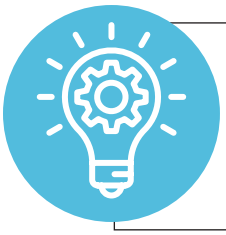
Grunden, N., & Hagood, C. (2012). Lean-led hospital design: Creating the efficient hospital of the future. CRC Press.

Gupta, T. Planning, Design, and Construction of Healthcare Facilities, AIA, Joint Commission Resources, 4th Edition.

Stichler et. al (2015). NIHD Handbook. HermanMiller.

Strategic Planning and Construction in Turbulent Times for Hospitals. (2023, August). Mossadams.com. https://www.mossadams.com/articles/2023/08/construction-project-strategy-for-hospitals

Design Process



VALIDATION

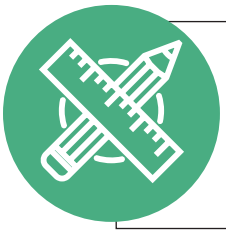
Big Picture

- Define high-level space program
- Review future state process maps
- Detail space planning
- Align needs/wants with schedule and budget

CRITERIA DESIGN

Key Adjacencies and Critical Flows

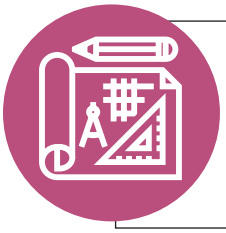
- Department adjacencies and locations
- Critical flows (review and improve)
- Site plan layout
- Building footprint/massing
- Capture future space needs
- Confirm scope and costs
- Opportunities for innovation



DETAIL DESIGN

Focus on Details

- Room-specific requirements
- Furniture, fixtures, and equipment (FF&E)
- Review mechanical, electrical, IT, security
- Coordinate code requirements
- Discuss site details and landscape
- Reconfirm scope and cost
- Finalize and sign off interior/exterior design & signage



CONSTRUCTION DOCUMENTS

Prepare Documents

- Final coordination with each discipline
- Confirm constructability with Construction Manager (CM)
- Final documentation and coordination (“blueprints”)
- Final review with regulatory agencies

CONSTRUCTION ADMINISTRATION

Break Ground

- City and State Reviews
- Shop drawing Reviews
- On-site observations
- Review and Process change orders

OCCUPANCY

Grand Opening

- Change Management
- Transition Planning
- Supply/stage space
- Trial/practice runs
- Open Doors!

Post Occupancy Evaluation

- Evaluate performance to the original design intent