

# Designing a Heart Center

## Abstract

Cardiovascular disease is the number one killer in the U.S. As a result, more hospitals are beginning to offer diagnosis and treatment for cardiovascular disease and open-heart surgical procedures. To date, comprehensive guidelines and standards for space requirements and design of heart centers have not been established. This paper will establish design guidelines and space requirements for non-invasive cardiology suites. The paper will also outline a means to consolidate all of the needed care services (i.e., cath lab, non-invasive cardiology, open-heart surgery, and cardiac rehabilitation) to create a heart center of excellence.

# Designing a Heart Center

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Figure 1: Minneapolis Heart Institute in Minneapolis, Minnesota.

Cardiovascular disease is the number one killer in the U.S. The American Heart Association (AHA) estimates that cardiovascular diseases claimed 959,227 American lives in 1996, and that 58,800,000 Americans have one or more forms of cardiovascular diseases. As a result, more hospitals are beginning to offer diagnosis and treatments for cardiovascular diseases and open-heart surgical procedures.

Starting open-heart surgery (invasive) and cardiology (non- and semi-invasive) programs is a major endeavor. These programs cross the traditional boundaries of surgery and medicine requiring specialized physicians, nursing, facilities, and logistical support. They also require commitment of large financial resources.

Traditionally, hospitals have grouped their functions and facilities by departments. Cardiologists usually report to the department of medicine; cardiovascular surgeons report to department of surgery. Radiologists report to the department of radiology. Chest pain observation is managed by the emergency department. Generally, overall responsibility is not determined for cardiac care.

Incorporating specialized facilities for open-heart programs within their existing physical plant is also challenging for the hospitals. Most hospitals cope with this challenge by dedicating open-heart operating rooms in their existing surgery suites by expansion or modification. The facilities also squeeze in one or two cath lab suites near imaging or surgery, incorporate chest pain/observation units in the emergency departments, dedicate an ICU as cardiovascular ICU and locate non-invasive cardiology in the physicians' office building. This fragmented approach often results in confusing transfers and pathways for patients and families, inefficient use of physicians' time and operation, and excess costs. Additionally, as the cardiology and open-heart programs grow, hospitals often find themselves burdened with placing more facilities in existing departments or undergoing expensive facility relocations.

Today's reimbursement patterns of bundled pricing demand an integrated approach to provide cardiac care in a cost-efficient and coordinated manner. This integrated approach requires

- Delivery and management of cardiac care by a cardiovascular team and standardization of clinical protocols
- Consolidation of facilities in a heart center for the delivery of cardiac care

Comprehensive guidelines and standards for space requirements and design of heart centers have not been fully developed. However, a model is emerging for heart centers consolidating all facilities required for cardiac care in a single facility with its own identity and entrance. A heart center can be freestanding, adjoining a hospital, or be within a hospital--similar to the concept of women's centers.

Components of a heart center:

1. Preventive care/screenings and physician offices
2. Non-invasive cardiology
3. Invasive cardiology
4. Chest pain observation/patient prep and recovery
5. Cardiovascular and cardiac intensive and acute inpatient care
6. Cardiac rehabilitation
7. Administrative areas
8. Logistical support areas

### 1. Preventive care/screenings

Cardiovascular disease is a progressive disease. As the “baby boomer” population is aging, more people will reach advanced stages of congestive heart failure. Most of this population will not have checkups and/or preventive care. Payers are realizing that comprehensive cardiovascular screenings will increase the odds of early detection and reduce overall health-care costs. Preventive care will use non-invasive modalities and require facilities such as consult rooms, patient education areas, and physician offices.

### 2. Non-invasive cardiology



Figure 2: Typical plans of various non-invasive cardiology rooms.

New technologies are constantly being developed to diagnose and treat cardiovascular diseases with non-invasive modalities. The use of these modalities is expected to rise with the emphasis on preventive care. The non-invasive cardiology suite can be organized with its own reception/registration, waiting areas and patient lockers/changing areas. The following are typical non-invasive modalities and area requirements:

Non-Invasive Procedure Room	Functional and Equipment requirements	Net Area
Electrocardiography (EKG)	Stretcher, EKG machine, lavatory, staff work st.	180SF
Echocardiography (ECHO)	Stretcher, ECHO machine, lavatory, staff work st.	180SF
Peripheral Vascular Lab	Stretcher, vascular lab, lavatory, staff work st.	180SF
Stress Lab	Stretcher, EKG machine, tread mill, staff work st.	220SF
Holter/Events Monitor	Holter Monitor, patient chair, staff work st.	120 SF
Nuclear Cardiology	Gamma camera, control console, needs hot lab	320SF
Ultra-fast CT Scan	CT scanner	350SF
■ Equipment Room	Electronic equipment	80 SF
■ Control Room	Control console	120SF
Reading station	Digital/film viewer	60-80 SF/St.

### 3. Invasive cardiology



Figure 3: A typical cardiac cath lab layout.

All procedures that require patient preparation and recovery due to invasive nature of the diagnostics and treatment should be grouped together. Cardiac cath labs are becoming more invasive and require sterility similar to the surgery suite. Invasive cardiology that includes the cath labs and cardiovascular operating room should be organized as a separate suite with separate reception/registration and waiting. The suite should be designed with restricted access. The staff lockers and change areas must be configured allowing staff to enter from unrestricted areas, change, and proceed directly to the restricted area.

As an alternate arrangement, the cardiovascular operating rooms can be located in an adjoining surgical service of the hospital. Additional support areas, such as soiled holding, cath lab viewing, digital/cine storage, and administrative space, are required in an invasive cardiology suite.

Invasive Procedure Room	Functional and Equipment Requirements	Net Area	Comments
Cath Lab	Cath lab equipment	600SF	Separate alcove for scrub and lead aprons
Control Room	Control console	120SF	Glazed window to cath lab
Equipment Room	Electronic equipment	150SF	located adjacent to cath lab
EP Lab	EP equipment	600SF	Separate alcove for scrub
Control Room	Control console	120SF	Glazed window to EP lab
Equipment Room	Electronic equipment	150SF	Located adjacent to EP lab
Cardiovascular OR	Equipment and space for surgeon, anesthesiologist and heart monitoring	700SF	Scrub alcove, stretcher alcove
Heart Pump Room	Storage of heart pumps	120SF/OR	Can be combined for 2 OR's
Sterile Core	Storage of case carts/supplies	100SF/Proc. Rm.	Storage of catheters and sterile supplies

#### **4. Chest pain observation/prep and recovery**

Areas that require nursing support chest-pain observation areas, patient prep, and recovery for cath lab can be grouped together. Clinical support areas include clean utility, soiled utility, medication room, and nourishment rooms. The patient prep and recovery can be designed in cubicles with curtains, three-wall cubicles, or enclosed rooms with glazed fronts. Outpatients typically change in their cubicles prior to and after the procedures.

#### **5. Cardiovascular and cardiac intensive and acute inpatient care**

A cardiovascular intensive care unit provides critical care after open-heart surgery. The unit should have convenient and direct access from the cardiovascular operating suite. Cardiac intensive care units house patients undergoing treatment for a cardiac attack. The design of these units is similar to typical critical care units. Separate waiting area for families should be included. The patient rooms should be 225- to 250-square-feet, including a toilet area. A cardiac care unit is utilized for step-down patient care from intensive care and inpatients undergoing evaluations. (As more procedures are being completed on an outpatient basis, use of the cardiac acute care unit is expected to be reduced in the future.)

#### **6. Cardiac rehab**



Figure 4: A typical cardiac rehabilitation layout.

Rehabilitation is an essential part of recovery after cardiovascular surgery or other cardiac treatment. For Medicare reimbursement purposes, this area is generally required to be separate from physical therapy spaces. A running track, and spaces for aerobic exercise, nutrition counseling, and exercise equipment are essential components for Phase 2 and 3 rehab after surgery. Separate areas for healthy people should be included for Phase 4 recovery.

Cardiac rehabilitation should have its own entrance and adjacent parking for convenience of the outpatients

#### **7. Administrative areas**

to coordinate the integrated cardiovascular service, a management team is required for each of the services. A separate office suite should be provided for the management team.

#### **8. Logistical support areas**

A heart center adjoining a hospital can share all logistical services, such as materials management, environmental services, food service, and plant operations. All of these services are required for a freestanding heart hospital--making it more capital intensive to build and operate.

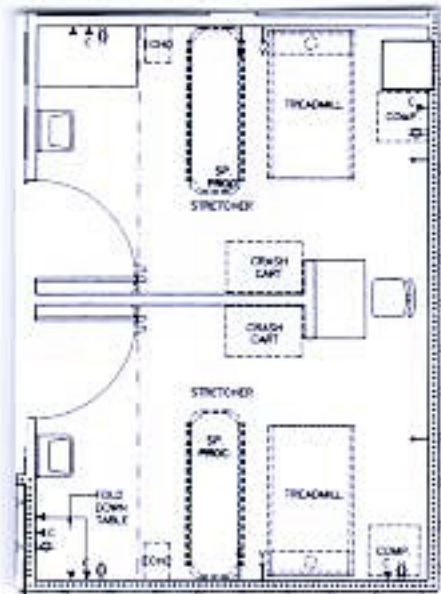
These components for a heart center can be organized vertically or horizontally, allowing each component the ability to grow and accommodate future technological changes. Separate vertical and horizontal circulation systems for outpatient and inpatient services should also be planned, using design guidelines appropriate to the size and model of the hospital.

Future success belongs to health-care providers who can work together and deliver cost-efficient cardiac care. Consolidated heart centers have the critical mass to achieve efficiencies with dedicated nursing, support staff, and logistical support. The heart centers of the future will provide care in a patient-focused and staff-friendly environment.

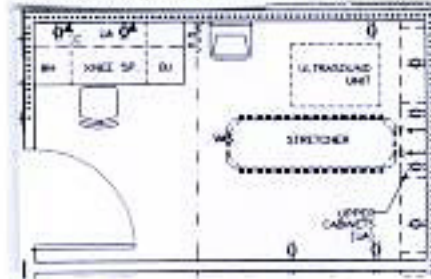


Figure 1: Minneapolis Heart Institute in Minneapolis, Minnesota.

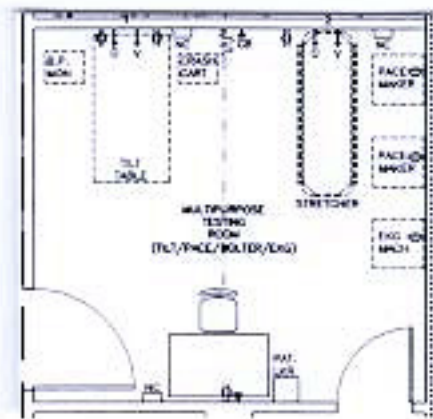




A typical stress laboratory for non-invasive cardiology.



A typical peripheral vascular lab/echo room for non-invasive cardiology.



A typical multi-testing room for non-invasive cardiology.

Figure 2: Typical plans of various non-invasive cardiology rooms.



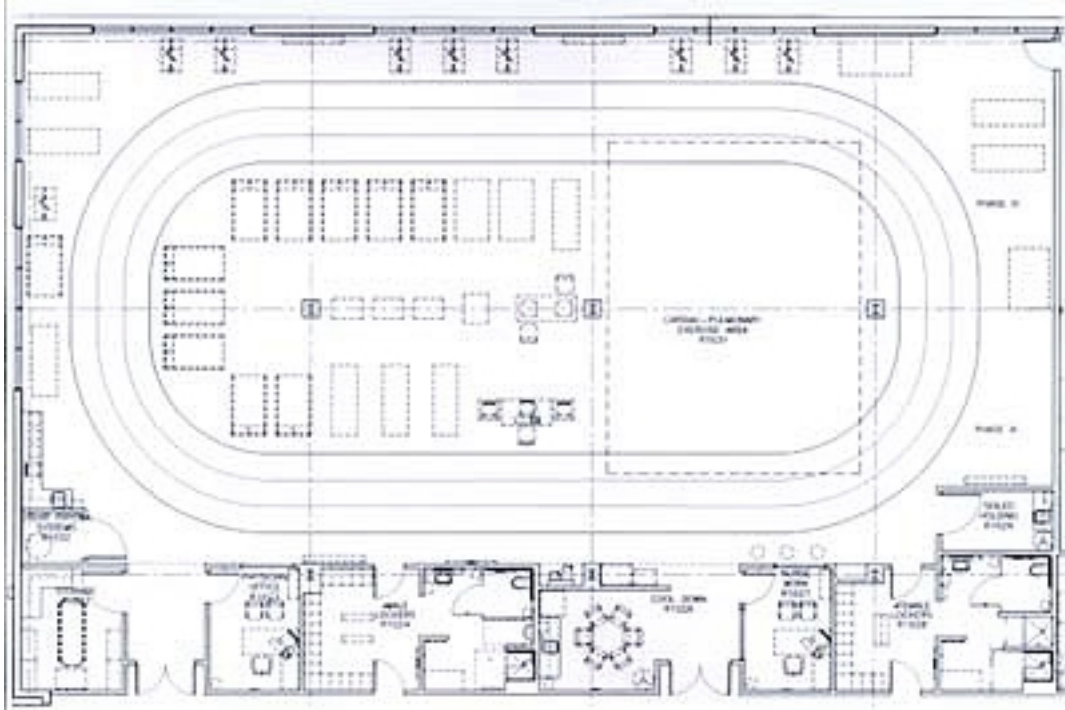


Figure 4: A typical cardiac rehabilitation layout.

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This article originally appeared in *The Academy Journal*, published by the AIA Academy of Architecture for Healthcare (Volume 3 – October 2000).