

Section 2

Narrative

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General Considerations

Narrative

OVERVIEW

Current Trends:

The Radiology Department performs examinations and produces images (on film or optical disc) from non-invasive or minimally invasive procedures performed on patients in specially equipped examination rooms.

Types of examinations performed may include:

- Radiographic: Employs X-ray film
- Fluoroscopic: Employs contrast media and X-ray film
- Special Procedures: Similar to fluoroscopic, but may require minor surgical procedure
- Mammography: Specialized X-ray examination of the breast
- Computed Axial Tomography: Computerized analysis of transverse planes swept by a radiographic beam)
- Ultrasound: Image produced by recording the passage of sound waves through tissues of varying densities)

Radiological examinations may be performed in several areas of the hospital or medical center, dependent upon the type or volume of examination required.

Portable radiographic and fluoroscopic equipment may be used in selected instances for imaging of patients.

Patient convenience and accessibility should be an integral part of the planning and design of the Radiology Department. A high percentage of the volume of this service will involve outpatients.

Flexibility and adaptability should be anticipated in the planning and design of the facility to accommodate evolving technology.

Future Trends:

Development of picture archiving systems (PACS) and hospital information systems based upon digital imaging will restructure the organization of the Radiology Department.

Implications of digital imaging:

- Image can be transmitted, viewed and stored electronically
- Eliminates need for immediate processing of cut film for diagnostics
- Allows remote imaging services with central reading/diagnostics staff
- Multiple recipients can simultaneously review image

Decentralized imaging rooms (either in the hospital or in satellite ambulatory care centers) may be linked to centralized film viewing/ interpretation centers in selected instances.

Functional Considerations Narrative

OPERATIONS:

Services:

Radiology Imaging Services may be organized as one central department which serves emergency, outpatients, and inpatients or as separate facilities for inpatients and outpatients.

If critical access to the main department is not possible or stat availability cannot be assured satellite facilities may be implemented as is frequently the case with Emergency Services.

Satellite facilities may be justified to serve the diagnostic needs of a special center of excellence if this can be coordinated with associated and complimentary diagnostic services to assure quality of patient care.

Imaging Process

Diagnostic Imaging is performed on Inpatients and outpatient on a regular and scheduled basis.

Services are performed on an unscheduled or stat basis for emergency patients.

Stat inpatient diagnostic procedures are performed within the department and outside of the department with portable equipment.

The Imaging Process for all procedures except ultrasound utilize x-rays to create film or digital images of structures or media which are opaque to X-rays.

The image may be enhanced electronically, recorded on video, stored on tape and reproduced as a laser image for paper or film copy.

Radiographic Process:

The process begins with patient arrival where patient appointments are scheduled and records are initiated within the patient reception and scheduling area.

The patients are directed or escorted to procedure rooms where examination and radiographic or fluoroscopic imaging exposure takes place

If image is processed by digital electronic image processing or by the development of a radiographic film.

The film record or electronic image is coded for patient identification and reviewed for image quality.

After the quality assurance process has confirmed the quality of the image the patient is released from Radiology Service.

Films and hard copies of electronic images are batched and delivered to radiologist offices / viewing areas for interpretation.

Interpretation of electronic images may also involve computerized image enhancement in computer workrooms housing image manipulation consoles.

Current films are sometimes available in alternators for physician viewing and consultation with the radiologists.

Diagnostic results are communicated to the ordering physician and entered into the patient records.

Image records are stored locally where they are available for retrieval for consultation and follow up exam comparisons.

Functional Considerations Narrative

Patient Care Concept

Providing more convenient access to health care in non institutional environments is a trend which is applicable to radiology diagnostic services.

Patient focused care concepts may be applicable to Radiology Services in selected areas.

Core facilities and core staff in hospital based facilities could serve as a resource which includes more highly specialized and lower volume modalities in addition to general inpatient services.

Although many procedures are short duration and familiar, patient education with family consultation may be used to avoid the stress which some specialized procedures may invoke on patients not familiar with the process and equipment.

Patient and procedure volumes should be considered in the decision to move equipment or patients receiving multiple procedures.

Level of Care

Routine inpatient services could be delivered throughout the hospital (and potentially long term care facilities) with assistance of cross trained nursing and medical staff.

The high cost and lower volumes of certain highly specialized technologies, the highly specialized space criteria dictated by permanently installed equipment, and the specialized staffing requirements, demands that some modalities be centralized at a location accessible to both inpatients and outpatients.

Consolidation of services by specialization and centers of excellence may improve the quality of patient care, particularly when intervention is required at higher acuity levels including surgical procedures or intensive care patients.

Patient Base

VA Radiology facilities are focused upon serving the Veteran, and may include sharing agreements, joint ventures and referrals including efforts to include the veteran's family as well as the general public.

Medical Records

Diagnostic evaluations generated within the department become part of the veteran's Consolidated Health Record with actual films and/or electronic data stored locally within the Radiology Facility.

Evaluations are also communicated to the ordering physician in either hard copy or electronic form as required.

Image manipulation, interpretation, archiving, retrieval and distribution procedures may occur within the Radiology Facility or may occur at remote specialty facilities linked to department archives and mainframe.

Patient Protocol

Outpatient and inpatient procedure are ordered by physicians and scheduled by the department during regular business hours.

Unscheduled and off-hour procedures will depend on the level of care including Emergency Services.

Inpatient and emergency procedures are ordered by physicians as required on a need basis twenty-four hours a day.

Remote services may require storage for mobile equipment located within the department or within the unit served.

Functional Considerations Narrative

Special Requirements

Teaching facilities will require more technical support space including space to accommodate small groups in control rooms, interpretation and consolation areas, and image manipulation areas.

Coordination with related departments, facilities and program missions is required to verify space needs which may include prep, recovery, exam, and stretcher holding spaces

- Hospital Nursing Care;
- Long Term Care Facilities;
- Ambulatory Services;
- Emergency;
- Surgery;
- Specialty Services; and
- Satellite Facilities.

Space Planning Issues

Flexibility

The technical space requirements to accommodate the radiographic shielding, the electrical services, data and communication services, physical support, and the planning constraints require a network of flexible systems to accommodate Radiology Services.

Universal Criteria are usually applied in the design of radiographic imaging and procedure rooms to accommodate a broad range of physical equipment configurations.

Although specialized facilities are required, generic guidelines should be applied to accommodate a wide range of imaging technology to maximize equipment selection and space utilization options.

Procedure rooms need to be adequately sized and have adequate systems to accommodate incremental options and upgrades.

For VA projects Handbook 7610 (Space Planning Criteria) provides listed equipment to be provided by the VA or General Contractor.

Human Factors

Patient dignity and self-determination are accommodated while considering operational efficiencies.

Patient's vulnerability to stress from noise, lack of privacy, poor lighting and other causes, and the harmful effects it can have on the healing process is well known and documented.

An inherent opportunity exists in the design of Radiology Facilities to address these issues and put forth creative solutions that enhance patient comfort and contribute to positive outcomes.

De-emphasizing the institutional image of traditional health care facilities and surrounding the patient (and family members) with architectural finishes and furnishings that are familiar and non-threatening should be a prime objective.

Good planning and design appeal to the spirit and sensibilities of patients and care providers alike.

Radiology facilities should be healing environments that allow the building itself to become part of the therapy while the technical requirements are addressed in an integrated manner that supports these concepts.

Handicapped access is accommodated-dated by the application of UFAS and ADA design standards to space and fixed equipment layouts.

Functional Considerations Narrative

Functional Space Relationships

Work Flow

Provide convenient Outpatient access with singular point of control for inpatients and outpatients.

The patient process flows from registration and waiting / holding, to gowning and patient prep where required, to procedure rooms and back to waiting for release from the service.

A functional plan accommodates patient flow with a minimum of staff direction.

Organizational Concepts

Functional Layering

Reception is located to control access to the patient areas and to secure the department from unauthorized access

Patient records are also usually received here and work orders initiated and distributed from this area.

Patient areas are consolidated to control patient access and to maintain patient privacy, security, and dignity.

High frequency short duration exams are located up front.

Staff Support Areas which deal with film work, image manipulation and quality control are consolidated in a staff work core to assure image quality, staff efficacy, and patient record security and privacy.

Administrative areas including reading, interpretation, and consultation are accessible to physicians

Consultation and interpretation areas are not accessed by patients and are to provide private staff work areas.

Building Systems Integration

Coordinate Locations of depressed slabs / structure for raceways and access flooring as required, overhead support grids, and Radiographic shielding.

Evaluate need for computer access flooring in digital imaging areas on a project basis.

Organize to minimize radiographic shielding.

Location / External Relationships

Patient Access / Wayfinding

Radiology Facilities should be located accessible to parking and ambulatory care areas since it provides outpatient diagnostic procedures.

Location with other diagnostic facilities assists in wayfinding and coordination of patient services.

Inpatient access is required if dedicated outpatient and inpatient facilities are not justified

Immediate access from emergency is required if dedicated radiographic facilities are not available within the Emergency Department.

Functional Adjacencies

The Radiology Department requires a location convenient to the inpatient hospital service core(s) and to outpatient clinical service areas.

Consider the high level of both inpatient and outpatient traffic at peak service hours in determining the location of this department

Service Access

General facility service access is adequate.

Technical Considerations

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TECHNICAL CONSIDERATIONS

Architectural

Interior Materials and Finishes - Partitions

Interior partition should be primarily painted gypsum wallboard on metal studs. Partitions around physician offices, exam rooms and treatment rooms should have sound attenuation batts between the studs in accordance with H-18-03 "VA Construction Standard" CD 34-1, "Noise Transmission Control".

Partitions and doors surrounding Radiographic Rooms, C.T. Scanner Room, and Special Procedures Room require radiation shielding. Refer to H-18-03 VA Construction Standard 64-1, "X-Ray Radiation Shielding and Special Control Room Requirements".

Working drawings will require written certification by a registered Health Physicist.

Interior Materials and Finishes - Floors

Floors in offices, conference rooms and waiting areas should be carpet with a 100 mm (4") high resilient base.

Floors in toilet rooms should be ceramic tile with a ceramic tile base.

Floors in Special Procedure Rooms should be welded seam sheet flooring with an integral base.

Floors in exam rooms, treatment rooms and most other spaces should be vinyl composition tile with a 100 mm (4") high resilient base.

Floors in Radiographic Rooms require a 100 mm (4") deep depression to facilitate installation of the floor trench duct system.

Floors in the C.T. Scanner Suite are required to be depressed to accommodate an access floor system. Coordinate access floor requirements with the equipment manufacturer.

Interior Materials and Finishes - Ceilings

Ceilings should be primarily lay-in acoustic ceiling tile. Coordinate the ceiling height requirements for Special Procedure Rooms with the equipment manufacturer.

Interior Materials and Finishes - Protection

Wall and corner guards should be used in corridors and other areas where wall damage from cart traffic is anticipated.

Interior Doors and Hardware

Interior doors should be 45 mm (1 3/4") thick solid core flush panel wood doors or hollow metal doors in hollow metal frames.

Doorjamb , except in rooms with radiation shielding, should have hospital type sanitary stops that stop 200 mm (8 ") from the floor to facilitate mopping. Hollow metal doors should be used where high impact is a concern and where fire rated doors are required. Kick/mop plates should generally be applied to both sides of the doors. Handicapped accessible hardware should be used throughout.

Refer to VA Handbook PG-18-14, "Room Finishes, Door and Hardware Schedule" for additional information.

Technical Considerations Narrative

Equipment

Casework

Casework systems should be chosen that provide flexibility for planning and utilization purposes.

Casework systems should incorporate components dimensioned for ease of multiple re-use installation applications.

Casework systems should be planned avoiding corner installations and filler panel instances.

Information Management Systems

Information Management Systems shall include elements of image retrieval / processing / storage, patient registrations, patient charges, Physician's order entry, and patient / staff movement.

These systems elements will require access to the main facility's "information backbone" as well as the departmental local area network. All components should be planned for compatibility.

Imaging Systems

Imaging Systems requirements will vary for each facility and the technology may be deferred in selection / procurement. Design requirements will be as instructed by the Contracting Officer.

Film Processing

Film processing requirements will vary for each facility. Design criteria for "cut-film", "digital laser" and the integrated use of Picture Archiving and Communications Systems, (PACS) will be as instructed by the Contracting Officer.

Film Storage

Film Storage requirements will vary for each facility. Design criteria for the total number of "file-inch" requirements and/or the integrated use of Picture Archiving and Communications Systems, (PACS) will be as instructed by the Contracting Officer. Attention to floor loads should be made to any area planned for the use of a high density film filing system.

Heating, Ventilation and Air Conditioning

Operation

Air conditioning systems should be provided to heat, cool and ventilate the individual space, as required to satisfy the VA design criteria.

The air conditioning systems serving the Radiology Service should be designed to operate at full capacity to suit schedule of the service.

A dedicated computer type AC unit should be considered to cool and heat the computer equipment room for special procedures CT scanner computer room.

Additionally, the air conditioning systems serving the Radiology area should be equipped with either waterside or airside economizer type. Climate often dictates which economizer type should be used.

Capacities

The number of people and the air conditioning load noted on the room design standard sheet is for purpose of establishing the basis of design guide and its use in planning. The engineers/designers should verify the actual number of people and the air conditioning load to agree with the project requirements.

The percent of outside air should be based on the space total supply air quantities.

Technical Considerations Narrative

Air Quality and Distribution

In general, clean areas shall have positive air pressure and soiled areas should have negative air flow with respect to the adjoining areas.

Corridors should not be used to supply or to exhaust/return air from rooms. Corridor air may be used to ventilate toilet rooms, HACS and small electrical or telephone closets opening directly on corridors. Exfiltration or Infiltration from positive or negative pressure rooms adjacent to a corridor should be considered in balancing air flow..

Where there are four (4) or more chest rooms a minimum of one (1) must be designed to meet the current TB requirements for ventilation. See HVAC Design Manual for Hospital Projects.

The transfer air should be no more than 2.83m³/min.(100 CFM) per undercut door.

Care should be taken to minimize the short circuiting of air between supply and return/exhaust openings in interior spaces.

See TB criteria requirements in HVAC Design Manual for Hospital Projects for hood exhaust requirements.

Exhaust System

Provide a dedicated exhaust system for hoods located in the Radiology Service. Locate supply diffusers as far away from the hood sash opening as possible. See HVAC Design Manual for Hospital Projects for hood exhaust requirements.

Seismic

Where required, install HVAC systems with seismic provisions as outlined in the VA HVAC Design Manual for Hospital Projects.

Refer to VA Handbook H-18-03 (CD-54), "Natural Disaster Resistive Design Non-Structural" for additional information.

Noise Level

Select HVAC equipment, ductwork, and air distribution devices to achieve noise levels listed in the HVAC Design Manual for Hospital Projects and Master Construction Specification Section 15200.

Plumbing

Water and Waste Systems

The plumbing systems should be provided to satisfy the departmental plumbing needs.

The department domestic cold water should be piped to all plumbing fixtures and equipment requiring this utility.

The department domestic hot water should be piped to all plumbing fixtures and equipment requiring this utility. A hot water return system should be provided to ensure the design temperature at the farthest outlet.

The department plumbing fixtures and drains should be drained by gravity through soil, waste and vent stacks. In addition, the department special waste should be drained through corrosion resistance flame retardant piping into either a local or centralized acid dilution tank.

Medical Gas Systems

The department medical gases outlets are shown to establish the basis of design guide and its use in planning. The engineers/designers shall verify the medical gases location and quantities for individual projects.

Technical Considerations Narrative

Seismic

Where required, the plumbing and medical gases systems should be installed with seismic provisions as outlined in the VA Plumbing Design Manual for Hospital projects.

Refer to VA Handbook H-18-03 (CD-54), "Natural Disaster Resistive Design Non-Structural" for additional information.

Electrical

Illumination

Illumination is typically provided utilizing recessed fluorescent luminaries with acrylic prismatic lenses. The fixtures typically use F32T8 lamps in compliance with the National Energy Policy Act of 1992. Lamps have a minimum color rendering index (CRI) of 85 and a color temperature of 4100 degrees Kelvin (K), which is close to the "cool white" color temperature of 4150 degrees K.

Fluoroscopic rooms will need incandescent lights on dimmers in addition to regular lighting.

Lighting intensities conform to the VA design criteria, the IES Lighting Handbook and IES publication CP-29, "Lighting for Health Care Facilities". IES CP-29 is currently being updated and will be replaced by IES Recommended Practice RP-29 in the future.

Lighting is typically controlled by wall mounted switches located at the entrance to the room. Larger spaces may utilize multiple switching by separate switches for lighting of individual zones or areas.

Power load densities for lighting are listed for use by the mechanical HVAC load calculation purposes. Load densities should be verified for the actual design, as they may vary depending on the room configuration, fixture types, lamps and ballast used.

Power

General purpose duplex receptacles are typically provided on each wall of a room or space.

Dedicated duplex or special receptacles are provided for selected pieces of equipment such as refrigerators.

Workstations with personal computer computers (PC's) are typically provided with quadruplex receptacles for the PC, monitor and printer.

Emergency power from battery generated equipment may be desirable. Generators for emergency power to x-ray equipment is now feasible.

Junction boxes are provided for equipment requiring a hardwired connection.

Certain modular casework units are provided with a utility access module with surface mounted electrical strip mold and also provides a chase for wiring. Conduits and junction boxes are provided to connect to the utility access module for power wiring.

Duplex receptacles on the critical branch of the emergency power system are provided for selected pieces of equipment

Security
(not used)

Life Safety

Purpose

The life safety program should be developed to provide a reliable system to protect the building occupants, firefighting personnel, building contents, building structure and continuity of building function. Its intent should be to provide a reasonable level of fire safety by reducing the probability of injury, loss of life or building function changes due to a fire. This can be accomplished by limiting the development and spread of a fire emergency to the area of origin and reducing the need for total occupant evacuation.

Technical Considerations Narrative

Life Safety (cont)

Components

The design aspects of the facility which relate to the fire and life safety include:

- Structural fire resistance;
- Building compartmentation ;
- Fire detection, alarm and suppression;
- Smoke control and exhaust;
- Firefighter access and facilities; and
- Emergency power.

Fire Suppression

New hospital construction and renovated areas of existing facilities are required to be fully protected by an automatic fire suppression system.

Egress

The minimum width of corridors and passageways in Outpatient and Inpatient Pharmacy areas is 1120 mm (3'-8"). However, consideration should be given to supply cart movement and 1830 mm (6'-0") or 2440 mm (8'-0") corridors and passageways may be more practical.

Waiting areas are now permitted to be open to the corridors.

Handrails on both sides of the corridor are required in patient areas.

References

Refer to the latest editions of NFPA 1010 "Life Safety Code", the Uniform Building Code and additional standards published by the National Fire Protection Association (NFPA).

Energy Conservation

Refer to VA HVAC Design Manual for Hospital projects for information.

Communications

Telephone

Telephone outlets are typically provided at each workstation or in each room. Desk outlets are 450 mm (18") AFF and wall phone outlets are 1200 mm (48") AFF.

Certain modular casework units are provided with a utility access module that house communication outlets and provide a chase for cabling. Conduits and junction boxes are provided to connect to the utility access module for telephone service.

Automatic Data Processing (ADP)

ADP or computer outlets are typically provided at each workstation with a personal computer (PC) and or printer. Desk outlets are 450 mm (18") AFF.

Automatic Data Processing (ADP) (cont.)

Certain modular casework units are provided with a utility access module that house communication outlets and provide a chase for cabling. Conduits and junction boxes are provided to connect to the utility access module for ADP service.

Public Address

The Radiology Service will not have an independent public address (PA) system. The service will be included as part of the hospital-wide PA system. Speakers are typically located in corridors and public spaces. The actual system configuration will depend on the overall design layout and functional requirements.

Technical Considerations Narrative

Waste Management

Medical Waste

Medical waste is generated in exam and treatment spaces and in soiled equipment work areas where it is bagged, collected and transported to the soiled utility rooms where it is held in separate containers until transport to the medical waste handling facility.

General Waste

General Waste is generated in all spaces and is held in containers for collection and sorting into carts or it is bagged and placed in a waste chute and transported to the waste handling facility.

Recycling

Methods for sorting, collecting, transporting and disposing of recyclable products must be specifically analyzed for each facility and location.

The optional use of disposable and reusable products is an important consideration in recycling and waste disposal alternatives.

Soiled Linen

Soiled reusable linens are generated in exam rooms, treatment spaces and patient and staff gowning areas and are collected in carts or hampers (depending on volume) in the soiled utility rooms or they are bagged and transported to (a) central collection area(s) via soiled linen chutes.

Disposable linens are include with general recyclable waste or medical waste as appropriate.

Utensils and Reprocessed Items

Reusable utensils included bed pans, urinals, emesis basins and other stainless steel items which are used in exam and treatment areas and then transported to the soiled utility room where they are reprocessed if steam washers are available or collected for transport to the Sterile Processing Department for reprocessing.

Space Requirements

Space requirements will vary with the selection of waste collection and recycling methods and systems, and space requirements need to be analyzed for each optional method or system considered for new and existing facilities.

While space needs are determined by H08-9 on a departmental basis, space provisions for waste collection needs to be distributed and dedicated to a variety of uses to accommodate the implementation of the system and method selected.

Transportation

Outpatient

Provide convenient access from patient parking and primary care entrance.

Provide passenger elevator access to radiology facilities located off main entrance levels.

Use techniques including clear access routes, public spaces, landmarks and signage to facilitate wayfinding.

Technical Considerations Narrative

Transportation (cont.)

Inpatient

Provide access for stretcher and wheelchair patients from inpatient areas.

Separate Inpatient and Outpatient traffic where possible.

Inpatient access from hospital service elevators is required.

Inpatients arrive at a control point common with outpatients.

Inpatients access patient holding through a dedicated route separated from outpatient waiting.

Staff

Provide staff access separated from patient waiting and holding areas.

Locate staff lounge and locker areas away from inpatient and outpatient traffic.

Specimens

Specimens may be collected locally in special procedure rooms and hand transported to the pathology lab as required.

Pharmaceuticals

Pharmaceuticals including narcotics are transported by pharmacy personal to the department in locked carts.

Narcotics are delivered to a narcotics locker which is usually located in a clean supply or patient prep area.

Materials

Clean supplies are transported by exchange carts which are stored in the Clean Supply Room.

Supplies are transported by Service Elevator and through hospital corridors separated from patient traffic where possible.

Linen

Disposable linens are delivered as part of clean supplies.

Sterile Supplies

The use of sterile supplies for special procedures is accommodated by prepackaging of disposable items.

Food

Meal and Nourishment deliveries to Radiology are not required.

Waste

Waste is collected by housekeeping staff and transported to the Soiled Utility Room where it is disposed as indicated by the Waste Management section of this narrative.