

Section 2 Narrative

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Narrative

Mission

Supply, Processing, and Distribution (SPD) is organizationally aligned under Acquisition and Materiel Management Service. The mission of SPD is to provide a steady flow of patient care supplies and equipment to points of need, and to return contaminated items to a central decontamination area. The accomplishment of this mission requires quick and efficient service to all departments dependent on SPD for indirect patient care.

SPD is the first line of defense against harmful microorganisms. Contamination prevention is achieved by closely monitoring the following elements:

- **Air Flow:** To minimize microorganism movement from dirty to clean areas. In clean areas there is a positive air flow.
- **Staff Flow:** Personnel work either on the clean side or the dirty side of the SPD unit to avoid cross contamination.
- **Work Flow:** Refers to the movement of clean (sterile) supplies and the return of contaminated items for decontamination and sterilization.

Communication

The single most frequent source of user dissatisfaction during both the design and construction phases is failure of communication and interaction among parties with an interest in and responsibility for the project. The Office of Construction Management selects the architect/engineer (A/E) with VA medical center representation on the Selection Board. The A/E bases the design on VA criteria. Costs are fixed at the end of design development; therefore, extensive changes must be avoided beyond this point. Plans should be reviewed by the Chief of Acquisition and Materiel Management, the Chief

of SPD, the Hospital Administrative Officer, and the VA Central Office during the design phases. In each instance, the reviews must thoroughly examine the plans. Planning changes and design errors must be addressed as early as possible to avoid costly change orders during construction.

Processing and Distribution Methods

SPD is divided into three main units/areas. The first unit is Decontamination, where all reusable medical and surgical items are sent for cleaning. It is important to keep in mind that contaminated materials do not use the same path as the clean materials. The second unit is Preparation. In this unit items are inspected and packaged for sterilization. Most sterilization is accomplished by using steam; or, in the case of materials that cannot withstand intense temperatures, ethylene oxide (EtO) gas (or another suitable chemical) is used. Materials undergoing EtO sterilization must be adequately aerated to ensure no hazardous traces are left on devices. The final unit in SPD involves the Distribution Process, including distributing surgical case carts. This unit is further subdivided into Primary Stock and Secondary Stock. Primary Stock are all the supplies that are stored within the confines of the SPD department. Secondary Stock are materials in user areas such as wards, clinics, nursing care units, and intensive care units.

Trends In SPD

One trend impacting SPD is the increasing complexity of many surgical procedures such as laparoscopy, endoscopy, laser, micro vascular, and more complex surgeries. SPD's role has become more technical in nature, by the

expansion of its supply, processing, and distribution role to include inventory control, equipment cleaning and testing, and other duties which have not traditionally been SPD functions.

Other trends include stricter protection of healthcare workers. Since pathogenic organisms (serum hepatitis, AIDS and HIV) have become known, protection for SPD staff has become more of an issue for concern.

Architectural Aspects

Location

Many architectural considerations play a role in deciding the ideal location for SPD. In order for SPD to provide fast and efficient service, it must be located in an area which will facilitate the delivery of supplies throughout the medical center in a minimum amount of time. In addition to issuing supplies and equipment, SPD receives soiled reusables back for reprocessing to complete the cycle. SPD accepts fresh supplies to store, issue, and inventory, as well as issue replacements for damaged, useless items. If SPD is not adjacent to the hospital warehouse and loading dock, a simplified route from these areas must be carefully planned.

Easy accessibility to SPD is key and is determined by the materials handling system within the facility. Halls, ramps, and elevators of sufficient capacity need to accommodate carts used to distribute supplies. SPD should be located where some degree of high speed automation of delivery (direct line cart lift, conveyor, dumbwaiter, tube system) can be maintained where emergency situations most commonly occur (operating rooms, recovery, and intensive care units). It is important that SPD have two separate and dedicated cart lifts or dumbwaiters (one for soiled and one for clean) to transport patient care items.

Environmental Requirements

The processing of medical and surgical equipment, linens, and case carts requires

facilities that provide precise environmental control yet are flexible to accommodate future needs. Environmental considerations most critical to SPD are: temperature, humidity, ventilation, light, and protection from contaminants.

Facility design is crucial to the efficiency and effectiveness with which these needed environmental conditions are met. Design features deserving particular attention include:

- Separation of soiled areas from sterile areas
- Restricted areas
- Containment area for EtO gas
- Heating, ventilation, and air conditioning (HVAC Systems)
- Room relationships (regarding function and staff utilization)
- Modularity of design/flexibility
- Interior surfaces and finishes

Space Planning Criteria

Space planning for the SPD facility is addressed in VA Handbook H-7610, which is the basis for developing all VA projects. This handbook outlines the space requirements needed to design a functionally effective SPD department. In multidivisional medical centers, total space for SPD is based on the combined workload of all divisions.

The following means of increasing the efficiency of space utilization should be addressed:

- Sufficient amount of floor space for parking returned soiled carts adjacent to sorting work stations is important to achieve efficient work flow. Space for cart queuing is determined using verified workload figures. The cart and equipment wash area must be immediately adjacent and interconnected to the soiled receiving and decontamination area.

- Work stations and equipment for cleaning soiled items must be located in a manner to facilitate unidirectional flow of work towards the clean side of SPD.
- The decontamination area is totally separated from the clean area and its staff is confined to this space; therefore, the staff must be provided with its own lounge, lockers, toilets, and shower facilities (LLTS). Space for this function is determined by staffing and workload projections on a project by project basis.
- If an automatic cart wash is required, an additional 5 NSM (53.8 NSF) is required for the integrated drying chamber.
- In the Preparation, Assembly & Sterilization Area sufficient space must be provided in front of the sterilizers for loading and unloading the sterilizer carriages and for cooling after the sterilization cycle.
- The EtO sterilizers/aerators, should be in an enclosed room inside the Preparation, Assembly & Sterilization Area. Loading/unloading zone access to the sterilizers must be included in this room.

Room Relationships & Adjacencies

An efficient and functional work flow must determine spatial arrangements for all SPD activities. Soiled materials (medical and surgical instruments) are returned to SPD via a vertical transport system (case cart lifts, elevators, or dumbwaiters) directly to the Soiled Receiving and Decontamination Room to be reprocessed. This room should be adjacent to the Preparation, Assembly & Sterilization Area. These two rooms are separated by a wall, with pass-through sterilizer chambers installed within the wall. A pass-through window must be available for small items proceeding from decontamination to the prep area. Maintenance access doors to the sterilizer must also be available.

Materials that have been cleaned are placed into the washer/sterilizer, processed, and the instruments retrieved at the Preparation, Assembly & Sterilization Area (clean side of

SPD). The instruments are thoroughly inspected, assembled, packaged, and sterilized (using the appropriate sterilizer; either steam or EtO gas), and then stored in the Sterile/Nonsterile Storage Room adjacent to the Preparation, Assembly & Sterilization Area for future use.

Refer to Section 3, Room Relationship Diagrams for examples of suggested room relationships, recognizing however, that the needs of individual healthcare facilities may determine deviations from the diagrams.

Functions of Areas Within SPD

- *Clean Receiving and Breakout Area:* This is where supplies enter the SPD from the clean side of the loading dock and are removed from their shipping containers prior to entry into the clean/sterile storage area.
- *Bulk Storage Area:* Incoming containers that remain sealed are stored temporarily in the Bulk Storage Area.
- *Clean/Sterile Storage Area:* Supplies are stored here prior to being delivered to users. These items consist of reusables and disposables, and may already be sterilized or awaiting sterilization.
- *Receiving, Cleaning, and Decontamination Area:* Contaminated reusable instruments and supplies are received, sorted, cleaned, decontaminated, and presterilized in this area. The room must be physically separated from the other SPD areas. This area should be provided with direct access to locker, lounge, toilet, and shower facilities where personnel assigned to this area can change clothing before entering/exiting.
- *Manual Equipment Wash Area:* Equipment and carts are decontaminated in the manual equipment wash area.
- *Automatic Cart Wash Area:* This area houses a cart washer that must have drying capabilities.

- *Preparation, Assembly & Sterilization Area:* Decontaminated, clean instruments and other reusable medical devices are inspected, assembled onto trays and sets, and wrapped or packaged for terminal sterilization.
- *Linen Processing Area:* Clean reusable linens are inspected, patched, folded, and assembled into packs. This area is to be provided only if the function is not delegated to Environmental Management Service, Laundry Division.
- *Equipment Testing and Storage Area:* Clean medical equipment is tested and stored here until issued. This area must be located so as not to interfere with the work flow traffic of the clean/sterile storage area.
- *Dispatch Area:* Control of receiving and issuing of supplies and equipment is maintained at the Dispatcher's Control Station.
- *Volunteers Work Area and Technician Training Room:* This dual purpose room serves as a working space for SPD volunteers, as well as a retraining area for SPD technicians, and new equipment demonstrations.
- *Housekeeping Aids Closet:* Cleaning supplies need to be maintained in dedicated closets; one for the decontamination area, and another for the clean areas.
- *Administrative Area:* This area contains office space for the Chief of SPD, supervisors, and clerical staff.

Engineering Considerations

Mechanical (Heating, Ventilating, and Air Conditioning)

An adequate heating and ventilating and air conditioning (HVAC) system is a critical element in planning for SPD and requires careful evaluation. The mechanical engineer should coordinate with the architect and equipment

specialists in order to accommodate sterilizing equipment specified for the project. Any request for deviation from HVAC design criteria must be approved by the VA and occur no later than the design development stage. The following represents the highlights of the mechanical system design for SPD. Refer to the VA HVAC Design Manual for further design requirements.

HVAC System

The entire SPD area should be under negative pressure with respect to adjoining areas. See the HVAC Design Manual for Hospital Projects for additional requirements.

A dedicated 100% outside air handling unit with constant volume reheat should be provided for SPD to serve each of the following areas:

- Soiled Receiving and Decontamination Room (Negative Air Pressure)
- Preparation, Assembly & Sterilization Area (Positive Air Pressure)
- EtO Gas Enclosure (Negative Air Pressure)
- Steam Sterilizer Enclosure (Negative Air Pressure)
- Preparation and Inspection of Surgical Linens and Packs (Positive Air Pressure)
- Sterile/Nonsterile Storage (Positive Air Pressure)

Separate dedicated exhaust systems should be provided for each of the following spaces:

- EtO Sterilizers
- Cart and Manual Equipment Wash
- General Exhaust of entire SPD suite, including steam sterilizers.

Since air is a very good carrier of contaminating agents, air in the Soiled Receiving and Decontamination unit should never mix with air in the Preparation and Inspection unit. It is imperative that the soiled areas have a negative air pressure and the clean areas have a positive air pressure. Conditioned air should be supplied to all SPD areas at a minimum rate of 10 air changes per hour (10 AC/HR).

Reconditioning of the medical and surgical instruments and utensils is dependent upon the temperature and humidity. The Soiled Receiving and Decontamination Area, and the Preparation, Assembly & Sterilization Area should have individual room temperature and humidity controls to maintain 24C (76F), 50% relative humidity (RH) in the summer and 22C (72F), 30% relative humidity (RH) in the winter months.

Utilities

When SPD is located on the ground floor, some experience problems with wet packs in their steam loads. It has been determined that this is due to steam pipes feeding from above the sterilizers. It is advisable that steam pipes should enter from below the sterilizer.

Floor Drains

The Manual Equipment Wash Area requires a floor drain. A floor drain for this area should have a minimum 100 mm (4 inch) diameter outlet, and be covered by a grid or strainer. Location of the drain should be at the center of the room with the floor sloping toward the drain at a rate of no less than 3 mm per 25 mm (1/8 inch per foot), and no more than 6 mm per 25 mm (1/4 inch per foot). The floors outside both doors of the Manual Equipment Wash Area should slope back toward the drain.

Electrical

SPD processes pumps, monitors, and other electronic devices that are used in patient care. These devices are rechargeable and must be calibrated in the Equipment Testing and Storage Area. A sufficient amount of power strips must be provided to handle the amount of electronic equipment brought down to SPD.

Computer (ADP) outlets should be installed in the Administrative Offices, Computer Room, and the Dispatch Area for use of the computers. Refer to the VA Electrical Design Manual and H-08-4, Vol. 4, for further information.

Lighting

Lighting in SPD is dependent on the functions associated with the various rooms. Lighting should be uniform, automatic, and individually controlled to ensure consistency. Task lighting is needed where specific tasks are performed. Separate switches should be used so that during off hours task lighting may be turned off. Furthermore, lights in the Preparation and Sterilization area and in the Soiled Receiving and Decontamination area should be recessed to facilitate cleaning. Light fixtures in the Auto Cart Wash and the Manual Equipment Wash should be waterproof, and surface mounted. Dust and moisture resistant fixtures must be used where humid conditions are present.

Emergency Power

Since ventilation and adequate temperature are integral in the function of SPD, the mechanical system must always be connected to the emergency electrical system to insure a constant source of electrical supply. Airflow is crucial to SPD, thus ventilation must always be operational to prevent cross contamination. Because EtO is flammable, extremely reactive, highly explosive, and a potential carcinogen, every sterilizer and aerator must have a dedicated exhaust system to the outside of the building. Vents must not terminate close to any air induction systems. EtO gas release monitors should be placed outside of the EtO Sterilizer room in both the Soiled Receiving and Decontamination Area and the Sterile Preparation Area, as a warning system for potential EtO leaks. The EtO gas release monitors must be connected to the emergency power supply, ensuring that the monitors are operational at all times. All sterilization equipment should be connected to emergency power.

Telecommunications (intercom system)

An interdepartmental intercom system is a convenient way for SPD employees to

communicate with personnel in other sections of SPD.

Intercom outlets should be placed in the Soiled Receiving & Decontamination Area; Preparation, Assembly & Sterilization Area; and Dispatcher's Control Station. Exact location of the outlets in those areas depends on the floor plan of individual SPD sections, and should be coordinated with the Chief, SPD.

Concerns Specific to Supply, Processing & Distribution

Equipment

Fixed equipment may be purchased and installed by the contractor (CC), or purchased by the user and installed by the VA or the contractor (CF), or purchased and installed by the user (VV). If purchased by the contractor, specifications must be clearly written. Certain items are obtained as "initial portable equipment" or "activation equipment."

The Chief of SPD operations at each VA medical center, or an SPD technician, are knowledgeable about equipment styles and types that best meet the needs of the facility, and should guide the selection of equipment. In purchasing equipment not listed in GSA catalogs, specifications must be sufficiently detailed to assure quality acquisition.

The selection of equipment should proceed along with facility design in order that utility and space requirements are considered during design development. Careful attention must be given to the location and capacity of electric outlets, water and steam supply, drains, vacuum, exhaust ducts and other utilities to insure compatibility with the equipment to be installed. Utilities and their locations are shown on the Guide Plates and are not project specific. It is the responsibility of the person selecting the equipment and the project designers to determine the adequacy of utilities in each space.

Equipment operation manuals should always be retained for future consultations by SPD technicians, and maintenance personnel.

NOTE: Refer to PG-7610, VA Equipment Guide List and PG-08-6, VA Equipment Symbol List for further information.

CONSTRUCTION NOTE: Frequent reviews of the VA Equipment Guide List should be made by a Project Coordinator and the Chief of SPD, to ensure that equipment specifications correspond with existing requirements. Furthermore, it is imperative that the equipment selected and installed by the user conforms to the voltage and phase supplied during construction. Thus, the Architect/Engineer (A/E) should note on the construction documents the voltage and phase at each special outlet to insure compatibility with equipment to be used by SPD.

Sanitation Equipment

Frequent and thorough cleaning of shelves and room surfaces is essential to prevent build up of dust and unwanted particles which may contaminate medical and surgical supplies.

Room walls are manually scrubbed with either a detergent and/or disinfectant. Thus, to facilitate cleaning, walls are typically treated with a smooth finish. Floors in the Soiled Receiving and Decontamination room may be damp mopped or cleaned with an electric floor scrubber. In the Sterile/Nonsterile storage room however, cleaning with a damp mop will suffice. Generally, storage shelves in the Sterile/Nonsterile storage room are kept 200 to 250 mm (8 to 10 inches) above the floor to facilitate cleaning.

The Manual Equipment Wash Area, because of its function, is an enclosed room and accessible by a pair of swinging doors at either end. A high pressure sprayer is to be used in cleaning equipment in this area.

Sonic Cleaner

When surgical instruments and similar hospital type hardware are brought to SPD for decontamination and sterilization, they are placed in the sonic cleaner. Sonic cleaners are single or double chamber devices using sonic energy to clean instruments in a water-soap solution.

Washer/Sterilizer

After the instruments have undergone ultrasonic cleaning, they are placed into the washer/sterilizer. The instruments are washed a second time before final sterilization. Again it should be noted that after the secondary wash cycle, the instruments are decontaminated, but not sterilized. It is at this point that the instruments can now be sterilized in the washer/sterilizer. The difference between a washer/sterilizer and a typical sterilizer is that the washer/sterilizer is for decontaminating as well as terminal sterilization. The steam sterilizer is solely for terminal sterilization.

Sterilizers (Steam)

After surgical instruments and utensils are cleaned, either manually or through a sonic cleaner, they are decontaminated, but not sterile. Steam is often used as a sterilizing agent because it is the most effective and efficient way of sterilizing equipment.

Sterilizers (Ethylene Oxide)

Although steam sterilizers are cost effective and efficient, certain equipment is not suitable for sterilization in steam sterilizers because they are not able to withstand intense heat. In this case, ethylene oxide gas is used. EtO sterilization however can cause skin irritation and severe burns to SPD staff. Proper aeration must therefore follow the process.

A dedicated exhaust system should be provided to exhaust air from EtO sterilizer mechanical chase to the outdoors. Consult the

VA HVAC Design Manual for EtO exhaust system design requirements.

Auto Transport System

Distribution of medical and surgical supplies and equipment is accomplished by a combination of manual vertical and horizontal transport systems. The distribution process is often cumbersome, time consuming, and requires many personnel (as with nurses) whose primary responsibilities pertain to patient healthcare. This has prompted the VA to explore the possibilities of installing an automatic transport system. An automatic system replaces a portion of the manual labor involved in materials handling with one of a number of varieties of electromechanically controlled apparatus designed to transport supplies between where they are stored or cleaned and where they are needed.

The carts for the system are equipped with container modules where supplies can be sealed, therefore eliminating the possibility of cross contamination. From a central control station, the carts can be guided to make one or a series of stops throughout the hospital. When it has completed its distribution cycle, it can be used to return soiled items to the hospital's central processing area. After the cart has been emptied, it goes through an automatic washer-sterilizer, where the carts are decontaminated and sterilized.

There are several VA medical centers that have installed an automatic distribution system in their hospitals. The first one to have done so is the medical center in San Diego, California, which was installed in the early 1970s. Since then some other VA medical centers that have followed suit are: Minneapolis, Minnesota; Houston, Texas; and Bay Pines, Florida. The installation of an automatic transport system is not standard for newly constructed or newly renovated medical centers and should be considered on a project by project basis.

It must be noted however, that the installation of an automatic transport system is not the sole decision of SPD, although SPD

benefits from it a great deal. Hospital administrators assess the needs of all departments and decide whether the installation of an automatic transport system would be advantageous. Other departments that could greatly benefit are Dietetics, Administration, Pharmacy, Environmental Management Service, and the various Laboratories.

jeopardize the doors' fire rating NOTE: See VA Program Guide PG-08-14, Room Finishes, Door, and Hardware Schedule.

Materials and Finishes

Interior finishes of SPD must be smooth, impermeable to moisture and capable of withstanding the impact of carts and equipment. Concrete Masonry Unit (CMU) walls should have flush joints with a 3 mm (1/8 inch) thick Portland cement plaster skim coat finish and sealed with epoxy paint. Bumper rails or curbing are needed to prevent wall damage throughout SPD and surrounding areas. Bases should be covered to allow for ease of cleaning. Walls of the Manual Equipment Wash must withstand periodic washing with detergents and high pressure water and steam.

Interior Doors and Hardware

Hospital type door jambs should be used throughout the interior spaces of SPD with door stops located 200 mm (8 inches) from the floor to permit mopping. Doors in corridors to offices in heavy traffic areas should have windows of shatter proof glass. They should fit the frames tightly, be mounted without a sill and be equipped with self sealing, externally mounted sweep strips if the space between the closed door and the floor exceeds 5 mm (3/16 inch). Storage areas for supplies require double doors each measuring 1070 mm (3'-6") and should not be less than 2135 mm (84") high, to facilitate the moving of carts and other equipment. They should be metal or metal clad, with small viewing windows, and should have full width kick plates and bumper guards at the height that protects them against movable equipment. If fire doors require kick plates over 381 mm (16 inches) a certificate from the manufacturer is required stating that the oversized kick plates will not