

THIRTEEN

PROCESSING LINEN

KEY CONCEPTS you will learn in this chapter include:

- Why careful handling and processing of soiled linen are important
- Which personal protective equipment to use and why
- How soiled linen should be collected and transported
- How soiled linen should be sorted, washed and dried
- How clean linen should be stored, transported and distributed

BACKGROUND

Although soiled linen may contain large numbers of microorganisms, there is little risk to health workers during linen processing. When worker-related infection has occurred, it often is the result of workers' not using gloves or washing their hands during or after collecting, transporting and sorting soiled items. To reduce the risk of contamination, staff at each healthcare facility should determine the best way to handle, process and store linens.

As the types and volume of services that hospitals and primary health clinics have expanded, so too has the need for clean linen on the wards and in housekeeping. In addition, surgical units, specialty areas (e.g., neonatal ICUs) and other departments such as anesthesiology, radiology and cardiology, where a variety of invasive medical procedures now are performed, have increased needs for linen items (caps, masks and gowns). As a consequence, in many large hospitals the laundering of linen increasingly is contracted out to companies specializing in this work. Regardless of where the soiled linen is processed, however, the infection prevention practices that are recommended to safely process linen are the same.

Remember: No additional precautions (e.g., pre-rinsing, labeling, separating or double bagging) are necessary, regardless of the patient's diagnosis, if Standard Precautions are used in all situations (Lynch et al 1997).

In smaller hospitals and clinics, however, housekeeping and cleaning staff will continue to be responsible for handling and processing soiled linen and other items. To do this job well, staff performing these tasks should be appropriately trained and regularly supervised. Without this, accidents will happen and staff will be at increased risk of exposure to infectious materials and acquiring work-related infections (Economics Report 1994).

DEFINITIONS

- **Detergent.** Cleaning agent that makes no antimicrobial claims on the label. Detergents (liquid or powder) are composed of a hydrophilic (water-seeking) component and a lipophilic (fat-seeking) component and can be divided into four types: anionic, cationic, amphoteric, and nonionic detergents.
- **Linens.** Cloth items used in healthcare facilities by housekeeping staff (bedding and towels), cleaning staff (cleaning cloths, gowns and caps) and surgical personnel (caps, masks, scrub suits, surgical gowns, drapes and wrappers) as well as by staff on specialty units such as ICUs and other units performing invasive medical procedures (e.g., anesthesiology, radiology or cardiology).
- **Occupational injury or infection.** Injury or infection acquired by healthcare staff while performing their normal duties.
- **Soaps and detergents (terms used interchangeably).** Cleaning products (bar, liquid, leaflet or powder) that lower surface tension, thereby helping remove dirt, debris and transient microorganisms from hands. **Plain** soaps require friction (scrubbing) to mechanically remove microorganisms, while **antiseptic** (antimicrobial) soaps also kill or inhibit growth of most microorganisms.
- **Soiled or contaminated linen.** Linen from multiple sources within the hospital or clinic that has been collected and brought to the laundry for processing. All items, regardless of whether or not they are visibly dirty or have been used in a surgical procedure, must be washed and dried. For example, even though the sterile towel drapes contained in a surgical pack have not been used, they must be laundered before they can be sterilized (see **Chapter 5**).
- **Sorting.** Process of inspecting and removing foreign, and in some cases dangerous, objects (e.g., sharps or broken glass), from soiled linen before washing. This step is extremely important because soiled linen from the operating room or clinic occasionally contains sharps (e.g., scalpels, sharp-tipped scissors, hypodermic and suture needles and towel clips).

PROCESSING LINEN

Note: If utility gloves are not available, putting on two pairs of examination or reprocessed surgical gloves (double gloving) provides some protection for staff responsible for collecting, transporting and sorting soiled linen and other items.

Processing linen consists of all the steps required to collect, transport and sort soiled linen as well as to launder (wash, dry and fold or pack), store and distribute it. Safely processing linen from multiple sources is a complex process. The principles and key steps are listed in **Table 13-1**. Staff assigned to **collecting, transporting and sorting** soiled linen need to be especially careful. They should wear thick utility or heavy-duty household gloves to minimize the risk of accidental injury from a needlestick or other sharp object, including broken glass (see **Chapter 4**).

Staff responsible for washing soiled items should wear utility gloves, protective eyewear and plastic or rubber aprons.

Table 13-1. Principles and Key Steps in Processing Linen

- Housekeeping and laundry personnel should wear gloves and other personal protective equipment as indicated when collecting, handling, transporting, sorting and washing soiled linen.
- When collecting and transporting soiled linen, handle it as little as possible and with minimum contact to avoid accidental injury and spreading of microorganisms.
- Consider all cloth items (e.g., surgical drapes, gowns, wrappers) used during a procedure as infectious. Even if there is no visible contamination, the item must be laundered.
- Carry soiled linen in covered containers or plastic bags to prevent spills and splashes, and confine the soiled linen to designated areas (interim storage area) until transported to the laundry.
- Carefully sort all linen in the laundry area before washing. **Do not presort or wash linen at the point of use.**

USE OF PERSONAL PROTECTIVE EQUIPMENT

Listed in **Table 13-2** is the recommended personal protective equipment (PPE) for use by staff performing the various tasks associated with processing linens.

Table 13-2. Recommended Personal Protective Equipment for Processing Linen

TYPE OF PPE	WHEN TO WEAR
Gloves (preferably household utility gloves) and closed shoes that protect feet from dropped items (sharps) and spilled blood and body fluids	<ul style="list-style-type: none"> • Handling disinfectant solutions • Collecting and handling soiled linen • Transporting soiled linen • Sorting soiled linen • Hand washing soiled linen • Loading automatic washers
Plastic or rubber apron and protective eyewear	<ul style="list-style-type: none"> • Sorting soiled linen • Hand washing soiled linen • Loading automatic washers

COLLECTING, TRANSPORTING AND SORTING SOILED LINEN

Collecting and Transporting After invasive medical or surgical procedures or when changing linen in patient rooms:

- Collect used linen in cloth or plastic bags or containers with lids. If linen is heavily contaminated with blood or body fluids, carefully roll the contaminated area into the center of the linen and place in a leakproof bag or container with a lid.
- Cloth bags are adequate for the majority of the patient care linen. They require the same processing as their contents.

Note: Several studies have shown that there is no difference in the level of linen contamination from isolated and nonisolated patients (Maki, Alvarado and Hassemer 1986; Pugliese 1989; Weinstein et al 1989).

- Handle soiled linen as little as possible and do not shake it. This helps prevent spreading microorganisms to the environment, personnel and other patients.
- It is not necessary to double-bag or use additional precautions for used linen from patients in isolation.
- Do not sort and wash soiled linens in patient care areas (CDC 1988; OSHA 1991).
- Collect and remove soiled linen after each procedure, and daily or as needed from patient rooms.
- Transport collected soiled linen in closed leakproof bags, containers with lids or covered carts to the processing area daily or more often as needed.
- Transport soiled linen and clean linen separately. If there are separate carts or containers available for soiled and clean linen, they should be labeled accordingly. If not, thoroughly clean the containers or carts used to transport soiled linen before using them to transport clean linen.

Sorting Soiled Linen

The processing area for soiled linen must be separate from other areas such as those used for folding and storing clean linen, patient care areas and food preparation areas. In addition there should be adequate ventilation and physical barriers (walls) between the clean and soiled linen areas.

Remember: Disposable sharps (suture needles, scalpel blades and hypodermic needles) must be placed in sharps containers located near the point of use.

Safe sorting of linen is extremely important. Sorting must be carefully performed because soiled linen (large drapes and towel drapes) from the operating room or other procedure areas not infrequently contain sharps (e.g., scalpels, sharp-tipped scissors, hypodermic and suture needles and sharp-tipped towel clips). In addition, bedding from patients' rooms may contain soiled dressings and be blood-stained or wet with other body fluids. These items must be handled carefully while wearing protective gloves, protective eyewear and plastic or rubber apron, and should be disposed of properly. Though infrequent, infections related to sorting have been attributed to failure of handwashing and proper use of PPE (McDonald 2002).

Soiled linen may also contain noninfectious items such as dentures, eyeglasses and hearing aids. These items pose no threat of infection and require no special handling.

LAUNDERING LINEN

Washing and Drying

All linen items (e.g., bed sheets, surgical drapes, masks, gowns) used in the direct care of a patient must be thoroughly washed before reuse. Decontamination prior to washing is **not necessary**, unless linen is heavily soiled and will be hand washed (repeated soaking of linen in chlorine,

Remember: The storage time for soiled linen before washing is related to practical issues, such as available storage space and aesthetics, **not** to infection prevention concerns.

Remember: Presoak in soap, water and bleach, **only** if linen is heavily soiled.

even dilute solutions, will cause the fabric to deteriorate more quickly). Staff responsible for hand washing linen should use PPE as described in **Table 13-2**. In addition, workers should not carry wet, soiled linen close to their bodies even if they are wearing a plastic or rubber apron.

Hand Washing

STEP 1: Wash heavily soiled linen separately from nonsoiled linen.

STEP 2: Wash the entire item in water with liquid soap to remove all soilage, even if not visible:

- Use warm water if available.
- Add bleach (e.g., 30–60 mL, about 2–3 tablespoons, of a 5% chlorine solution) to aid cleaning and bactericidal action.
- Add sour (a mild acid agent) to prevent yellowing of linen, if desirable.

STEP 3: Check the item for cleanliness. Rewash if it is dirty or stained.

STEP 4: Rinse the item with clean water.

Machine Washing

STEP 1: Wash heavily soiled linen separately from nonsoiled linen.

STEP 2: Adjust the temperature and time cycle of the machine according to manufacturer's instructions and the type of soap or other washing product being used. Both cold and hot water washing cycles that include bleach reduce bacterial counts in the linen.

Hot-water washing:¹

- Use hot water above 71°C (160°F) and soap to aid in loosening soil.
- Add bleach and sour as above.
- Adjust the time cycle of the machine according to the manufacturer's instructions.

STEP 3: When the wash cycle is complete, check the linen for cleanliness. Rewash if it is dirty or stained. (Heavily soiled linen may require two wash cycles.)

Note: Uniforms and scrubsuits or gowns worn by housekeeping or cleaning staff can be safely laundered at home (i.e., home laundering does not increase the risk of infection to patients or staff) (Manangan 2001).

¹ Lower temperatures or cold water washing are satisfactory if the cleaning products (type of soap or detergent, amount of bleach and other additives) are appropriate and used in proper concentrations. Using cold water also saves energy.

Drying, Checking and Folding Linen

For both hand and machine washed linens, the steps are the same.

STEP 1: Completely air or machine dry before further processing. Air dry in direct sunlight, if possible, keeping the fabric off the ground, away from dust and moisture.

STEP 2: After linen items are totally dry, check for holes and threadbare areas. If these are present, the item must be discarded or repaired before reuse or storage. (If there are any holes or many repaired areas, the item should not be used as a drape. It can be cut into pieces to be used as cleaning rags.)

Setting standards helps determine when drapes (lap sheets) or linen wrappers should be made into rags. For example, a drape should have no more than 5 patches per 1-foot (12 inches) square area or 20% of the drape covered with patches. Patches should be avoided because they increase the thickness of the linen item and decrease steam penetrability if sterilization is required.

Note: If surgical drapes are to be sterilized, do not iron. Ironing dries out the material, making autoclaving more difficult.

STEP 3: Clean and dry linen should be ironed as needed and folded. For example, if a **clean, dry drape** is acceptable, the drape can be ironed before placing it on a shelf or in a container for storage.

If **sterile linens** are required, prepare and sterilize wrapped packs as discussed in **Chapter 11** and **Appendix G**. The recommended guidelines for processing soiled linens are summarized in **Table 13-3**.

STORING, TRANSPORTING AND DISTRIBUTING CLEAN LINEN

Storing Clean Linen

- Keep clean linen in clean, closed storage areas.
- Use physical barriers to separate folding and storage rooms from soiled areas.
- Keep shelves clean.
- Handle stored linen as little as possible.

Transporting Clean Linen

- Clean and soiled linen should be transported separately.
- Containers or carts used to transport soiled linen should be thoroughly cleaned before used to transport clean linen. If different containers or carts are used to transport clean and soiled linen, they should be labeled.
- Clean linen must be wrapped or covered during transport to avoid contamination.

- Distributing Clean Linen**
- Protect clean linen until it is distributed for use.
 - Do not leave extra linen in patients' rooms.
 - Handle clean linen as little as possible.
 - Avoid shaking clean linen. It releases dust and lint into the room.
 - Clean soiled mattresses before putting clean linen on them.

Table 13-3. Guidelines for Processing Linens and Personal Protective Equipment (PPE)

ITEM	DECONTAMINATION	CLEANING	HIGH-LEVEL DISINFECTION	STERILIZATION
Protective eyewear (plastic goggles and face shields)	Wipe with 0.5% chlorine solution. Rinse with clean water. After each procedure or when is visibly soiled.	Wash with liquid soap and water. Rinse with clean water, then air or towel dry. ² After each procedure or when visibly soiled.	Not necessary	Not necessary
Linens (caps, masks, scrubsuits or covergowns)	Not necessary. (Laundry staff should wear plastic aprons, gloves, and protective foot and eyewear when handling soiled items.)	Wash with liquid soap and water, removing all dirt particles. Rinse with clean water, air or machine dry. ² Air-dried attire can be ironed before use.	Not necessary	Not necessary
Aprons (heavy plastic or rubber)	Wipe with 0.5% chlorine solution. Rinse with clean water. Between each procedure or each time they are taken off.	Wash with liquid soap and water. Rinse with clean water, air or towel dry at the end of the day or when visibly soiled. ²	Not necessary	Not necessary
Footwear (rubber shoes or boots)	Wipe with 0.5% chlorine solution. Rinse with clean water. At the end of the day or when visibly soiled.	Wash with liquid soap and water. Rinse with clean water, air or towel dry at the end of the day or when visibly soiled. ²	Not necessary	Not necessary
Surgical gowns, linen drapes and wrappers	Not necessary. (Laundry staff should wear plastic aprons, gloves and protective foot and eyewear when handling soiled items.)	Wash with liquid soap and water, removing all particles. Rinse with clean water, air or machine dry. ²	Not practical	Preferred
Paper or disposable plastic items	Place in plastic bag or leakproof, covered waste container for disposal.			

² If tap water is contaminated, use water that has been boiled for 10 minutes and filtered to remove particulate matter (if necessary), or use chlorinated water—water treated with a dilute bleach solution (sodium hypochlorite) to make the final concentration 0.001% (see **Chapter 26**).

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