



وزارة الصحة
Ministry of Health

الإدارة العامة لمكافحة عدوى المنشآت الصحية General Directorate for Infection Prevention and Control (GDIPC)

Infection Control Guidelines for Reprocessing of
Linens in Healthcare Settings
(Central Laundry)

December 2020

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Ministry of Health

v.1.0

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1. Introduction

Hospital linen is clearly recognized as a potential reservoir for microorganisms and could be a vector of disease transmission and can harbor large numbers of pathogenic microorganisms. However, the risk of actual transmission of disease from soiled linen is negligible, and there are very few recorded cases of health-related diseases linked to contaminated fabrics.

Efforts to reduce the occupational risk of infection associated with handling and /or dealing with contaminated linen primarily focus on applying infection control precautions as appropriate hand hygiene practices and use of personal protective equipment.

Although prolonging the life of the linen used in healthcare is considered one of money saving method, but this must not compromise their aseptic quality.

Laundry can either be done inside the facility or contracted to an outside contractor.

2. Purpose of the Guidelines

- To provide the infection control standards for the hospital laundry to reduce the risk that may be associated with contaminated linen.
- Provide advice on appropriate safety practices to protect the worker from exposure to potentially infectious materials during collection, handling, and sorting of contaminated linens through proper infection control precautions.

3. Responsibilities

Responsibilities of laundry supervisor

- Facilitate, monitor and supervise the application of these guidelines.
- Create open communication channels between laundry department and users (nursing staff).
- Ensure every worker in laundry have received training on these guidelines.
- Ensure correct and safe handling of linen.

Responsibilities of Laundry Workers

- Collection and transport of used linen from departments to the laundry.
- Sorting and dealing with used linen using impermeable apron, gloves and practicing standard measures while dealing with the used linen.
- Transportation of clean linen to departments in a safe way using closed carts.

Responsibilities of Infection Control Department

- Supervise the process of collection and transportation of the used linen in the healthcare facility.
- Supervise the infection control requirements in central laundry with documented tools.
- Visiting the outsourced laundry and supervise the application of infection control guidelines using a documented tool.
- Training and supervision of the central laundry workers for proper infection control precautions.
N.B training should be done before joining the work and once annually.
- Participate in any project for renovation of the central laundry department.

4. Principles:

4.1 Laundry Design (Basic Requirements):

▪ Location:

Laundering services department should be located in a suitable place. Ideally, it should be in the basement or on the ground floor of the building, with convenient access from various departments.

▪ Zones:

A. Dirty Zone

- a) A special area to receive and sort soiled linen and an area for loading washing machines (washers should pass-through double door types).

- b) This section must be connected to areas used for storage of chemicals and cleaning agents, also areas used for cleaning and disinfecting dirty laundry carts.
- c) Negative pressure should be maintained in the receiving and sorting area compared to other areas, and generally less than the hospital corridor to prevent spread of infectious agents and lint during the sorting process.

B. Clean Zone

- a) An area for receiving/accepting clean linen from the washing machines, drying, inspecting, sewing, ironing, folding, packaging and storing clean linen.
- b) It is essential to have definite physical separation between the dirty zone and the clean zone and restrict movement of laundry personnel from clean to dirty zone (unidirectional flow).
- c) The area contains administrative & supporting areas, lockers, changing room for employees, W.C, supervisor's office, files and space for holding housekeeping supplies.
- d) Following conditions should be available for clean linen storage areas:
 - Preferred to be positive pressure in relation to the adjacent areas.
 - Good ventilation system to prevent accumulation of dust and linen dust.
 - Absence of sewage apertures or water pipes.
 - Storage shelves should be 15-20 cm above the floor 2.5-5 cm away from walls, and 25 cm below ceiling.
 - Used only for storage of clean textiles.
 - The door of the storage area should always be closed.

▪ **Floors:**

The floor must be smooth, non-slip, and non-porous, with no depressions or cracks to prevent fluid settlement and tolerate regular cleaning and disinfection.

▪ **Walls:**

The walls must be smooth and of non-porous surfaces without projections or gaps to avoid accumulation of dust and linen lint, and it should tolerate cleaning & disinfecting agents. To avoid settling and accumulation of fluids, the angles between walls and floor must be round.

▪ **Ceilings:**

The ceiling should be at least 4.5-meter height, solid, smooth, and non-porous surfaces without projections or cracks to prevent collection or building up of linen lint and dust.

▪ **Important accessories:**

Hand hygiene facilities should be conveniently located in all work areas, also emergency eye wash and shower equipment should be available in work areas.

4.2 Ventilation & Temperature Control:

- The dirty area should be under negative pressure with exhaust to the outside.
- Humidity should not be out of range 30-60% and temperature must be within safe limits from 21°C to 24°C.
- Laundry exhaust vents should be provided with filters to capture dust and linen lint. These filters should be repeatedly cleaned and washed by the maintenance staff with supervision of infection control personnel.

4.3 Microbiological Samples:

It is only done if there is epidemiologic evidence suggesting a role of linen in disease transmission in health care facilities, it should be done in consultation with infection control department.

4.4 Linen, pillows and mattresses:

All bedding materials may become colonized with bacteria and become a reservoir of infection.

- Maintain integrity of linen, pillows and mattresses and their covers.
- All mattresses and pillowcases that are torn or have blood stains that cannot be removed should be disposed of.
- All mattresses and pillows used in clinical areas must have sealed intact impermeable covers which can be cleaned and disinfected between patients.
- All mattresses and pillows which are not covered should be washed between patients and when soiled if they are washable.
- Wash all linens made of cloth and washable pillows at hot water cycles.
- Non washable pillows should be disposed of after each patient.

5. Steps of Textiles Processing Cycles

5.1 Collection of contaminated linens in healthcare areas:

- Care must be taken before collection to make sure that there are no foreign or sharp objects such as gloves, syringes, needles, dressings...etc.
- The used linen should be carefully removed by folding and rolling to avoid unnecessary agitation and directly placed into the appropriate bags .
- Used linen should not be carried across the department as it increases the risk of spread of microorganisms into the air, on the floor, staff uniforms, bodies or bedside tables.
- linen Dirty bags should be brought to the bedside.
- Contaminated linen should not be sorted or pre-rinsed in-patient care areas.

5.2 Bagging of contaminated linens:

- The contaminated linens should be placed once collected in leak-proof laundry bags located at the bedside.
- There is no infection prevention advantage of double bagging except in certain isolated cases e.g. EBOLA and in case of leakage of primary bag.
- Contaminated linen and linens full of blood or other body fluid or those collected from isolation rooms should be collected in water dissolvable laundry bags before placing it in the usual laundry bags.

5.3 Transit storage:

- The temporary linen storage is the area where the soiled linen is stored for a short time before it is transported to the central laundry.
- This area could take the form of a dirty utility room in each hospital ward.
- Soiled linen should only be stored in sealed containers or in sealed liners.
- Regular collection of the soiled linen from the temporary storage areas is essential to prevent any build-up of linen in these areas.
- The daily cleaning of the storage area and all containers or stands used for linen is essential.

5.4 Transporting dirty and soiled linen to the laundry receiving area:

- Linen can be collected more than once daily. Soiled linen is transported within a healthcare facility by means of wheeled trolleys. The trolleys or wheeled containers should be cleaned and disinfected daily with an appropriate MOH disinfectant.
- There should be a cart washing station.

Requirement of the trolley washing area:

- Smooth, waterproof and easily cleanable surfaces of the walls and ceiling.
- Non-slip, waterproof floors.
- Hot and cold-water outlets.
- Drainage to the floor.

- An area for manual drying of trolleys, and space for holding cleaned trolleys awaiting transport to clean holding areas.

5.5 Sorting:

- Make sure that no foreign objects (e.g. Needles, scissors, catheter bags etc.) are contained within the used linen. Failure to remove foreign objects presents unnecessary risks to laundry personnel and other members of the staff.
- Laundry staff should wear PPE during sorting of used linen, that should include plastic aprons and heavy duty gloves. Gloves used during sorting process should be thick, water proof and puncture resistant to protect employee from sharp injuries.
- Sharp boxes and medical waste bags (yellow) should be available at the sorting area in the laundry.
- Disposable laundry bags should be disposed of as medical waste, reusable cloth laundry bags should be washed and disinfected as contaminated linen.
- Adequate access to hand washing facilities with supervision of the staff to make sure of compliance.
- The textiles are sorted according to degree and type of soiling.
 - **Advantages of sorting before laundering process:**
 1. Decrease chemical use to increase life span of the linen.
 2. Decrease damage to laundry machines and linen by removing needles and surgical instruments that are accidentally left during the collection process.
 3. Identify hospital area with misuse of linen.
 - **Disadvantages of sorting before laundering process:**
 1. Increase risk of needle stick injury.
 2. Fear of employee exposure to infection.

5.6 The Laundering Process:

Laundering cycles consist of flush, main wash, bleaching, rinsing, and souring. The antimicrobial action of the laundering process results from a combination of mechanical, thermal, and chemical factors as follows: -

- a) Dilution and agitation in water remove significant quantities of microorganisms.
- b) Soaps and detergents function to suspend soils and exhibit some micro biocidal properties.
- c) Hot water provides an effective means of destroying microorganisms.
- d) The use of chlorine bleach assures an extra margin of safety.
- e) The last series of rinse cycles is the addition of a mild acid (i.e., sour) to neutralize any alkalinity in the water supply, soap, or detergent.
- f) The rapid shift in pH from approximately 12 to 5 is an effective means to inactivate some microorganisms.
- g) Factors affecting cleaning and disinfection of textiles include:
 - Used chemicals (chlorine bleach, soap), their concentration, time of adding to washing and rinsing cycles.
 - Load.
 - Degree of linen soiling.
 - Mechanical action.
 - Water temperature.
 - Time.
- h) Laundry process:
 - If hot water laundry cycles are used, wash with detergent in water $\geq 71^{\circ}\text{C}$ for ≥ 25 minutes.
 - Adding proper amount of chlorine bleach to low temperature cycles (49°C - 60°C) for heat sensitive fabrics.
 - A total available chlorine residual of 50–150 ppm is usually achieved during the bleach cycle. Chlorine bleach becomes activated at water temperatures of (57.2°C – 62.7°C).

N.B.

- Never mix soap and chlorine bleach or any other chemicals.

5.7 Unloading

5.8 Inspection

5.9 drying

5.10 Ironing, folding and repairing

5.11 Packaging and storage

- a) Packaging and storage must maintain the clean state of the linen for delivery.
- b) The linen should be wrapped in fluid-resistant securely sealed plastic bags or placed unwrapped into fluid-resistant covered carts.
- c) Unwrapped clean linen must be stored in a designated, controlled-access, clean storage area, with a closed door at all times.

5.12 Transportation of clean textiles

- a) Clean linen must be covered during transport and storage to prevent contamination; transportation carts should be routinely washed.
- b) If carts are used for transportation of linen, there should be separate carts for clean and used linen. Used linen must be placed in bags to avoid spills before putting them in carts.

5.13 Storage of clean textiles

Storing of clean linen could be done in closed carts or covered carts to prevent contamination.

Important notes:

- Wash contaminated linen as soon as possible.
- In case the facility adopts a policy of not sorting linen before washing it, all contaminated linen should be put in water dissolvable bags to be loaded directly into the washing machine.
- Never sort the linens from isolation rooms, it should be collected in water dissolvable bags to be put directly into washing machine.
- Temperature used for drying or/and ironing gives additional effect against microorganisms.

6. Management of on – Site Laundry Department

- a) Food and drinks should never be allowed in the laundry.
- b) Washing machines should be checked regularly to make sure that they meet disinfection standards.
- c) Washing machines should be capable of raising decontamination temperature to the suitable temperature needed.
- d) Washing machines should contain drainage holes and a cycle for decontamination.
- e) Washing machines must have temperature recording equipment that can be monitored (every 4-6 weeks). Records should be monitored by the laundry supervisor.
- f) Periodic maintenance of the equipment should be recorded by the laundry supervisor.

7. Healthcare Worker Uniform

- a) All healthcare workers should use the central laundry services of the healthcare facility. As their uniform could be directly contaminated by infectious agent / body fluids during their work time.
- b) Workers should change their hospital uniform daily except if it became contaminated, it should be changed immediately and placed into a laundry bag and sent to laundry.
- c) It is not allowed for the health care workers to take their uniform to be washed at home.

8. Safe Practices

- a) Apply standard precautions while dealing with all used linen in the same way as if it is contaminated, to prevent transmission of infections.
- b) Hand Hygiene:
 - Cover any skin wounds by fluid resistant gauze at the beginning of the work shift.

- Enough stocks of hand hygiene products should be available and placed in a suitable place.
 - Perform hand hygiene especially after dealing with contaminated linen.
 - Perform hand hygiene after taking off PPEs and before conducting another work.
 - All laundry staff should be compliant with hand hygiene practices.
- c) Personal Protective Equipment (PPEs):
- Personal protective equipment should be worn while dealing with used linen.
 - Apply the standard precautions and wear fluid resistant aprons and other PPEs when required.
 - Wear multiple use heavy duty gloves for protection of workers instead of a single use gloves that cannot withstand the process of sorting.
- d) Occupational safety (Vaccinations, sharp injuries incident reports):
- Vaccination of all laundry workers with HBV vaccine& tetanus.
 - Dealing with all incidents of sharp injuries at occupational health clinics.
 - Smoking and /or eating and drinking is not allowed in the laundry area.
 - Careful dealing with contaminated linen with blood or body secretions.
- e) Transport of used linen in appropriate bags placed in a specific container.
- f) Laundry workers:
- They should not work at clean and dirty area at the same shift.
 - They can deal with dirty linen after clean linen in the same shift but should not be allowed to return to work in the clean area during that shift.

9. Training

- a) Laundry workers should be trained on appropriate standard precautions when handling contaminated linen. Records for the training done for the workers must be kept by the head of laundry department.
- b) Laundry workers should receive job-specific training upon hiring and at least once annually.
- c) Training should include:
 - Safe practices (Standard precautions, isolation precautions, principle of safe laundry handling, correct and safe use of personal protective equipment).
 - Hand hygiene and personal cleaning practices.
 - Occupational health program (vaccination/sharp injuries incident reports/chemical exposures).
 - Waste disposal and dealing with blood spills policy.
 - Ideal application of housekeeping policy.

10. Infection control documents

- There should be an infection control policy and procedures covering all areas related to laundry services. It should contain a policy for reporting of foreign and sharp objects.
- There should be records for all laundry processes and documentation of all washing cycles for every machine. The records should document all process monitoring which include:
 - a. Cycle time: prewash, wash, rinse, and final rinse time.
 - b. Temperature: wash cycle, bleach cycle, and rinse cycle temperatures.
 - c. Chemical usage: chemical types and usage level for every step in the washing process.
- Every chemical must have a material safety data sheet, and copies must be available at the point of use.

11. Management of Off-site (out-sourced) laundry

- Some healthcare facilities have no laundry services inside the facility, the contaminated textiles are collected and transported to be reprocessed in an outside laundry, in another healthcare facility or contracted laundry.
- Process of collection, transit storage, transport of the contaminated textiles, back transport of clean reprocessed textiles to the healthcare facility and distribution to the clinical departments should be under the supervision of infection control department.
- Transportation vehicles should contain sealed containers.
- Mixing of clean and dirty textiles in one transportation cycle is not allowed.
- Cleaning and disinfection of transportation vehicles after each cycle is done and documented.
- Infection control department of the facility should visit and audit the outsourced laundry at least once every 3 months, these visits should be documented with corrective action plans when needed.

12. References:

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GDIPC, October -2020