SOP for the Cleaning of Incubators

Ministry of Health and Wellness
MAURITIUS

July 2023

Approval Form

Version: 2.0 **Effective date:** 22 July 2023

STANDARD OPERATING PROCEDURE FOR THE CLEANING OF INCUBATORS			
	NAME	**SIGNATURE**	**DATE**
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PEER REVIEW

Dr. B. Azmutally (IPC doctor), Mrs. S. Gopy-Burthia (Charge Nurse) and Dr. A. Bundhoo (Neonatologist, Connecticut).

Date of next review: December 2025

Updates

June 2023

- Emphasis has been placed on the use of sterile water in water reservoirs and of the need to clean them daily.
- It is highlighted that babies who cannot be removed from their incubators while their incubators need cleaning will need to be moved to another clean incubator as opposed to postponing the cleaning i.e., all incubators need to be cleaned fully at least once a week.
- Instructions on the daily cleaning of incubators have been added.
- A table summarizing the main points has been appended.

Version history

Version	Date
Version 1.0: Created	6 March 2022
Version 1.0: Approved	15 March 2022
Version 2.0: Revised	23 June 2023
Version 2.0: Approved	21 July 2023

Standard Operating Procedure for the Cleaning of Incubators

Progress made since the last version

Outbreaks continue to be identified in the neonatal ICUs of the country with investigations occasionally demonstrating that organisms like *Serratia sp.* can still be cultivated from the humidifiers of incubators.

Purpose

This document delineates the steps that should be taken to properly clean and disinfect incubators.

Key points

1. Always follow the manufacturer's instructions.[1, 2]
2. Do not clean electrical components with cleaning agents and disinfectants. This can damage the circuit.
3. Do not spray cleaning solution. Wipe with a cloth. Sprayed solution can damage electrical components.
4. Do not use scouring pads or acetone.
5. Before cleaning, ensure the equipment is turned off and that it is disconnected from the oxygen supply. Allow 30 minutes for cooling.
6. Ensure all NICU staff have received training on incubator cleaning, including principles around good cleaning methods – such as, working from clean to dirty, wipe in an 'S' shaped pattern and taking care not to go over the same area twice.
7. Incubators should be cleaned (terminally) at least every week or after each use. The water reservoir should be cleaned daily.
    a. Water reservoirs should be filled with sterile water.
    b. Babies who still require being in the incubator after a week need to be moved to another clean incubator.
8. Components that need to be surface cleaned and disinfected include:
    a. Hand port gaskets, hose grommets, controller, shell, trolley, condensation management bracket, sensor module, hood, inner double walls, heater radiator, fan impeller, humidifier, air inlet filter chamber, air inlet filter cover, rail and accessories, drawers, cylinder holder, utility shelf, IV pole, mattress, bed, x-ray tray, upper cover, scale and T-bars.
9. Components that can be steam sterilized at 132° C for 3-5 minutes include:
    a. Manifold, heater / impeller cover, duct cover and water reservoir assembly.
    b. Replace the above components if cracks appear.
    c. Check the manufacturer's instructions before sterilizing – some incubators have heaters, impellers and water drawers that cannot be steam sterilized.
10. Components that can be soaked in a disinfectant include:

a. Grommets, porthole gaskets and fans.

11. Suitable disinfectants are:
    a. Hypochlorite at a concentration of 0.5%;
    b. Quaternary ammonium compounds at 0.4-1.0%;
    c. Glutaraldehyde at a concentration of 2%;
    d. Hydrogen peroxide at a concentration of 6%;
    e. Iodophor solution at a concentration of 0.27%;
    f. Mixture of a quaternary ammonium compound at 0.28% with isopropanol at 17.2%;
    g. Magnesium monoperoxyphthalate hexahydrate at a concentration of 800-1,000mg/g;
    h. Potassium peroxymonosulfate at a concentration of 0.6-1.0g per 100g;
    i. Alkaline enzymatic universal cleaners for thermostable and thermolabile instruments; and
    j. Peroxyacetic acid at 0.1-0.2% with hydrogen peroxide at 0.5-1.0%.
12. The contact time is usually 1-10 minutes. Check the "Standard Operating Procedure for the Routine Environmental Cleaning of Healthcare Facilities" for details.
13. Acrylic components like the hood and the inner double walls are sensitive to alcohol – do not use. Autoclaving, unless otherwise specified, can damage the equipment.
14. The following items should be exchanged regularly:
    a. If the air inlet filter is damaged, visibly dirty, older than 3 months or used on an infectious neonate, replace it.
    b. Cuffs and iris port sleeves should be changed weekly or when necessary.
    c. Skin temperature probes and probe covers should be changed weekly.
        i. Disposable temperature probes must not be reused.
15. Inspection and safety checks of incubators should be carried out annually.
16. Ensure cleaning exercises are documented in a cleaning schedule for ease of reference during outbreak investigations.

Steps for terminal cleaning

1. Perform hand hygiene and wear the appropriate personal protective equipment (PPE) as per risk assessment. Always wear clean gloves. Sterile gloves are not necessary.
2. Disassemble the incubator for optimum cleaning and disinfection.
3. Wipe off and remove all accumulated fluids.
4. Remove all soiling and debris by wiping with a dampened cloth. Use a soft and neutral detergent like soap if necessary.

5. Wipe with a disinfectant three times. Observe the recommended contact time.
6. Wipe with a wet cloth to remove residual disinfectant. Ensure that clean water is used.
    a. If incubators are recurrently positive for microorganisms, especially *Pseudomonas*-like bacteria, the water source may be contaminated. To decontaminate, it is suggested to pour 250ml of 24% acetic acid once weekly for 10 weeks into sink drains and wait for 30 minutes before flushing.[3]
7. Ensure that all holes and indentations are cleaned.
8. Wait for the product to air dry for 45 minutes.
9. Check for visible soiling. Repeat the above steps if soiling persists.
10. Assess for damage of the item. Replace if necessary.
11. Dispose of waste as per the "Standard Operating Procedure for the Routine Environmental Cleaning of Healthcare Facilities".
12. Remove PPE and perform hand hygiene.

Steps for daily routine cleaning[4]

1. Change mattress sheets and incubator cover daily or if they are stained with blood.
2. Clean high touch surfaces, for example, the door handles and latches at least thrice daily.
3. Clean the outer surface of the incubator at least once daily.
4. If the humidifier is in use, the reservoir must be cleaned, and sterile water must be changed daily.
5. Incubators should be covered after cleaning and if not in use. Store in a dedicated place, away from any potential sources of contamination, such as splashes from sinks.

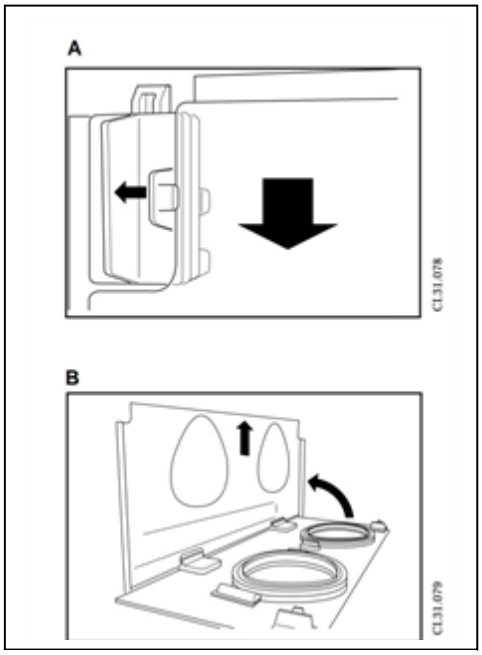
Summary

Component	Frequency	Disinfection
Hood (external surface)	Daily	Soap -> Wipe -> Disinfect -> Rinse -> Dry Sensitive surfaces like the hood can be disinfected with quaternary ammonium compounds. Most other surfaces can be disinfected with quaternary ammonium compounds, alcohol or hypochlorite.
Inner double wall	Weekly	
Frequent touch points e.g., door handles and latches	3 times per day	
Gasket, grommets, hand ports, access panel, locking button, sensor module opening	Weekly	
Mattress, mattress tray, x-ray tray, cover, upper cover, scale, T bars, temperature probes	Weekly Disposable items should be thrown away	

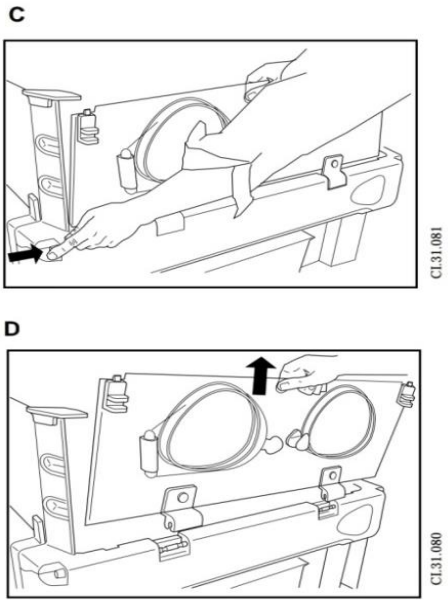
Incubator trolley & shell: - Heater well - Controller - Shell - Trolley - Attached trolley parts	Weekly Ensure proper disassembly first	Soap -> Wipe -> Disinfect -> Rinse -> Dry Sensitive surfaces like the hood can be disinfected with quaternary ammonium compounds. Most other surfaces can be disinfected with quaternary ammonium compounds, alcohol or hypochlorite. Some components may not be rinseable – please check the manufacturer's manual.
IV pole	Daily or if stained	
Heater radiator & fan impeller	Weekly Note: – Do not steam sterilize parts when dissembling for cleaning – Do not immerse the heater assembly in liquid	
Water reservoir for humidification	Daily Change the water daily and use sterile water	
Water reservoir, heater impeller cover, duct cover assembly	Weekly Avoid steam sterilization – check manufacturer's instructions first	
Air inlet filter chamber & cover	Every 3 months or following use on an infected baby – it is typically replaced Note: Do not attempt to clean the air inlet filter (risk of damage to the filter)	

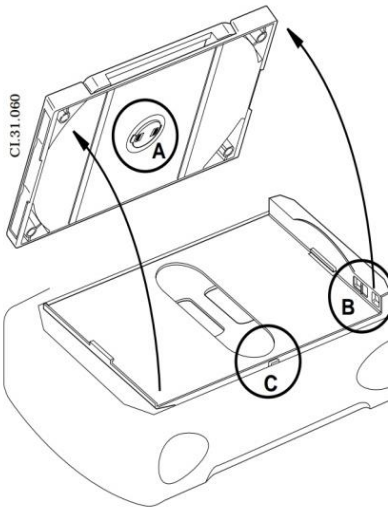
Disassembly of the Giraffe incubator

- Raise the canopy to its top limit.
- Turn the power off and unplug.
- Allow to cool for 30 min.
- Unplug any probes.
- Open the side doors by squeezing the latches located at the top corners of each door.
- To remove the inner wall, push out on the tabs on the back of the door latches to release the top of the wall **A,** then rotate the inner wall down until it slides directly out of the door hinges **B**.

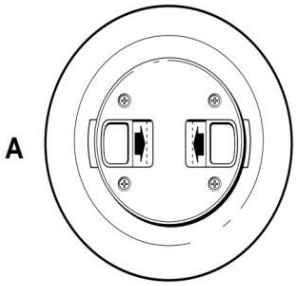


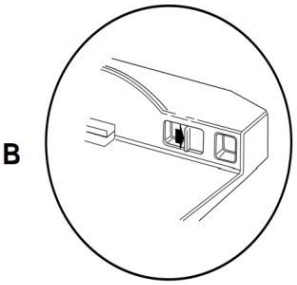
- Remove the side doors by pushing in on either of the spring-loaded buttons at the bottom corners of the door **C** and lifting the door out of its hinges **D**.
- Lower the wall at the foot of the bed by lifting the wall directly up and then allowing to rotate forward and down.
- Lift the wall up from the centre. The wall will stop about 4cm up to allow cleaning underneath it.
- Remove porthole seals and irises.

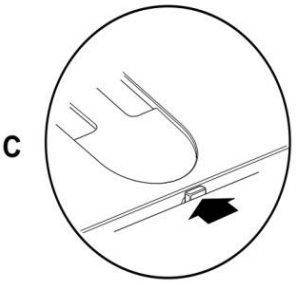


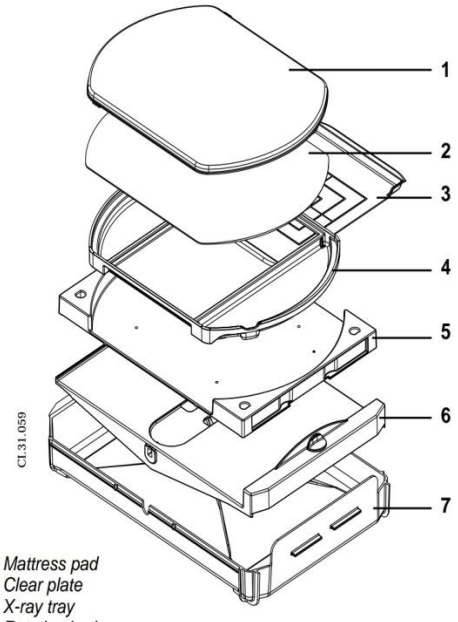


- Remove mattress pad, clear plate and x-ray tray.
- Centre the transition deck and lift up the chassis.
- Separate the rotating bed from the transition deck by turning it over and squeezing between the two spring latches located in the bed centre **A**.
- To remove the tilt platform first slide open the finger pocket latch located on the right at the head of the bed **B** to release the screw ball. Next use the tab on the right tilt pivot pin **C** to slide the spring-loaded pin in and lift the tilt platform up out of the bed.
- Lift the pan up out of the chassis.
- Grasp the bottom of the humidifier reservoir and pull it away from the bed.
- Remove the screw that holds the intake filter cover and inspect/replace the filter.









1. *Mattress pad*
2. *Clear plate*
3. *X-ray tray*
4. *Rotating bed*
5. *Translation deck*
6. *Tilt platform*
7. *Pan*

Disassembly and assembly of the Dräger incubator

References

1. Dräger. Instructions for use: Isolette 8000 Plus SW 5.n. Edition: 4 – 2019-07.
2. Giraffe Omnibed. Operator's Manual. 2001.
3. Stjärne Aspelund A, Sjöström K, Olsson Liljequist B et al. Acetic acid as a decontamination method for sink drains in a nosocomial outbreak of metallo-β-lactamase-producing *Pseudomonas aeruginosa*. J Hosp Infect. 2016 Sep;94(1):13-20. doi: 10.1016/j.jhin.2016.05.009. Epub 2016 May 24.
4. UK Health Security Agency. Good IPC practice for the cleaning and handling of incubators and other equipment in neonatal units. United Kingdom. 27 Oct 2022.