**Disposal of Filled Blood Bags by Autoclaving — SOP**

**Document Number: 529**

*The purpose of this SOP is to standardize the specific procedures to be used for the facility. This document should be customized to meet your facility’s needs.*

# Purpose

This procedure covers the correct handling, treatment by autoclaving, and disposal of filled blood bags that have been discarded as waste.

# Scope

Blood bags are used for collecting blood donated for transfusing patients. Once rejected for use (contaminated, incorrect typing, in excess of requirements or expired), the bags and any blood will need to be treated prior to disposal to reduce any potential for infection. Donated blood that has been checked for infectious agents prior to issue and found safe can be considered safe for discard to closed sewer for subsequent treatment, such as provided in a wastewater treatment works, a septic tank or biodigester (Refer to Doc 521: Sanitary Sewer Disposal of Liquid Laboratory Waste —Guidance).

In some countries, where the blood donor screening and testing is not thorough enough to ensure that all blood supplied for transfusion or used in health care may be considered noninfectious, all waste blood products should be considered hazardous and treated as infectious waste. The discarded filled blood bags will need to be disinfected prior to disposal, to prevent the spread of disease.

If blood is known to be contaminated, it will require disinfection prior to disposal and autoclaving is the recommended treatment method.

Because blood bags are usually made from the chlorinated plastic PVC (polyvinyl chloride), they should not be incinerated, due to the generation of dioxins and furans during the burning process. These toxic compounds cause cancers even in low concentrations. In addition, where the incineration devices are basic, the burning bags may leak, which will create a hazard in the vicinity of the incinerator. Autoclaving is the preferred option for treatment of blood bags. Another option is discharge to a closed sewer connected to a waste treatment facility (such as wastewater treatment works, septic tank or biodigester). Small-scale incineration without air pollution control devices may be considered as an **interim** solution until suitable alternatives have been developed.

# Definitions

Refer to Document 522: On-site Treatment and Disposal of Blood Transfusion Products – Guidance.

# Responsibilities

* 1. This SOP refers to all personnel who are trained and authorized to handle discarded blood bags.
  2. All training must be documented, updated regularly and filed by the responsible person.
  3. The person using a blood bag with a needle, once the pack is ready to be discarded, must:
     + Tie the tube above the needle.
     + Ensure any residual blood is pushed back into the bag.
     + Cut the needle off the tubing below the knot, discarding it in the sharps container.
     + Empty any residual blood down the drain, if the blood has been assessed to be non-infectious and the drain is closed, discharging to a treatment facility (refer to the requirements of Doc 521: Sanitary Sewer Disposal of Liquid Laboratory Waste —Guidance).
  4. The person authorized to accept waste blood bags for treatment prior to disposal must ensure that:
     + Where present, the needle has been removed – any incidents of nonconformance are immediately communicated to the department manager for action, to prevent a recurrence.
     + Only residual liquid remains in the bag, unless the blood has been considered infectious, requiring disinfection in the bag prior to disposal.
     + All blood bags (empty or full) are autoclaved and not incinerated.
     + The autoclave cycle used has sufficient exposure time to disinfect dense liquids like blood.
  5. The department manager is responsible for:
     + Ensuring that waste blood bags are responsibly handled and treated, prior to disposal.
     + Ensuring that action is taken to solve any reported problems.

# Materials and Equipment

* Sharp pair of scissors – to cut the needle off the tubing on a waste blood bag.
* Access to the drain for disposal of any residual or expired, clean blood.
* Autoclave – for disinfecting waste blood in bags.
* Labeled containers for storing waste blood bags at the place where they are used.
* Reusable autoclave containers in which to place blood bags or packs, to contain any liquid that may leak from ruptured bags.
* Appropriate PPE. When handling blood or blood products, always use:
  + Eye protection (safety glasses or goggles) to protect against blood splatter.
  + A mask to prevent breathing air-borne pathogens.
  + Gloves to protect your skin from spills or leaks.
  + Laboratory coat or other protective clothing to protect your upper body from spillages.
  + Closed shoes.

# Hazards and Safety Concerns

* 1. Always
  + Wear appropriate PPE (see section 5).
  + Use the ***precautionary principle*** – if the hazard is unknown, assume the worst - only if the blood or blood products are **shown** to be uncontaminated, may you assume that they are not hazardous.
  + Protect cuts or skin abrasions by using a plaster to close the wound.
  + Wash your hands with soap after handling blood or blood products.
  1. Infectious waste

The hazard arises from blood or blood products that may be contaminated by pathogens. Contaminated blood should not be disposed of to drain unless there is no other option. Remember that if the drain or sewer becomes blocked, the maintenance personnel or plumber will have to manually clear the debris, which puts them at risk from exposure to pathogens too. They will also need to take steps to prevent exposure to infectious organisms.

* 1. Sharps

If there is a needle present, make sure that it is discarded as sharps waste and not left attached to the blood bag. In removing the needle from the blood bag, make sure that you cannot be spattered by blood or allow the blood to leak out and spill.

# Procedures

* 1. Preparing for treatment
     1. For blood bags with contaminated contents or those considered potentially infectious, ensure all the liquid and the containers are sent for autoclaving to disinfect them prior to disposal.
     2. For blood bags with an attached needle, once the blood bag is ready to be discarded:
        + Tie a knot in the tubing above the needle.
        + Drain the blood in the tube back into the bag, using a pen or other suitable device, rolling it along the tube to move the blood.
        + Cut the needle off the pack and dispose of it in the waste sharps container.
  2. Loading the blood bags in the autoclave
     1. Load the blood bags in single layers in reusable, leak-proof secondary containers to ensure the steam is able to heat the liquids effectively, and to contain any material that leaks from the bags, which often burst during autoclaving.
     2. Where only a few bags (fewer than five) are required to be autoclaved at any one time, these may be loaded with other infectious waste for treatment. It is best to use a “liquid cycle,” which is usually one of the program options on electronically controlled autoclaves. This has an extended exhaust stage to prevent liquids from bubbling out of containers as the pressure reduces. This slow exhaust stage will provide sufficient time to allow the bags to hold the required temperature long enough for disinfection.
     3. For situations where routinely many blood bags at a time require autoclaving, such as for blood banks, where contaminated bags have been returned for disinfection, then
        + Undertake a full validation for this waste stream to determine the correct parameters required for disinfection of the blood.
        + If the majority of the waste to be autoclaved comprises filled bags, then the autoclave cycle will have to be validated for this waste prior to being treated for the first time.
        + Some of the modifications likely in a successful blood bag cycle include:
          - It can be anticipated that each load of filled blood bags may need at least another 20 minutes at 121°C to ensure effective disinfection. Some researchers recommend 2 hours autoclaving.
          - Use a liquid cycle because the longer cooling down period will allow more time for the blood bags to be effectively disinfected and minimize boiling of liquids due to rapid pressure drops.
          - Do not vent for at least 20 minutes after the usual disinfection time has elapsed.
     4. When a lot of blood bags are to be autoclaved, but where this will not be a routine operation, spread the bags out over many loads to prevent too many from being autoclaved together. Blood bags generally need a longer holding time at the target temperature (121°C) required to effectively disinfect the dense liquids. This can be achieved by:
        + Using a liquid cycle as the longer cooling down period will allow more time for the blood bags to be effectively disinfected and to minimize liquid boiling over due to rapid pressure drops.
        + Not venting for at least 20 minutes after the usual disinfection time has elapsed.
  3. Discarding autoclaved blood
     1. Blood usually congeals in the bags, which burst during autoclaving, so do not discard autoclaved blood to drain, as this semi-solid or gelatinous material may cause blockages by forming a plug in the pipes and u-bends.
     2. Autoclaved blood can either be:
        + Discarded with other solid waste or directly into a placenta pit, septic tank or biodigester (not if accessed via drains or pipes) or
        + Macerated and discharged to a closed drain connected to a treatment system.

# Reporting and Recordkeeping

* 1. The number or mass of blood bags autoclaved should be included in the autoclave operation log.
  2. Any incidents, including needles remaining on waste blood bags must be reported to the department manager for action.
  3. Report any incidents or accidents, such as spills and needle stick injuries, according to standard institutional procedures. Where prescribed by local legal requirements, the relevant authorities must be notified of any incidents, such as needle stick injuries.

# References

# Chitnis V, Chitnis S, Patil S, Chitnis D. Treatment of discarded blood units: Disinfection with hypochlorite/formalin versus steam sterilization. Indian Journal of Medical Microbiology, 2003;21(4):265.

# United Nations Development Programme‒Global Environment Facility (UNDP‒GEF), Global Healthcare Waste Project. Guidance on the microbiological challenge testing of healthcare waste treatment autoclaves. New York (NY): UNDP‒GEF; 2010. 9 p.

<http://gefmedwaste.org/downloads/Guidance%20on%20Microbiological%20Challenge%20Testing%20for%20Medical%20Waste%20Autoclaves-%20November%202010.pdf>

# Perkins JJ. Principles and methods of sterilization in health sciences. 2nd ed. Charles C Thomas Pub Ltd; 2008. P. 477-478.

# Related Documents

* Doc 309: Incident Log
* Doc 308: Incident Reporting Form
* Doc 532: Autoclave Operation Log
* Doc 522: On-site Treatment And Disposal Of Blood Transfusion Products — Guidance
* Doc 530: Autoclave Operation — SOP

# Attachments

None