Video Transcript: Safe Use of a BSC (https://vimeo.com/9466020)
Time: 10m 34s

In the modern biomedical research laboratory procedures are occasionally conducted that can generate infectious aerosols. These aerosols must be contained, so exposures to researchers will not occur. Other procedures require a sterile environment so that cell and other cultures will not become contaminated while they're being handled.

Both of these procedures, if performed in a properly working biological safety cabinet by a researcher using good technique can be performed safely and without contamination. This training program reviews the steps required to safely and effectively work in a biological safety cabinet, including what to think about while planning your work and what to wear while working in a cabinet. How to start the blower and prepare the cabinet for your work. How to minimize the contamination of your work, the release of aerosols, and the disruption of cabinet airflow while working in the cabinet. How to respond to spills within the cabinet and how to remove materials from the cabinet, disinfect and shut down a cabinet and remove protective clothing.

We will now look at each of these in detail. Prior to working in a biosafety cabinet, you must carefully plan out the steps to be used in your procedure, enlist all the supplies that are needed, including equipment, cultures, media, and other materials. This will allow you to load all the materials you will need before starting. You will also want to pick a time to work in the cabinet that will be uninterrupted. If the cabinet is in a dedicated room place a sign on the door indicating that the cabinet is in use and people should not enter. Depending on the level of risk of the work being conducted and the laboratory standard operating procedures appropriate personal protective equipment should be donned.

Prior to donning your protective clothing, wash your hands and forearms thoroughly with germicidal soap. Then when conducting low risk work, don a lab coat with knit cuffs and gloves. For higher risk work such as BL2+ and BL3 work a solid front long sleeve gown with knit cuffs and two pairs of gloves is more appropriate. Make sure the glove covers the gowns cuffs. There should be no exposed skin. These garments will protect you from the agents you work with, as well as keep you from contaminating the cabinet, your cultures, and other research materials with skin flora.

You'll want to turn off the UV light as soon as you enter the laboratory if it is being used. Turn on the fluorescent lights and check the intake and exhaust grills to make sure they're clear of obstructions. Then start the blower, raise the view screen and check the pressure indicator to ensure the HEPA filter is not clogged. Your certification certificate will list with the certifier, considers an excessive pressure drop across the filter for your biosafety cabinet.

Allow the air to purge for at least five minutes after starting the blower. This will remove all the airborne contaminants from the biosafety cabinet. If you will use a vacuum line in your procedure, check to see that it is protected with dual collection flask located in the biosafety cabinet and a vacuum filter. This will protect the house vacuuming system from contamination. Make sure that the drain from the pan beneath the front grill is closed so that any spill in the grill will be contained in the pan. Next, adjust the height to the lab chair so that your armpits are approximately level with the bottom of the view screen. This will ensure that your face is protected by the view screen but give you plenty of room to work. Wash down the interior surfaces with an appropriate disinfectant, including the grill. This may be 10% sodium hypochlorite solution or another EPA tuberculocidal disinfect. If you use bleach, follow it up with a 70% alcohol wipe down to prevent corrosion. The most effective disinfectant will depend on the organisms manipulated and the work conducted in the biosafety cabinet. After wiping down the outside of items to be placed in the biosafety cabinet with disinfectant, load the cabinet with all the supplies you will need to conduct your work.

This is where good planning pays off. Nothing should be taken out or put in the biosafety cabinet once you begin working. Make sure you have everything you need before you start. Biosafety cabinet should not be overloaded and make sure all items are at least four inches behind the view screen, which reduces the potential for contamination and disruption of airflow.

Pay special attention to the grills which must not be covered as illustrated here. Materials placed on the grills will disrupt the air flow. Interfering with the air barrier. Your work area should be laid out within the biosafety cabinet, so we have a clean and a dirty or contaminated area. These are typically positioned on opposite sides of the cabinet. These areas must be located to minimize movement of clean items over contaminated items and vice versa. Your supply should be located in the clean area and your pan or container of disinfectant and waste container in the contaminated area. Tape, experimental and emergency procedures to the view screen so they'd be available to you if you need them.

After assembling your equipment, wait two to three minutes before starting work. This purges the air contaminants and allows the air flow to stabilize. While performing tasks in the biosafety cabinet, transfer materials from the clean side through the work area to the contaminated side.

Placed used pipettes in a container of disinfectant. If you placed a pipette in a vertical container, make sure the disinfectant is drawn high enough into the pipette to rinse out residual material. Always use a bulb or auto pipetting device. Never mouth pipettes. You should never use sharps and particularly needles and syringes in a biosafety cabinet. Using disposable items eliminates the need for a bunson burner whose flame can create turbulence, disturbing airflow, and potentially damaging the HEPA filter.

Avoid moving your hands in and out of the biosafety cabinet as demonstrated here. When working in a biosafety cabinet, move slowly and deliberately. When extracting or inserting your hands, move your arms straight in and out and not side to side, and when entering or exiting a cabinet, do so from straight on.

Properly using and maintaining biosafety cabinets will control aerosols but will not eliminate contact transfer. It is essential that good aseptic technique be followed. Keep the open mouth of bottles, tubes, and flasks parallel to the airflow when open and the top over Petri dishes or tissue culture plates. Transfer viable material as far back in the biosafety cabinet as possible and always recap vials. Work with one specimen at a time and recap before going on to the next person. Discard empty tubes immediately. This will minimize contamination of your work. If a spill should occur while working in a biosafety cabinet cover with a towel and soak with 10% bleach. After allowing 10 - 15 minutes for contact time. Wipe surrounding exposed surfaces and equipment with disinfectant.

After cleaning up a spill, discard your gloves and replace them with a new pair. Allow the cabinet to purge for several minutes and be sure to autoclave all contaminated materials. After completing your work, run the biosafety cabinet for two to three minutes without activity to purge the air. Disinfect the outside surfaces of all items to be removed from the biosafety cabinet. Place all waste in the discard container within the biosafety cabinet. Remove, discard and replace your gloves. Then remove all the items that have had their surfaces decontaminated.

Remove any waste and disinfectant and autoclave or place in the appropriate waste stream. Finally, disinfect all biosafety cabinet surfaces; the bench, top sides and back, as well as the view screen. You should also periodically decontaminate under the work rails if these parts are removable. Now that the biosafety cabinet is appropriately disinfected for the next. Turn off the lights, the blower, and shut the view screen. When your work is complete. It is now time to properly remove your protective clothing by doffing and disposing your gloves and removing your lab coat. Wash your hands and forearms thoroughly with germicidal soap and water.

If you perform higher risk activities in the cabinet, remove your outer gloves and then your gown being careful not to contaminate your skin and street clothes. The outer gloves and gowns should be disposed of as biomedical waste. Wash your hands thoroughly with germicidal soap and water.