Laboratory Equipment Safety: Autoclaves/Sterilizers

What's at Stake?

Consider the following incident…

A postdoc was badly scalded by water while removing items from the top autoclave of a tower-style autoclave. To autoclave her own materials, the doctor began to remove a load that belonged to another laboratory while standing on a low step-stool. The load in the autoclave consisted of a Nalgene tub that contained liter bottles of media with water around them. The water in the tub was near boiling temperature, and as the doctor attempted to remove it, the contents spilled down her torso and thighs.

What's the Danger?

Autoclaves and sterilizers pose many threats to workers. The most common issues are burns from steam, water or other detergent/ chemicals used in some types of autoclaves, and/or burns from the equipment being sterilized.

Additionally, cuts can be common hazards, as many instruments to be sterilized are made of glass and/or metal, and unless handled carefully with appropriate PPE, can be a risk to workers.

In addition to burns and cuts, autoclaves/sterilizers can explode if not maintained or used properly. In these instances, workers are at risk of being impaled by shrapnel from the equipment, severe burning, and exposure to pathological materials from instrumentation that was not properly sterilized.

How to Protect Yourself

1. PPE: Your employer must assess and identify potential worksite hazards to which you may be exposed while you are

doing your job. Employers must also ensure that workers use appropriate personal protective equipment (PPE).
    - Workers should use appropriate hand protection when hands are exposed to hazards such as cuts, lacerations or thermal burns.
    - Using oven mitts for handling hot items, and steel mesh gloves for handling or sorting sharp instruments are examples of appropriate PPE.
    - Additionally, lab coats, smocks, and/or aprons should be used to prevent scalding of the body.
2. Training: It is always good practice to have appropriate training when working with autoclaves/sterilizers, even if workers have been experienced with sterilization techniques before.
    - Different models of sterilizers pose different risks. For example, the tower style autoclave as seen in the story above, is more dangerous than a standard autoclave.
        - Removing a load from the top autoclave requires standing on a step-stool or platform ladder and stepping down to place the load on a cart.
        - For a short-statured person, a standard step-stool is not high enough to allow them to remove a load without reaching over their head.
    - Autoclaves and sterilizers pose electrical hazards. Workers should be trained on these hazards, as well as the location and use of control valves, electrical panels/shut-offs.
    - In most labs and medical facilities, the autoclaves and sterilizers are used by multiple groups.
        - Training must be done to ensure that issues such as overcrowding in the rooms, unfamiliarity with equipment/loads, and unfamiliarity with first aid measures, do not pose threats for all workers who will be using the autoclaves and sterilizers.
3. Good work practices: To ensure the safety for all workers the following standards should be practiced.

- Ensure that the autoclave/sterilizer door is closed and locked before beginning the cycle.
- Do not remove items from an autoclave/sterilizer until they have cooled. Wait 10 minutes from the time the door is cracked open to allow time for sufficient cooling.
- Remove glassware one by one before removing tubs from the autoclave.
- Avoid handling the sharp ends of instruments; use forceps or other tools in addition to steel mesh gloves to remove sharp instruments from baskets and autoclaves.

Final Word

Although very common and relatively easy to use equipment, autoclaves and sterilizers can pose threats to lab workers if potential hazards such as cuts and burns are not recognized.