

Autoclave Scalding

Post-doc Scalded when using Tower-Style Autoclave

A postdoc, Dr. X, was scalded by water while removing items from the top autoclave of a tower-style autoclave. The autoclave was determined to be working properly at the time of the incident.

To autoclave her own materials, Dr. X began to remove a load that belonged to another laboratory while standing on a 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 as Dr. X attempted to remove it, and the contents spilled down the trunk and thighs of Dr. X. Another employee had gone to retrieve a cart so that the materials could be removed more safely.



Findings: Factors contributing to the Accident

1. Style/Model of the Autoclave: The tower style autoclave 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. (Note: A standard step stool was used in this incident.) In addition, the bottom autoclave is too low for a tall person to comfortably insert or remove loads.

The facility has appropriate platform ladders in place to allow individuals of different heights to reach the top autoclave. They are bulky, however, and personnel are probably more likely to use a step stool. Facility had not required that liquid loads be autoclaved in the bottom unit before the accident because of ergonomic considerations for tall people. However, since the accident, liquid loads are permitted only on the bottom.

2. Training Issues: Despite having attended a recent training session where the participants were brought to the autoclave room and given detailed safety instructions, Dr. X failed to:

- a) remove glassware one by one before removing tubs from the top autoclave
- b) wear a lab coat (but was wearing autoclave gloves)

c) wait 10 minutes from the time the door is cracked open to allow time for sufficient cooling

d) have cart available.

The other user of the autoclave failed to add no more than 1" of water (to prevent breakage of glass vessels.)

3. The autoclave log had not been filled in by the previous user: Dr. X was removing a load of whose contents she was unfamiliar with. If the log had been completed, she could have asked the owner to remove his/her load.

4. Nalgene tubs were used instead of metal tubs: Dr. X indicated that the nalgene tub had buckled. The Nalgene tubs may get less sturdy as they age and may soften when exposed to intense heat.

Lab personnel may prefer using 5" nalgene tubs because they are deeper than the metal tubs and more likely to catch boilover from flasks. However, according to Steris, the nalgene tubs should not be used. The steam compresses the air in the tray, creating an insulation pocket, which interferes with sterilization. Furthermore, the use of the nalgene trays creates a need to use water in the tubs to fill the insulation pocket.

5. Adding Water to the Tub: According to Steris, only 50% of autoclave users add water to their autoclave tubs. As mentioned in 4 (above) this water may not be necessary if metal tubs are used. It is believed that adding water to the tub prevents glassware from breaking during sterilization. According to Steris, breakage should not be a problem if sturdy glassware is being used.

6. First Aid: Apparently, Dr. X's burns were worse in areas that were covered by underwear which was not removed. Removal of all clothes covering affected skin should be stressed and tyvek labcoats should be readily available for emergencies.

Additional Recommended Follow-up

a. The Health and Safety Office is exploring the possible use of a hydraulic cart that could be used to take tubs out of the autoclave without the need to bend down or climb a platform ladder.

b. The Health and Safety Office will work with the lab to evaluate if autoclaving loads without water causes glass breakage.

c. Aprons, should be easily accessible in autoclave rooms. Signs should be posted about what personal protective equipment must be worn.

d. The Health and Safety Office will inform lab personnel of the incident and how it could have been prevented through training sessions, signage and a newsletter article. The

Health and Safety Office will increase emphasis on autoclave safety in initial and refresher laboratory safety training sessions.

e. The Health and Safety Office strongly recommends that tower- style autoclaves not be installed in any future buildings or renovations.