Hazard Alert – Ethanol fire burns Research Associate

In preparation to conduct bacterial culture work on the open bench, an employee sterilized the benchtop and their gloves with ethanol in the presence of a lit Bunsen burner. The Bunsen burner stayed lit from a previous procedure as employee intended to use it for flame sterilization of equipment for the bacterial culture work. As the employee poured ethanol into a small glass jar, a fire ignited and spread to the employee’s hand, arm, lab coat and benchtop. Combustible materials stored nearby also caught fire before other lab personnel were able to use a fire extinguisher to put out the fires on the bench top and on the employee’s lab coat which had been removed. Campus Security responded and examined the employee. BCAS transported the employee to hospital where they were treated for second degree burns to the right forearm and released.

What caused the incident?
Ethanol vapours were generated during the sterilization of the benchtop and gloves and when the small glass jar was filled with ethanol. The presence of the lit Bunsen burner provided an ignition source to cause a flash fire.

How can similar incidents be prevented?
Since flame sterilization makes use of ethanol and an open flame, it is crucial to follow key safeguards:

- Select a suitable location for flame sterilization; remove any flammable and combustible materials adjacent to the workspace (e.g. bench paper, bottles of flammable solvent)
- Use a low, stable glass container for the ethanol and use the minimum quantity required
- Only light the Bunsen burner once all surface and glove sterilization has taken place and ensure the ethanol liquid has evaporated and vapours have dissipated.
- Keep the ethanol container a safe distance away from the Bunsen burner (min. 30 cm)
- Some labs do not use ethanol and open flames for their sterile plating process. Consider changing your procedure to make it safer, such as using disposable sterile equipment.
Things to consider

- The Research Associate had 10+ years of experience working in the lab. **Even if you have experience with a specific technique, still consider all potential hazards associated with the task at hand and develop strategies to mitigate them.**
- Employee had completed all sessions of EHRS Lab safety training in 2004. **Consider attending EHRS lab safety training to refresh your knowledge on a regular basis.**
- The Research Associate was working in the lab during the evening. Fortunately, there were co-workers present at the same time, one of whom had recently completed Fire Extinguisher training. **It is critical that researchers working alone in the lab after hours or weekends conduct a risk assessment with their Supervisor to determine what activities can be conducted alone and what safeguards must be in place.**
- The lab coat worn by the Research Associate is a polyester-cotton blend. EHRS has tested these coats and determined they melt very quickly when on fire. **A 100% cotton lab coat is more appropriate for researchers who work with flammable solvents as even though they will burn, they do not melt onto the skin. For work with large volumes of flammables or for high hazard materials (e.g. Pyrophorics), a lab coat made of fire-retardant material (Nomex®) is recommended.**
- A reminder that an emergency shower can be used to put out fire on clothing. If a shower is not nearby, a person should “Stop, Drop & Roll”.
- Use cool running water to cool burned skin and not ice, which can lead to infection and damage tissues.
- A reminder that anytime a fire occurs in a building on campus, even if the fire is then extinguished, the Burnaby fire department advises that the fire alarm should be pulled.

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