Antifogging techniques as part of personal protective equipment (PPE)

Fogging of protective head/eye gears is one of the most common problems in 80% of cases in the daily practice of using PPEs during endotracheal intubation. Routine use of antifog treatment to prevent interference especially during airway management has been recommended. Full body encapsulating PPEs increase sweating and the added heat with moisture contributes to noncompliance in continued usage of PPEs.

Fogging of the eye PPE is caused mainly by two factors namely improper fit of the face mask causing escape of exhaled air from the upper edge of the mask and imbalance between temperature and humidity of the face relative to the environment.

While ensuring proper mask seal during donning by pressing down the nose piece, placing adhesive medical tape or double tape along the upper border and performing a ‘user seal check’ essentially identifies air leak, this article highlights simple ‘Do It Yourself (DIY)’ antifog techniques that could be attempted in health care settings.

The antifog agents are either hydrophilic agents or surfactant based. The commercially available hydrophilic antifog sprays being strong chemicals could irritate eyes and hence requires caution. Some DIY techniques are as below.

Iodophors (e.g., povidone-iodine, a compound of polyvinylpyrrolidone with iodine) applied evenly on the inner layer of the protective glasses or shield with gauze, especially in the visual field area and used after drying, is an easily available measure. It is a proven disinfectant widely used in clinical practice with a good antifog effect but leaves a yellow tinge and needs time to dry. PVP or polyvinylpyrrolidone present in povidone-iodine is a hydrophilic synthetic polymer that readily dissolves water molecules.

A thin layer of Savlon antiseptic liquid (Cetrimide 3.0% w/v and Chlorhexidine gluconate 0.3% w/v) applied evenly on the inner layer of the goggles or face shield has an equally effective antifog effect. Cetrimide is a quaternary ammonium compound with surfactant and antiseptic properties. Though routinely being used to demist nasal endoscopes and laparoscopic lenses, the residual Savlon needs to be wiped or allowed to air dry as it can cause eye discomfort. This technique is easier, quicker, and devoid of the yellow tinge associated with Iodophor.

The surfactant effect of detergents commonly used in daily life, such as dish soap, baby shampoo, or hair conditioner is another easy way to defog. A small drop of detergent applied evenly to the inner layer and letting it dry before use prevents fogging.

Although hand sanitisers (Chlorhexidine gluconate 0.5% w/v and Ethyl alcohol IP 70% v/v) have an antifog effect, the effect dissipates quickly over time (<20 sec) as the alcohol evaporates. It also has a mild irritant effect on inhalation and causes discomfort (as the alcohol content is as high as 70%).

Another handy method to reduce fogging is by increasing the face-mask distance by keeping 5–6 cm between the forehead and the face shield. Most face shields having breathable foam in the forehead. A surgical Gamgee pad can be used for the face shields without the foam.

Another technique has been described wherein the relative imbalance of temperature between the face and outside environment is altered. Nasal prongs are slipped snuggly underneath the foam of the face shield and placed over the forehead. Oxygen supplied through the nasal prongs at 10-12 L/min in the face – face shield space through flow meter from central supply or auxiliary oxygen port of anaesthetic machine achieves immediate defogging especially during critical events like intubation.

Anti-fogging with these techniques offers simple and effective means to avoid interference during airway management. Anti-fog preparations though easy, are to be planned early in the sequence of donning PPEs and should be a standard part of PPE in these testing times.

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