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What do we know about Eye and Facial Protectors : Review for COVID-19 Pandemic and Possible Future Epidemics

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Abstract

Personal Protective Equipment (PPE) is mandatory for everybody in a threatening state, they are meant to provide safety and prevent injuries especially in hazardous issues. Facial guards are mostly used for providing eyes and face from splash-kind of hazards. During the COVID-19 pandemic, their use also was recommended to longer the use of masks or respirators, due to their shortage and the excessive demand of their reuse. This review gathered the information on eye and face protectors from various manufacturer, international and local guidelines; also authors' experiment during the COVID-19 pandemic in Iran.

Introduction

Protecting Eyes and Face (i.e. mucus membrane) against hazardous materials is highly recommended by every occupational health institute. Safety glasses were used mostly in clinical and para-clinical areas before the COVID-19 pandemic; they were used in industrial and non-health-care fields

too. Thereby various kinds of disposable or reusable eye and face protectors were designed and were available during this pandemic. This review has to recommend the key points of guidelines and manufacturers for Health-Care Providers (HCP) about using these PPE.[1–6]

Methods and Materials

The primary draft of this article was based on Interim World Health Organization (WHO) and Center of Diseases Control and Prevention (CDC) guidelines and updates or recommendation protocols from manufactures and suppliers for safety glasses, goggles, and face-shields use, extended use, reuse, and disinfection methods.[3–9] Also some self experiences of applying these methods by authors for about 50 days period of COVID-19 incidence in Iran; however, it was not published at the time and about one year later according to Ebola Outbreak reports in February 2021, it was planned to get refurbished and reviewed for publishing.[10]

Results

We have reached three general guidelines from WHO about PPE use for healthcare providers,[3,9,11] and three procedural articles from the New England Journal of Medicine (NEJM) for PPE and hand hygiene.[6,8,12] Through the Ebola outbreak WHO provided a useful questionnaire that could be used for addressing the recommendations of this paper or any other PPE guidelines for personnel use.[7]

Discussion

There are some principal for proper use of facial PPE:

- Before using any form of eye protectors, if the provider uses prescribed glasses, they should be fixed.
- To prevent from dropping or dislodging while doing procedures like Cardio Pulmonary Resuscitation (CPR).
- And to prevent the breach in protection to fix the glasses after donning PPE.
- Using prescribed contact lenses is not recommended in hazardous environments like dry, dusty, or chemically charged environments.
- That may involve care giving patients with infectious diseases and while epidemics and crises overload pathogens.
- The leaning forward technique when doffing the PPE in the head and neck part is the reason of preventing eye contamination.

Face Shields

Like other PPE, the disposable type of these piece of equipment is preferred to reusable ones, that way and according to the cost-effective matter, disposable face-shield is recommended due to:

- Their extended protection from forehead to below chin and through the face.
- They are easy to make as a home-craft for individuals and that way easier to dispose of and reduce infectious spreading.
- Better user satisfies in comparison to safety glasses for people with prescribed optics.
- Less fogging effects on shields in comparison to goggles.
- While supporting the full face from the forehead to below the chin, even respirators that are not fluid-resistant could be used with ease and comfort.

In case of using the reusable industrial face-shields, they should be kept and carried within the predefined washable plastic boxes to the disinfection unit.

- It is not recommended to reuse the reusable PPE in hematogenous spreading infections' epidemics.

The full-face respirators, Powered Air-Purifying Respirator (PAPR), or Self-Contained Breathing Apparatus (SCBA) use, reuse, extended use; and disinfection should follow the manufacturer's guidelines, local protocols, or the following adopted protocol:[13]

"ASSEMBLE THE FOLLOWING EQUIPMENT ON A

WORK SURFACE NEAR A SINK WITH A WARM WATER SOURCE:

- Protective equipment: Nitrile gloves- 2 pairs, 1 mask with eye shield, and 1 liquid-resistant gown
- 1 canister of hospital-approved bleach disinfectant wipes
- 1 bottle of mild dish-washing liquid
- 1 soft bristle brush
- 2 plastic medication cups or other graduated container to measure ml and/or ounces
- Clock or timer
- 2 gallon buckets
- 1 pair of metal tongs
- 2 disposable pads 60cm x 40cm
- 1 clean plastic container large enough to hold mask and components after cleaning
- Hospital air and hose if available or clean, soft cloth

TO CLEAN AND DISINFECT THE RESPIRATOR, FOLLOW THESE STEPS:

- Place unopened bag containing the contaminated face shield/full face mask/PAPR/SCBA near sink by instructions.
- On the other side of the sink, place opened disposable pad and lay tongs on top. Place the second opened disposable by the clean bin.
- Place the 2 buckets in the sink and run 4 litres of comfortably warm (50°C) water into the first bucket and 8 litres of warm water into the second bucket.
- Perform hand hygiene and then don protective equipment–gloves, gown, and mask with eye shield.
- Pour 15mLs of dish-washing liquid in the first bucket containing 4 liters of water.
- Pour 30mLs chlorine bleach 5% in the second bucket containing 8 liters of water, to make a 0.2% hypochlorite solution. Mix bleach solution with tongs, and lay the back on the disposable pads.
- Open bio-hazard bag, remove the equipment, and place it on the top of the bag.
- Inspect the equipment (especially PAPR and SCBA) for any kind of damages, distortion, cracks, or tears.

* Pop off the splash guards (if equipped) on each side of the full face mask and immerse them in the soapy water.
* Remove the filters by unscrewing or turning them to the left.
* Wipe the filters with disinfectant wipes and place them in a clean bin (do not spray into the cartridges, it may cause filter-moisturize and filter-dysfunction).

- Without removing the straps, immerse the equipment in the soapy water.
- Clean and splash guards (if equipped) with the brush and soapy water gently on the inside to avoid damaging the valves. Then rinse them well in running water.
- Place rinsed splash guards and mask (face up) into bleach disinfecting solution.
- Submerge the shield completely into the solution; then while the mask is submerged, use the tongs to turn the mask over until it is face-down. This will avoid air pockets.
- Place the end of the tongs gently inside the shield to keep it submerged. Then lean the tong handles against the side of the bucket. Leave the tong handles submerged in the disinfectant solution.
- Set timer for 2 minutes.
- Discard bio-hazard bag. Wipe faucet handles with a bleach wipe.
- Discard gloves and perform hand hygiene. Don a new set of gloves.

- After the 2 minute immersion, remove the equipment and splash guards from the disinfecting solution with the tongs and set them on the disposable pads by the side of the sink, along with the tongs
- Rinse them (if equipped) completely in running water and place them on the second disposable pads by the clean bin.
- Dry them with hospital air hose if available; if not available, dry with. clean cloth or allow to air dry.
- When dry, reassemble mask, filters, and splash guards.
- Check the integrity of the respirator/PAPR/SCBA and store it in a plastic bag.
- Empty and rinse buckets, clean sink area with bleach wipes. Then remove PPE and perform hand hygiene."

Goggles and Glasses

Goggles are products that only protect the eyes and they may have a breathable valve for better comfort and anti-fogging effect.There are safety glasses too, but neither safety neither prescribed glasses don't provide protection against pathogens and are not recommended to use as the protector in the clinical field.

It's not recommended to use goggles and face-shields together by WHO guidelines, which may be due to the probable effect of using both of them on visual acuity, otherwise, if the provider may feel better protection and do the donning and doffing properly, it doesn't seem to be against principles of PPE.

Head Covers

Headcover that extended to the neck, should be part of PPE, especially in occasions that there is a probability of hematogenous or splash spreading infection, and a higher precaution standard of PPE is mandatory.

- It's not recommended to extend the cover that starts from the head under the nipple line
- Due to higher risk of infection spreading while doffing.
- The principle of leaning forward while doffing is considerable here more.

Conclusion and Summary of Studying

Prescribed glasses or safety glasses do not provide full protection. Contacted lenses are not recommended to be used in a hazardous environment. Before donning PPE, the prescribed glasses should be fixed by bands to lower the dislodging rate during clinical practice.

Shields are recommended as the choice in comparison to goggles, according to their full protection from forehead to below the chin, extra protection for masks and respirators, and ease of making disposable shields as home crafts by providers.

While doffing any PPE that has been done to the head and neck region, leaning forward is mandatory to lower the risk of infection via the ophthalmic and mucus membrane. Headcover that extended to the neck, should be part of PPE, especially in occasions that there is the probability of hematogenous or splash spreading infection, and a higher precaution standard of PPE is mandatory.

Full-face respirators, PAPR, and SCBA use, reuse, disinfecting should follow the manufacturer's recommendation and local regularities of healthcare occupational centers.

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