A Method by Disposable Medical Hydrogel to Reduce Water Vapor in Goggles

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Abstract In this letter, we describe a method about disposable medical hydrogel recommended inside surgical masks to reduce the water vapor in the goggles. The introduction is as follows.

Level of Evidence V This journal requires that authors assign a level of evidence to each article. For a full description of these Evidence-Based Medicine ratings, please refer to the Table of Contents or the online Instructions to Authors www.springer.com/00266. Letter to the Editor

Keywords Surgical mask · Goggles · Disposable medical hydrogel

Dear Sir

Since the World Health Organization declared a global pandemic for the new coronavirus disease (COVID-19), self-protection and social distancing are strongly recommended for the global public to limit the transmission of the disease [1, 2]. Articles reported that many countries are

facing similar concerns, particularly as covid-19 outbreaks deepen around the world [2–6].

Many experts believe that mask wearing is important to slow the spread of SARS-CoV-2 [7–12]. Medical surgical masks are simple and effective protective measures. In some special infection areas, it is necessary to wear goggles to prevent the splashing of body fluids, so as to achieve the purpose of self-protection. However, in the process of work, due to the hot air from the nasal cavity coming into the goggles along the top of the mask, the lens often forms water mist, which brings great inconvenience to patients in the implementation of treatment and nursing (as shown in Fig. 1).

The operation of the medical staff completely depends on the small gap between the water droplets on the goggles, and even some medical staff cannot stick to their work because of the complete lack of vision [2]. To solve this problem, we plan to use disposable medical hydrogel paste on the inside of the metal strip above the mask, parallel to it (Fig. 2), to fill the gap between the face and the surgical masks, and to prevent the exhaled heat from flowing out of the mask. Its special hydrocolloid material can also effectively reduce the water vapor of lens and the risk of pressure injury, and the wearing experience is good (as shown in Fig. 3).

Improvement Plan

Structure

Disposable surgical mask, goggles, disposable medical hydrogel eye paste.

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Fig. 1 Original method of wearing masks and goggles

Usage

1. Cut the disposable medical hydrogel eye paste to 17.5 cm long 1 cm strip.
2. Put the cut hydrogel eye paste on the inside of the disposable surgical mask, parallel to the metal strip of the disposable mask.
3. Remove facial skin oil.
4. After wearing a mask, press the disposable medical hydrogel eye paste gently with your hand to keep it tightly attached to the face.
5. Finally wear goggles.

Fig. 2 Disposable medical hydrogel eye paste on disposable surgical mask

Fig. 3 New method of wearing masks and goggles

Discussion

Necessity of Using Goggles

Although the operator's vision is not blocked by disposable masks, the upper part of the nose is exposed and often splashed on the face and even the eyes. Therefore, it is particularly important to wear goggles as a self-protection measure. However, in practical work, the fogging problem of goggles often bothers medical personnel. Especially when it is cold, the phenomenon of lens fogging is more obvious, which not only affects the visual field, nurses cannot complete the blood drawing, intravenous infusion and other fine work, and even cannot complete the information entry of nursing records; doctors cannot complete emergency rescue work such as endotracheal intubation and deep vein catheterization, replacing the goggles increases the opportunity of occupational exposure. Therefore, to ensure that the work of medical personnel can be carried out smoothly, it is necessary to ensure that they have a clear vision, and the antifogging treatment of goggles is particularly important. Therefore, it is urgent to solve the water vapor in the goggles.

The Causes of Water Mist are as Follows

When the medical staff breathes, because there is a gap between the mask and the bridge of the nose, the exhaled heat goes up the mask and enters the goggles. At this time, there is a significant difference between the temperature on the lens and the surrounding air temperature. When the lens

balances the temperature difference between the two, heat will be released. When the energy inside the gaseous water molecules decreases, they will form small water droplets attached to the lens and becomes the fog we see. Therefore, we must stop the exhaling gas from flowing into the goggles by using disposable medical hydrogel eye paste to fill the gap with the skin with its thickness, and prevent the exhaled heat from flowing out of the mask so as to prevent the goggles from fogging.

Advantages of the New Method of Wearing Masks and Goggles

1. It helps the medical workers to have a clear vision: fill the gap between the mask and the nose bridge with the thickness of the disposable medical hydrogel eye paste, prevent the hot air flow in the mask, and greatly reduce the fog generation in the goggles. On the one hand, this measure is conducive to prevent the breath from adhering to the lens through the gap of the upper edge of the mask; on the other hand, it is conducive to prevent the virus in the air from entering the nasal cavity through the gap.
2. Increase the stability of masks: medical workers are complicated and tired. There are many reasons for masks to shift or fall off. It is very undesirable to use a contaminated hand to replace the mask. Disposable medical hydrogel eye paste itself has some viscosity, which can increase the firmness of the mask.
3. Reduce the growth of bacteria in the goggles: the upward flow of breath in the mask will not only keep a lot of water in the goggles, but also transfer the bacteria in the mouth to the goggles.
4. Reduce skin damage: long-time mask and facial skin friction, long-time skin pressure on the nose bridge, all of which are easy to cause skin congestion, redness, rash, and other problems. The disposable medical hydrogel eye gel layer can effectively prevent pressure injury.
5. Wear experience: the disposable medical hydrogel eye paste is better than the ordinary medical surgical mask because the water gel layer soft waxy material increases the comfort and satisfaction of the medical staff.
6. Low-cost only one piece of disposable medical hydrogel eye paste can be cut into suitable shape to be placed in the corresponding position of the mask, which can effectively prevent the goggles from fogging, not only convenient, but also economical and practical.

To sum up, the disposable medical hydrogel eye patch can prevent the hot air flow in the mask, which can greatly

reduce the mist in the goggles, make the goggles more clear, improve the comfort of medical workers, and have good popularization value.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflicts of interest or disclose.

Statement of Human and Animal Rights or Ethical Approval

This article does not contain any studies with human participants or animals performed by any of the authors.

Informed Consent For this type of study informed consent is not required.

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