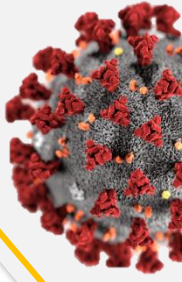




THE EFFECTIVENESS OF KF94 MASK TO BE USE AS HEALTH CARE WORKERS PERSONAL PROTECTIVE EQUIPMENT



PURPOSE

To provide scientific evidence on the effectiveness, safety and cost-effectiveness of KF94 mask as a front liner personal protective equipment.

INTRODUCTION

The outbreak of severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) has emerged rapidly and caused great mortality. In the past week, over 2.6 million new cases have been reported with 72 000 new deaths globally. As of 16 June 2021, there have been 176,303,596 confirmed cases of COVID-19, including 3,820,026 deaths, reported to WHO.¹

Wearing a mask is a key measure to suppress transmission of COVID-19 and saves lives. Masks are a simple barrier to help prevent your respiratory droplets from reaching others.² Depending on the type, masks can be used for either protection of healthy persons or to prevent onward transmission.³

KF94 mask is produced in Korea with the fabric made in Korea. KF94 mask is basically stands for Korean Filter and the '94' represents the filtration efficiency, that is 94%. Like N95 masks, KF94 have an adjustable bridge that can be manipulated to get a secure fit over the bridge of your nose. They also have side flaps to contour to your face.



Figure 1: KF94 Mask

N95 respirators and KF94 masks were able to filter out viral particles likely due to their denser fibre structure, larger number of layers, different materials, and the band and mask structure that allow tighter fits.⁴

KF94 masks are disposable and are readily used by the general public in South Korea.⁵ According to the Korean government Personal Protective Equipment (PPE) recommendations, the KF94 mask is at the same level as the N95 respirator and should be worn when contacting a patient with COVID-19.⁶

EVIDENCE/INFORMATION SUMMARY

KF94 mask have been submitted for evaluation and tested using a modified version of NIOSH Standard Test Procedure (STP) TEB-APR-STP-0059. The maximum and minimum filter efficiency was 99.94% and 99.85% respectively. Currently, there are no NIOSH-approved products with ear loops as NIOSH-approved N95s have head bands. Furthermore, limited assessment of ear loop designs, indicate difficulty achieving a proper fit.⁹

Early this year, A Fit Test for N95 Filtering Facepiece Respirators and KF94 Masks for Healthcare Workers study was done by the Division of Infectious Diseases, Department of Internal Medicine, Kangnam Sacred Heart Hospital, Hallym University College of Medicine, Seoul, Korea. In this prospective single-center simulation study, five N95 respirators (two made in the USA by 3M and three made in Korea) and six KF94 masks, the Korean standard medical masks, were tested. 30 participants were enrolled, and 330 fit tests were performed for fit factor (FF) and leakage rate.⁶

Adequate protection rates of all tested N95 respirators and KF94 masks were 22.7% (n = 75) by FF and 20.6% (n = 68) by leakage rate. N95 respirators showed a significantly higher adequate protection rate than KF94 masks for FF (48.7% vs. 1.1%, $P < 0.001$) and leakage rate (42.0% vs. 2.8%, $P < 0.001$). This means that particles can leak through the worn masks, even though the filtering performance is similar. The stability of KF94 masks during aerosol-generating processes was questioned as a result of these findings.⁶

Adequate protection rate of 3M-made N95 respirators was significantly higher than that of those made in Korea (83.3% vs. 25.6% in FF, $P < 0.001$; 73.3% vs. 21.1% in leakage rate, $P < 0.001$). In KF94 masks, after fixation of ear strap with a hook, adequate protection rate improved significantly (1.1% vs. 12.8% in FF, $P < 0.001$; 2.8% vs. 11.1%, $P < 0.001$). Wearing N95 respirators instead of KF94 masks is advised for undertaking aerosol-generating activities because of their greater protection rate.⁶

Many factors can explain the difference between N95 respirators and KF94 masks; however, the main difference in the structure is the shape of the strap. The N95 respirators have a head-band design meanwhile the KF94 mask had an ear-loop design. The ear-loop design appears to be less effective for a proper fit compared with the head-band design. Better fit was achieved when a hook is used to fix the loop at the back of the head and it could be an evidence of a structural problem. In addition, the part of the mask in direct contact with the face was thin and lifts easily with movement. Most of the KF94 masks could not be tightened with a string, so they could not be adjusted to an individual's face. When health care workers wear the KF94 mask, it is necessary to

improve the fit by checking that the masks fit well to the size of the health care workers face in advance; researching the method of wearing a mask to prevent leakage is therefore necessary.⁶

In a study done by the Department of Infectious Diseases, AsanMedical Center, University of Ulsan College of Medicine, South Korea involving seven patients, viral particles were not discovered in petri dishes after coughing while wearing the N95 mask or the KF94 mask. While viral particles were found on both the inner and outer surfaces of surgical masks, the N95 and K94 masks only have viral particles on the inner surfaces.⁴

Another study assessed the effect of beard hair lengths on face masks used as personal protective equipment during the COVID-19 pandemic conclude that N95 respirators offer the best respiratory protection for bearded men. While KF94 mask is compromised considerably by increasing beard length, they proved better options than procedure and cotton face masks.¹⁰

To date there were no retrievable evidence on cost-effectiveness on the usage of KF94 mask as PPE in health care workers.

CONCLUSION

In conclusion, the adequate protection rate of N95 respirators was higher and better fit than that of KF94 masks. It is recommended to wear N95 respirators instead of KF94 masks because of their superior protection rate and better fit especially when performing aerosol- generating procedures.

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Malaysian Health Technology Assessment Section (MaHTAS),
Medical Development Division,
Ministry of Health, Malaysia.

