**Philippine COVID-19 Living Clinical Practice Guidelines**
*Institute of Clinical Epidemiology, National Institutes of Health, UP Manila*
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## EVIDENCE SUMMARY

# Should facemask plus face shield be used rather than facemask alone to reduce SARS COV2 transmission?

# Is facemask plus face shield more effective than facemask alone in reducing SARS COV2 transmission in the general public?

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## RECOMMENDATIONS

We suggest the use of face mask plus protective eyewear (either face shield or goggles) among the general public in areas with sustained community transmission of SARS-COV2. *(Very low quality of evidence; Conditional recommendation)*

We recommend the use of face shield plus medical face mask and standard personal protective equipment among health care workers not directly involved in the care of COVID-19 patients in areas with sustained community transmission of SARS-COV2. *(Very low quality of evidence; Strong recommendation)*

### Consensus Issues

The panel remarked that none of the studies considered ventilation. Eye protection is more for droplet transmission while airborne transmission would require better fitting masks.

Regarding the recommendation for the general public, it was clarified that the term “face mask” may also pertain to cloth mask, considering the concurrent recommendation of the Philippine Living CPG which states that:

> “We suggest using a cloth mask that fits snugly on the face and made of at least two layers of cotton (e.g., t-shirt fabric) or non-woven nylon with aluminum nose bridge for the general public with low risk of exposure to COVID-19 in outdoor or indoor areas to prevent COVID-19 infections. *(Low quality of evidence; Conditional recommendation)”*

The recommendation for health care workers is specific for areas with sustained community transmission of SARS-COV-2 so that it will not be misconstrued that the use of face shield plus medical face mask will be part of the standard PPE even without the pandemic.

## Key Findings

There was no available direct evidence for face shield plus face mask versus face mask alone against COVID-19 in the general public. One case-control study ascertained the effectiveness of face shield in reducing the risk of SARS COV 2 among healthcare workers (HCW). The use of face shield/goggles in addition to other personal protective equipment offered significant protection during usual care of patients with COVID-19 infection compared to non-use of face shield/goggles (OR = 0.44; CI: 0.23–0.84), but this protection was not evident during the performance of aerosol-generating procedures, (OR 0.70; CI: 0.31–1.59). The study is of low quality being non-randomized and unadjusted for potential confounders.

A reduction in the proportion of SARS-COV-2 -affected healthcare workers was demonstrated in two pre- and post- surveillance studies after routine use of face shield was required in one hospital in the United States and in one community in India. The addition of face shield to standard masks and personal protective equipment was associated with lower SARS-COV infection compared to standard practice of personal protective equipment alone ( pooled OR 0.27 95% CI [0.21, 0.35]). The studies were of very low quality with high risk of bias.

Overall, the use of face shield in addition to face mask was associated with significant reduction of viral transmission of SARS-COV2 among healthcare workers (three studies, n = 6819, OR 0.29 [95% CI 0.22, 0.37]; low certainty) compared to face mask alone.

## Introduction

Despite use of facemask and adherence to physical distancing and hygiene protocols, the continuous transmission of infections in hospitals and in the community remain a challenge. One occupational hazard among health care workers are droplets of infectious fluids that can land or deposit on broken skin and mucous membrane in the eyes, nose and mouth, and thereafter cause illness. The US Health Care Infection Control Practices Advisory Committee (HIPAC) has explicitly recommended the use of face mask and eye protection for healthcare worker doing procedures likely to generate splashes and sprays of blood and other bodily secretions, and for all patient care of patients with SARS, and Avian flu (1). For the care of patients with other infections spread by respiratory aerosol and droplet, HIPAC has no recommendation for routine use of eye protection including that of face shield in addition to mask [1].

In a systematic review and meta-analysis, the use of eye protection (goggles or face shield) was associated with significant reduction of viral transmission of MERS and SARS (adjusted n=701, aOR 0.22 [95% CI 0.12, 0.39]; low certainty) [2].

The exposure of healthcare workers to cough aerosol, and the efficacy of a face shield in reducing this exposure, has been demonstrated using coughing patient and breathing worker simulation [3]. In the experiment, the amount of aerosol transmission from 1 to 30 minutes was calculated using droplet size analyzer attached to the breathing head form. The volume inhaled by the breathing simulator was calculated by integrating the volume concentration and breathing rate over time. The amount of influenza virus copies eluted from the respirator mask and face shield

was measured by preparing a medium incubated with pieces of the mask and face shield and performing quantitative polymerase chain reaction on the sample. Face shield reduced influenza virus inhalation by 96% within 18 inches of a cough, and surface contamination of N95 respiratory mask by 97%. Face shield was less effective with small aerosols, blocking only cough and N95 mask surface contamination by 68% and 76%, respectively. Protection was also reduced to 23% at one to 30 minutes of a cough, supporting less efficiency of face shield for blocking airborne transmission.

The simulation study was able to quantify the health risk posed by infectious droplets and percentage reduction in exposure provided by face shields and together with the meta-analysis provide indirect evidence for the benefit of face shields in SARS-COV-2 transmission.

## Review Methods

We comprehensively searched various electronic databases PUBMED and Cochrane CENTRAL until May 17, 2021 using a combination of subject headings and keywords for the following PICO: P - general public, I - face shield with face mask, face shield, C – no face shield, and O - and prevalence of SARS-CoV-2 transmission. We included any study type investigating the effects of face shield or face mask on the incidence of SARS-COV-2 infection and transmission in the general public. We checked reference lists of included papers, and relevant systematic reviews. We also did a free search of online sources, preprint articles, and various coronavirus resource centers. We screened abstracts, reviewed full texts and extracted relevant information on study design, settings, population and outcomes. We included only articles with full-text reports written in English including reviews and letters.

## Results

We found no direct studies on the use of face mask plus face shield compared to face mask alone, for the prevention of COVID-19 among the general public.

Regarding this review's subgroup of HCWs, there were three observational studies (one case control study and two cohorts) that investigated the effectiveness of face shield in reducing transmission of SARS-COV-2 among them [4-6]. Two studies were done in a hospital care setting [4,5] while one was done among healthcare workers providing counselling in the community [6]. In all studies, the use of face shield was added to standard personal protective equipment including facemask and other infection prevention strategies. The type of face shield supplied to HCW was specified in two studies; one employed face shields made of polyethylene terephthalate of 250-µm thickness [6], while one was a commercially-available Lazarus 3D model manufactured in Corvallis, Oregon, USA [5]. In the study of Khalil, the use of either face shield or eye goggles was considered together [4].

The reduction of SARS CoV2 transmission as studied by Khalil et al., was in a multicenter study that enrolled almost equal numbers of COVID 19 RT-PCR positive (n=98) and negative (n =92) physicians. They were asked to complete a pre-designed structured questionnaire adapted from the World Health Organization tool, in order to quantify the frequency with which physicians have observed personal protective measures, and then determine the odds ratio of these measures in

preventing COVID 19 during usual care and during aerosol-generating procedures (AGP). The study found that during usual patient care, use of face shields/goggles was associated with significantly lower odds of COVID-19 infection (Odds ratio 0.44 [95%CI: 0.23, 0.84] p = 0.012). However, during AGP, this was not significant (OR 0.70 [95%CI: 0.31, 1.59] p = 0.397).

Two studies among health care workers investigated the importance of universal use of face shield as an intervention. In India, 62 community health care workers (HCWs) who were working as counsellors for asymptomatic contacts and families with SARS COV2, added face shield to their PPE after 12 (19%) of them contracted COVID-19 despite compliance with safety and distance protocols. None of the 50 healthcare workers who continued to work developed COVID-19 on surveillance, even if some of the contacts they were counselling subsequently tested positive for SARS-COV-2 (6). Similarly, universal face shield became a requirement upon entry for all HCW in a hospital in Texas after continued increase in community transmission and increase in number of affected healthcare workers and patients developing hospital-acquired SARS COV infection. “Possible hospital-acquired infection (HAI)” was defined as a positive SARS-COV-2 test between 5-13 days from admission with no previous positive test while “confirmed HAI” was defined as a positive SARS-COV-2 test after 14 days from admission with no previous positive test. After the institution of change in hospital protocol, the number of SARS-COV-2 infection declined rapidly as evidenced by positivity rate among HCW and the number of weekly hospital-acquired infection cases. The change in predicted proportions through modelling with interrupted time series analysis and segmented regression for both outcomes became significant by the 13$^{th}$ week [5].

Among the advantages of face shield mentioned in both surveillance studies is its tolerability, low cost, reusability and easy cleaning and disinfection after use. [5,6] None of the 3 studies reported any adverse events [4-6].

Overall Quality of Studies

The quality evidence on effectiveness of face shield in reducing transmission of SARS-COV-2 was very low. All studies did not control for potential confounders such as the type of PPE used and compliance with other infection prevention measures which may reduce the demonstrated effect. All three studies were indirect as they investigated SARS-COV2 transmission among health care workers and not the on the general public which is the primary group of interest [4-6].

## Recommendations from Other Groups

The World Health Organization has recommended the use of eye protection (goggles or face shields) in addition to masks, gown and gloves among health care workers providing direct care to patients with COVID 19 [7].

The Centers for Disease Control and Prevention Interim Infection Prevention and Control Recommendations for Healthcare Personnel During the Coronavirus Disease 2019 (COVID-19) Pandemic stated in its latest update on Feb 10, 2021, that health care workers should wear respiratory or well-fitting facemask and eye protection (either face shield or goggles) while in the

hospital facility and during patient encounters. The use of face shield alone is not recommended [8].

## Research Gaps

There is one non-inferiority randomized controlled trial listed on clinical trials.gov, which was conducted in Bogota, Colombia. It compared the effectiveness of closed-face shields and surgical face mask, versus surgical face mask alone in terms of COVID 19 incidence and adherence among working adults. The study, named COVPROSHIELD conducted within the CoVIDA project was marked completed as of March 2021 but no results are available at this time.

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## Appendix 1. Characteristics of Included Studies

| Study | Study Design | Setting/Country/ Study period | Population | Outcomes |
|---|---|---|---|---|
| Khalil, 2020 (4) | Case control | Multicenter, Hospital based, Bangladesh from May – June 2020 | 98 rt-PCR COVID-19 positive and 92 rT-PCR negative physicians | Odds of COVID -19 infection with use of personal protective measures |
| Bhaskar, 2020 (6) | Cohort, pre and post intervention surveillance | Community based, India<br><br>May 3-15, 2020 vs May 16 - June 30, 2020 | 62 HCW | No and % of affected HCW with COVID-19 infection |
| Mojajer, 2021 (5) | Cohort, pre and post intervention surveillance | Single hospital in Texas<br><br>April 15-July 5, 2020 vs<br>July 6, 2020 – Sept 7, 2020 | 6527 HCW | No and change in proportion of affected HCW and patients with hospital acquired infection (HAI)<br><br>Change in predicted weekly rate of positivity through modeling |

# Appendix 2. GRADE Evidence Profile

| Certainty assessment | | | | | | | № of patients | | Effect | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| № of studies | Study design | Risk of bias | Inconsistency | Indirectness | Imprecision | Other considerations | with face shield | no face shield | Relative (95% CI) | Absolute (95% CI) | Certainty | Importance |
| **SARS-COV-2 infection** | | | | | | | | | | | | |
| 3 | observational studies | very serious [a] | not serious [b] | serious [c] | serious [d] | none | 135/4214 (3.2%) | 215/2605 (8.3%) | **OR 0.288** (0.224 to 0.369) | **6 fewer per 100** (from 6 fewer to 5 fewer) | ⨁◯◯◯ VERY LOW | CRITICAL |

**CI:** Confidence interval; **OR:** Odds ratio

**Explanations**

a. No randomization in all studies. Volunteer bias observed on the study of Mojajer 2020. Recall bias likely in the study of Khalil 2020 as the exposure classification was assessed via questionnaire method. All studies did not control for potential confounders. Controls in the study of Khalil 2020 were only matched based on one criterion.

b. Test for heterogeneity is not significant but I^2 might present moderate heterogeneity (I^2 = 42.0% (95% CI 0.0% to 82.8%); p=0.178). One study by Bhaskar was also noted to have wide confidence interval.

c. One of three studies considered the use of face shield or eye goggles. Although studies were on SARS-COV-2 infection, the studies were limited to HCW and not to the general public. Two studies were done in a hospital setting while one study involved health care workers providing counselling in the community for families of COVID 19 patients.

d. Very few events observed in the study Bhaskar 2020.

# Appendix 3. Summary of Findings

**Use of Face shield on SARS-COV-2 Transmission**

| Study | Risk of Viral Infection during Usual Care | | Absolute Difference | OR | CI | Quality of Evidence |
|---|---|---|---|---|---|---|
| | With Face shield/goggles n/N (%) | Without Face shield/eye goggles n/N (%) | | | | |
| **SARS-COV2** | | | | | | |
| Khalil, 2020 (4) | 55/98 (59.8%) | 68/88 (77.2%) | -14.4 | 0.43 | 0.02-0.83 | Very low |
| | | | | | | |
| | **Risk of Viral Infection during Aerosol Generating Procedure** | | | | | |
| | 39/55 (70.9%) | 52/67 (77.6%) | - 6.7 | 0.70 | 0.310-1.593 | |

### Comparative Pre and Post Routine Use of Face shield

| Study | Findings | Quality of Evidence |
|---|---|---|
| Bashkar, 2020 (6) | 12 of 62 (19%) of community HCW affected with COVID 19 before intervention<br><br>After intervention, 0 of 50 HCW (0%) were infected despite increase in the number of SARS COV 2 among contacts being counselled | Very Low<br><br>Small number of HCW<br><br>Compliance with other measures not reported |
| Mojajer, 2021 (5) | After intervention<br><br>• Decrease in the positivity rate of HCW from 12.9% to 2.3%<br>• Decrease in predicted positivity rates among health care workers in week 13 from 22.9% to 2.7 % (p<0.001)<br>• Number of hospital acquired infections (HAI) among patients decreased from 7 to 0<br>• Change in predicted HAI at week 13 (8.7 vs 1.7 per 1000 patient-days, (p<0.001) | Very Low<br>Confounders such as compliance with other infection prevention measures were not analyzed.<br><br>No reports on individual data of healthcare workers<br><br>Compliance with testing increased during the surge which can be a confounder in rates |

### Recently Completed Randomized Controlled Trial

| NCT No (Sponsor) | Title | Participants | Intervention | Control | Outcome | Study Completion |
|---|---|---|---|---|---|---|
| NCT04647305 (University of San Andes, Columbia) | Effectiveness and Adherence of Closed Face shield to Prevent COVID 19 Transmission (COVPROSHIELD) | 233 working adults of Bogota, Colombia | Closed face shield with Surgical face mask use during daily activities | Surgical face mask uses only during daily activities | COVID-19 incidence<br><br>(Time Frame: 21 days of follow-up, RT-PCR test at day 21)<br><br>Adherence to closed face shields use (Time Frame: 21 days of follow-up]<br><br>Percentage of seroconversion in the experimental group and active control group (Time Frame:<br><br>Serological test at day 21) | March 4, 2021 (results not yet published) |