Are face shields effective in preventing COVID-19 infections?

Authors: Myzelle Anne J. Infantado, PTRP, MSc (cand.) (majinfantado@gmail.com)
Dan Louie Renz P. Tating, MSc (cand), RN (dptating@up.edu.ph)
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This rapid review summarizes the available evidence on the efficacy of face shields in preventing COVID-19 infections. This may change as new evidence emerges.

KEY FINDINGS

Direct evidence for face shields in minimizing COVID-19 infections among healthcare workers is already underway. Indirect evidence from a very low quality study show that suboptimal adherence in using face shields increases the risk of having influenza-like illness among healthcare workers.

- **Face shield is considered a PPE (alternative to eye goggles) necessary in standard or droplet precaution because it provides a barrier for the facial area from body fluids (e.g. blood, saliva, bronchial secretions, vomit) [1-5].**
- **In an *in vitro* study [6], using face shield resulted to lower volume of airborne particles from a cough and reduced amount of influenza virus copies in a breathing simulator and in a respirator.**
- **Indirect evidence from very low quality cohort studies suggests that adherence to using face shield might offer protection against viral respiratory infection and influenza-like illness among healthcare personnel [9,10].**
- **A randomized controlled trial is already on-going to determine benefits of face shield among healthcare workers [12].**
- **There are no completed or on-going studies investigating effectiveness of using face shields in preventing COVID-19 infection in the general public.**
- **International organizations recommend use of disposable face shield among healthcare workers particularly those who are in practice where high respiratory protection is needed (e.g. aerosol-generating procedures) [13-18].**

RESULTS

Three studies [9-11] included in this review are **indirect** evidence because there were no studies found specific to COVID-19. They also have serious flaws in study design (e.g. small sample sizes [9-11], retrospective design [10]). Two of these studies were on healthcare workers [9,10] and one was a study on healthy volunteers [11].

A small cohort of healthcare workers (n=9) who were exposed to a 67-year old patient with severe acute respiratory syndrome (SARS) participated in an observational study done in Canada [9]. Out of 9 participants, five nurses wore full set of PPE including face shield. One ward nurse did not have a face shield as part of this PPE set. Two respiratory therapists and a physician wore a T4 Personal Protection System and N95 respirator. Among 9 HCWs [9], only three had symptoms of infection such as fever (T_{max} 37.8˚C to 38.5˚C), headache, myalgia, malaise. All three were nurses who wore the full set of PPEs including face shield. Out of the five HCWs who consented for the serologic testing, only one had a positive finding for SARS antibodies.

Another study was done on a cohort of nurses who were in clinical duty in a medical department in Hong Kong [10]. Out of 133 nurses who responded in the survey, 30 had developed ILI. In the final regression model, suboptimal adherence to wearing face shield during aerosol-generating procedures resulted to increased odds of acquiring ILI (OR 3.56, 95% CI 1.18,10.69).

Finally, a randomized challenge-transmission trial [11] was done in the UK to assess the importance of aerosol transmission in human-to-human transmission of influenza virus. A group of healthy volunteers were randomly divided into intervention and control groups, with the former using face shields and hand sanitizers, and refraining from touching their faces. All of the volunteers were allowed to interact in a house with special environmental controls, at close distances in a single exposure room, and for 15 hours/ day, four consecutive days. This trial found similar rates of symptomatic non-ILI and ILI, and laboratory-confirmed influenza, between a control group and an intervention group with face shield, hand sanitizer and limitation in touching faces.

Indirect evidence from these very low quality studies suggests that face shields might offer some protection against acquiring viral respiratory illnesses such as SARS and ILI.

Ongoing studies

There is one on-going randomized controlled trial [12] in Canada found comparing an open face shield and hood in enhancing PPE security and minimizing COVID-19 transmission among healthcare workers performing high-risk procedures. It is expected to end in August 31, 2020.

Recommendations from Other Guidelines

Disposable face shield is considered included in the PPE and as eye protection in hospital settings where high respiratory protection is needed according to Center for Disease Control and Prevention, Public Health England and WHO [13-18]. It is recommended to be used upon entry to the patient room or care area by HCWs and to be discarded after unless following protocols for extended use [13, 14]. In the context of community settings, WHO called for rational use of PPE including face shield among public health authorities and individuals [18].

CONCLUSION

There is still lack of evidence on the efficacy of face shields in preventing COVID-19 infection. However, indirect evidence from very low quality study showed adherence to using face shield might offer some protection against influenza-like illness among healthcare personnel in a hospital setting.

International organizations recommend use of disposable face shield among healthcare workers particularly those who belong in practices where high respiratory protection is needed.

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Appendix 1. Characteristics of included studies

No.	Title/Author	Study design	Country	Population	Intervention/Comparator	Outcomes	Key findings
1	Possible **SARS coronavirus** transmission during cardiopulmonary resuscitation Christian et al, 2014	retrospective cohort	Canada	Healthcare workers exposed to patient who was SARS positive (N=9)	N/A Factors observed were: Tasks, exposure time, protective equipment (gloves, gown, face shields, shoe cover, hair cover, safety glasses or T4 Personal Protection System)	SARS serologic findings	9 HCWs were observed. Among nurses (n=6), 5/6 wore PPE with face shield. 3/9 HCWs were symptomatic and 1/5 tested positive for SARS CoV antibodies. The only nurse who did not wear face shield in PPE had no symptoms after patient contact and refused to be tested. Hypotheses for transmission were 1) breach in contact and droplet precautions and 2) amount of viral load.
2	Preventing healthcare workers from acquiring **influenza** Ng et al, 2014	Retrospective cohort	Hong Kong	Nurses in the medical department at Prince of Wales who were on clinical duty during period January 1 – April 30, 2007 (N=133 respondents)	N/A • influenza vaccination within 6 months • household members had acute respiratory illness • Working with a colleague who had symptoms of respiratory infection • Performed aerosol-generating procedures • Unanticipated, unprotected contact with respiratory secretions of patient • Adherence to handwashing after patient care • Adherence to wearing gloves during contact with respiratory secretions of patient • Adherence to wearing gowns during contact… • Adherence to wearing face shield during aerosol-generating procedures • Adequate knowledge of infection control measures	Acquisition of influenza-like illness (odds ratios) ILI – fever with a temperature of more than 38˚C and a cough and/or sore throat (with a high predictive value of up to 88% for influenza infection during peak seasons)	Out of 133 respondents, 30 had developed ILI. Univariate analysis of risk factors and adherence to standard and/or droplet precautions showed significant factors at p-value of less than 0.05: with influenza vaccination within 6 months, adherence to wearing gloves and gowns during contact with respiratory secretions of patient, wearing face shield during aerosol-generating procedures andadequate knowledge of infection control measures. In the final regression model, suboptimal adherence to wearing face shield during aerosol-generating procedures resulted to increased odds of acquiring ILI (OR 3.56, 95% CI 1.18-10.69).
3	Minimal transmission in an influenza A (H3N2) human challengetransmission model with exposure events in a controlled environment Nguyen-Van-Tam, et al.,	Randomized challenge-transmission trial	UK	Healthy volunteers, between the ages of 18 and 45 years, not living with anyone deemed at high risk of influenza complications on discharge, and not to have had a seasonal influenza vaccine in the last 3 years Intervention = 40 Control = 35	Intervention: face shield use, hand sanitisation, and no-touch-face rules Control: no face shields or hand sanitizer, and allowed to touch face freely	Respiratory symptoms Symptomatic status Influenza-like illness (ILI) Lab-confirmed infection	Similar rates of symptomatic non-ILI and ILI, and laboratory-confirmed influenza, in both groups Intervention: 0/40 infected Control: 1/35 infected

Appendix 2. Characteristics of on-going clinical trial

No.	Clinical Trial ID / Title	Status	Start and estimated primary completion date	Study design	Country	Population	Intervention Group(s)	Comparison Group(s)	Outcomes
1	NCT04373096 Development of a Novel Hood Shield to Enhance PPE Security and Minimize COVID-19 Transmission to Frontline Healthcare Workers Performing High-Risk Procedures	No yet recruiting	May 7, 2020 to August 31, 2020	Randomized controlled trial, single-blinded, parallel design	Canada	42 participants Inclusion criteria • Healthy, ASA 1-2 members of intubating team (staff anesthesiologists, fellows, anesthesia assistants, nurses) • Age 20-75 • Male or female	Modified IPAC-UHN PPE • Fit-tested N95 mask • Hood • Double extended-cuff gloves	Current IPAC-UHN PPE • Fit-tested N95 mask • open face shield • double extended-cuff	• incidence of contamination of any part of the base clothing or exposed skin of the upper body Secondary outcome measures • number of body areas contaminated • number of discrete areas of contamination • visibility during the simulated procedure • ease of intubation procedures when wearing PPE • ease of breathing while wearing PPE • thermal comfort while wearing the PPE • incidence of breaching of doffing procedures

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