

Rapid Review Report

Review Title:	Do neck or back coverings provide additional protection to gown and N95 mask when conducting an aerosol generating procedure?
Keyword Title:	Neck and Back PPE
Review ID:	EOC051201 RR
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Key Findings

- Small simulation studies have demonstrated potential contamination of neck and back area
- Many associations recommend neck coverage, or if unavailable to ensure sanitation/washing of exposed skin after doffing PPE
- Several warnings that increasing amount of PPE increases chances of contamination and may decrease level of compliance

Limitations

- No in-practice evidence, only modelling simulations and theoretical frameworks

GRADE of Evidence: D - Very Low

A grade of "D" is assigned when the estimate of effect is very uncertain. The review may consist of expert opinion, no direct research evidence, and/or one or more studies with severe limitations.

For more information about how this rating was determined, visit https://www.essentialevidenceplus.com/product/ebm_loe.cfm?show=grade

Background/Context

PPE supplies are being carefully managed in the wake of the COVID-19 pandemic worldwide. It has been well established that aerosol generating medical procedures carry a higher risk of transmission of COVID-19 and appropriate PPE and donning/doffing techniques are critical. Conventional PPE includes the use of N95 respirator masks, gowns, gloves and eye protection, however some skin may be exposed on the back of the neck and upper back with this PPE system.

Purpose

Is there any evidence for the use of neck/upper back PPE in addition to the current standard of N95 masks, gowns, gloves and eye protection for aerosol generating medical procedure?

Review Question(s)

- Do neck or back coverings provide additional protection to gown and N95 mask when conducting an aerosol generating procedure?

Method

A literature search was conducted by the Saskatchewan Health Authority library encompassing academic databases, pre-print databases and relevant grey literature. The literature search was synthesized into a rapid review by a University of Saskatchewan researcher for the EOC committee. Please see the Appendix for search strategies used.

Summary of Evidence

A number of relevant associations (including the Canadian Anesthesiologists Society, BC Interior Health, Canadian Society of Otolaryngology and the Safe Airway Society) recommend the use of neck covers and to ensure there is no skin exposure while performing aerosol generating medical procedures. In contrast, the BC Children's Hospital recommends against neck covers due to the concerns with increased contamination risks when doffing. The North York General guidelines echo this sentiment due to the general lack of availability of suitable neck covers and instead recommend tying gowns as high as possible and to wash neck or shower if possible after doffing PPE.

One study found that when only N95 masks were worn, healthcare workers were still infected with the SARS coronavirus strain while performing CPR. In addition, during the MERS epidemic in the Middle East, HCW were mandated to wash face and neck post PPE doffing after intubation procedures. A review of 202 intubations of COVID-19 positive patients in Wuhan did not find any incidences of transmission in HCW wearing full face shields or hoods without positive air pressure respirators.

While one study found that despite precautions, healthcare worker infections occur, likely due to secondary exposure from fugitive emissions or fomites, there is little evidence in the use of additional worn PPE for healthcare workers. There is a small pocket of evidence for the use of patient shields/hoods to reduce droplet spread during aerosol generating medical procedures, including a study assessing the use of positive pressure hoods for the endotracheal intubation of 12 COVID-19 positive patients after which all 9 healthcare workers involved tested negative for COVID-19.

Several simulation studies have shown a potential for contamination of the neck/upper back area both during aerosol generating medical procedures as well as self-contamination during PPE doffing, however, the methods used in these simulations may not accurately represent COVID-19 transmission due to differences in particle size/weight.

The only review study assessing the use of additional PPE found low evidence that more coverage leads to better protection, and is generally associated with more difficult doffing and less user comfort leading to more potential for contamination and decreased compliance.

Conclusions

While several simulation studies show the potential for contamination of the neck and upper back area both during aerosol generating medical procedures and subsequent doffing, there is little evidence for the use of additional PPE covering the neck and lower back despite many associations recommending they be used. There is an increasing amount of evidence showing that the use of patient shields/intubation hoods may decrease the spread of infective droplets during aerosol generating medical procedures. Several concerns are raised about the use of additional PPE, namely the difficulty in doffing and decreased user comfort leading to increased potential for contamination and decreased compliance.

Glossary

(Optional, but useful if there are clinical/statistical terms being referenced in the document.)

Table 1: Summary of Literature

Ref	Sample/population	Method	Primary outcome measure	Additional findings	Quality of study
1.			[change title to reflect the outcome measure reported]		

References Included in Summary

1. Feldman O , Meir M , Shavit D , Idelman R , Shavit I . Exposure to a surrogate measure of contamination from simulated patients by emergency department personnel wearing personal protective equipment. Published online April 27, 2020. JAMA. doi:10.1001/jama.2020.6633 <https://www.ncbi.nlm.nih.gov/pubmed/32338711>
2. Helman, Anton. (North York General, Toronto). Ep 139 COVID-19 Part 3 – PPE: What We Know, Conservation Strategies and Protected Code Blue [blog post and podcast] <https://emergencymedicinecases.com/covid-19-ppe/>
3. Wax RS, Christian MD. Practical recommendations for critical care and anesthesiology teams caring for novel coronavirus (2019-nCoV) patients. Canadian Journal of Anesthesia/Journal canadien d'anesthésie. 2020 Feb 12:1-9.
4. Canadian Anesthesiologists Society. COVID-19 Recommendations During Airway Manipulation https://www.cas.ca/CASAssets/Documents/News/Updated-March-25-COVID-19_CAS_Airway_Vsn_4.pdf
5. BC Children’s Hospital. [May 4, 2020] COVID-19 & persons under investigation for COVID-19 aerosol generating medical procedures only: personal protective equipment donning and doffing. <http://policyandorders.cw.bc.ca/resource-gallery/Documents/Infection%20Control/C-0506-07-60576%20AGMP%20Procedures%20Only%20Personal%20Protective%20Equipment%20Donning%20and%20Doffing.pdf>
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PubMed Abstract: <https://www.ncbi.nlm.nih.gov/shal.idm.oclc.org/pubmed/32293717>
Full Text: <https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD011621.pub4/full>
11. Benge CD, Barwise JA. Aerosolization of COVID-19 and Contamination Risks During Respiratory Treatments. *Federal Practitioner.* 2020;37(4):160-3.
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<https://doi.org/10.3760/cma.j.cn112147-20200222-00153>

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15. Malik JS, Jenner C, Ward PA. Maximising application of the Aerosol Box in protecting healthcare workers during the covid-19 pandemic. Anaesthesia. 2020. <https://doi.org/10.1111/anae.15109>
16. Matava CT, Yu J, Denning S. Clear plastic drapes may be effective at limiting aerosolization and droplet spray during extubation: implications for COVID-19. Canadian Journal of Anesthesia/Journal canadien d'anesthésie. 2020. <https://doi.org/10.1007/s12630-020-01649-w>
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19. Chahal AM, Van Dewark K, Gooch R, et al. A Rapidly Deployable Negative Pressure Enclosure for Aerosol-Generating Medical Procedures. medRxiv. 2020:2020.04.14.20063958.
<https://doi.org/10.1101/2020.04.14.20063958>
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<https://doi.org/10.1101/2020.05.09.20096032>
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<https://doi.org/10.1093/ofid/ofx163.1031>

Appendix: Evidence Search Details

Search Strategies

Ovid MEDLINE(R) ALL <1946 to May 11, 2020>

#	Searches	Results
1	exp Equipment Contamination/pc or exp Personal Protective Equipment/	33905
2	(gown* or overall* or protective layer or protective layers or surgical toga or apron* or smock or smocks or (hazmat adj1 suit) or glove? or gloving? or mask? or masked or masking? or N95 or P2 or air-purifying respirator or PAPR or (enhanced respiratory adj1 contact precautions) or E-RCP or respiratory protection or transparent panel or surgical mask or surgical masks or filtering face piece or filtering facepiece or goggle? or visor? or facial protect* equipment or safety glass* or safety spectacles or personal protective equipment or PPE or protective equipment or overshoe* or shoe cover or shoe covers or shoe covering? or rubber boot or rubber boots or head cover or head covering or face shield or face shields or surgical hood or hood or gloving or donning or doffing).tw,kf,hw.	146495
3	exp Infection Control/ or ((infection? or communicable disease) adj1 (control* or surveillance or monitoring or notification?)).tw,kf.	82507
4	(aerosol* or surface* or environment* or contaminat* or spatial or aerodynamic or disinfectant or cross infection or infection prevent* or infection control or cleaning or inactivation or indirect transmission or indirect virus transmission or indirect viral transmission or hand rub or hand rubbing or hand rubs or	2910589

	alcohol or hand hygiene or ethanol or hand disinfection).tw,kf.	
5	(universal precautions or isolat* or quarantine? or physical distanc* or social distanc* or contact tracing or disinfect* or antiseptis or antiviral or anti-viral or disease eradication or cross-infect* or nosocomial or hospital-acquired infect* or hospital infect* or disease outbreak* or (control* adj1 outbreak)).tw,kf.	1476739
6	1 or 2 or 3 or 4 or 5 [PPE/infection control hedge]	4318810
7	exp coronavirus/ or exp Coronavirus Infections/	17332
8	((corona* or corono*) adj1 (virus* or viral* or virinae*)) or (coronavirus* or coronovirus* or coronavirinae* or CoV or HCoV*).ti,ab,kw,kf.	19381
9	("2019-nCoV" or 2019nCoV or nCoV2019 or "nCoV-2019" or "COVID-19" or COVID19 or "CORVID-19" or CORVID19 or "WN-CoV" or WNCov or "HCoV-19" or HCoV19 or "2019 novel*" or Ncov or "n-cov" or "SARS-CoV-2" or "SARSCoV-2" or "SARSCoV2" or "SARS-CoV2" or SARSCov19 or "SARS-Cov19" or "SARSCov-19" or "SARS-Cov-19" or Ncovor or Ncorona* or Ncorono* or NcovWuhan* or NcovHubei* or NcovChina* or NcovChinese* or SARS2 or "SARS-2" or SARSCoronavirus2 or "SARS-coronavirus-2" or "SARSCoronavirus 2" or "SARS coronavirus2" or SARSCoronavirus2 or "SARS-coronavirus-2" or "SARSCoronavirus 2" or "SARS coronavirus2").ti,ab,kw,kf.	11607
10	(respiratory* adj2 (symptom* or disease* or illness* or condition*) adj10 (Wuhan* or Hubei* or China* or Chinese* or Huanan*).ti,ab,kw,kf.	452
11	("seafood market*" or "food market*" or pneumonia*) adj10 (Wuhan* or Hubei* or China* or Chinese* or Huanan*).ti,ab,kw,kf.	1229
12	((outbreak* or wildlife* or pandemic* or epidemic*) adj1 (Wuhan* or Hubei or China* or Chinese* or Huanan*).ti,ab,kw,kf.	233
13	Middle East Respiratory Syndrome Coronavirus/	1037
14	("middle east respiratory syndrome*" or "middle eastern respiratory syndrome*" or MERSCoV or "MERS-CoV" or MERS or ("severe acute respiratory syndrome*" or SARS)).ti,ab,kw,kf.	17174
15	("SARS-CoV-1" or "SARSCoV-1" or "SARSCoV1" or "SARS-CoV1" or SARSCoV or SARS-CoV or SARS1 or "SARS-1" or SARSCoronavirus1 or "SARS-coronavirus-1" or "SARSCoronavirus 1" or "SARS coronavirus1" or SARSCoronavirus1 or "SARS-coronavirus-1" or "SARSCoronavirus 1" or "SARS coronavirus1").ti,ab,kw,kf.	5726
16	or/7-15 [coronavirus hedge]	38949
17	6 and 16 [coronavirus+ppe hedge]	10995
18	(barrier? or protect* or shield* or enclos* or cover* or defend* or defense* or seal* or mask*).ti.	316480
19	(expos* or vulnerab* or (risk adj1 transmission) or prone or unprotect* or non-protect* or susceptible or "at-risk").ti.	259676
20	((back or neck) adj1 (barrier? or protect* or shield* or enclos* or cover* or defend* or defense* or seal* or mask*).tw,kf.	413
21	((back or neck) adj2 (expos* or vulnerab* or (risk adj2 transmission) or prone or unprotect* or non-protect* or susceptible or "at-risk").tw,kf.	470
22	17 and (or/18-21)	602

Search history sorted by search number ascending

Embase <1974 to 2020 May 11>

#	Searches	Results
1	exp Coronavirinae/ or exp Coronavirus infection/ or ((corona* or corono*) adj1 (virus* or viral* or virinae*).ti,ab,kw. or (coronavirus* or coronovirus* or coronavirinae* or CoV or HCoV*).ti,ab,kw.	30005
2	("2019-nCoV" or 2019nCoV or nCoV2019 or "nCoV-2019" or "COVID-19" or COVID19 or "CORVID-19" or CORVID19 or "WN-CoV" or WNCov or "HCoV-19" or HCoV19 or "2019 novel*" or Ncov or "n-cov" or "SARS-CoV-2" or "SARSCoV-2" or "SARSCoV2" or "SARS-CoV2" or SARSCov19 or "SARS-Cov19" or "SARSCov-19" or "SARS-Cov-19" or Ncovor or Ncorona* or Ncorono* or NcovWuhan* or NcovHubei* or NcovChina* or NcovChinese* or SARS2 or "SARS-2" or SARSCoronavirus2 or "SARS-coronavirus-2" or "SARSCoronavirus 2" or "SARS coronavirus2" or SARSCoronavirus2 or "SARS-coronavirus-2" or "SARSCoronavirus 2" or "SARS coronavirus2").ti,ab,kw.	7952
3	(respiratory* adj2 (symptom* or disease* or illness* or condition*) adj10 (Wuhan* or Hubei* or China* or Chinese* or Huanan*).ti,ab,kw.	542
4	("seafood market*" or "food market*" or pneumonia*) adj10 (Wuhan* or Hubei* or China* or Chinese* or Huanan*).ti,ab,kw.	1317
5	((outbreak* or wildlife* or pandemic* or epidemic*) adj1 (Wuhan* or Hubei* or China* or Chinese* or Huanan*).ti,ab,kw.	99
6	Middle East respiratory syndrome/	935

7	Middle East respiratory syndrome/ or ("middle east respiratory syndrome*" or "middle eastern respiratory syndrome*" or MERSCoV or "MERS-CoV" or MERS).ti,ab,kw. or ("severe acute respiratory syndrome*" or SARS).ti,ab,kw.	17593
8	("SARS-CoV-1" or "SARSCoV-1" or "SARSCoV1" or "SARS-CoV1" or SARSCoV or SARS-CoV or SARS1 or "SARS-1" or SARSCoronavirus1 or "SARS-coronavirus-1" or "SARSCoronavirus 1" or "SARS coronavirus1" or SARSCoronavirus1 or "SARS-coronavirus-1" or "SARSCoronavirus 1" or "SARS coronavirus1").ti,ab,kw.	4809
9	or/1-8	40116
10	exp protective equipment/ or exp medical device contamination/pc [Prevention]	53234
11	(gown* or overall* or protective layer or protective layers or surgical toga or apron* or smock or smocks or (hazmat adj1 suit) or glove? or gloving? or mask? or masked or masking? or N95 or P2 or air-purifying respirator or PAPR or (enhanced respiratory adj1 contact precautions) or E-RCP or respiratory protection or transparent panel or surgical mask or surgical masks or filtering face piece or filtering facepiece or goggle? or visor? or facial protect* equipment or safety glass* or safety spectacles or personal protective equipment or PPE or protective equipment or overshoe* or shoe cover or shoe covers or shoe covering? or rubber boot or rubber boots or head cover or head covering or face shield or face shields or surgical hood or hood or gloving or donning or doffing).ti,ab,kw.	164367
12	exp infection control/ or ((infection? or communicable disease) adj1 (control* or surveillance or monitoring or notification?)).ti,ab,kw.	118378
13	(aerosol* or surface* or environment* or contaminat* or spatial or aerodynamic or disinfectant or cross infection or infection prevent* or infection control or cleaning or inactivation or indirect transmission or indirect virus transmission or indirect viral transmission or hand rub or hand rubbing or hand rubs or alcohol or hand hygiene or ethanol or hand disinfection).ti,ab,kw.	3401766
14	(universal precautions or isolat* or quarantine? or physical distanc* or social distanc* or contact tracing or disinfect* or antisepsis or antiviral or anti-viral or disease eradication or cross-infect* or nosocomial or hospital-acquired infect* or hospital infect* or disease outbreak* or (control* adj1 outbreak)).ti,ab,kw.	1762831
15	or/10-14	5113722
16	(barrier? or protect* or shield* or enclos* or cover* or defend* or defense* or seal* or mask*).ti.	367476
17	(expos* or vulnerab* or (risk adj1 transmission) or prone or unprotect* or non-protect* or susceptible or "at-risk").ti.	309033
18	((back or neck) adj1 (barrier? or protect* or shield* or enclos* or cover* or defend* or defense* or seal* or mask*)).tw,kw.	1678
19	((back or neck) adj2 (expos* or vulnerab* or (risk adj2 transmission) or prone or unprotect* or non-protect* or susceptible or "at-risk")).tw,kw.	629
20	or/16-19	671393
21	9 and 15 and 20	608
22	limit 21 to medline	188
23	21 not 22	420

Search history sorted by search number ascending

CINAHL Wednesday, May 13, 2020 11:45:46 AM

#	Query	Results
S1	(MH "Coronavirus Infections+") OR (MH "Coronavirus+") OR (MH "COVID-19")	4,856
S2	TX ((corona* or corono*) N1 (virus* or viral* or virinae*))	261
S3	TX (coronavirus* or coronavirus* or coronavirinae* or CoV or HCoV*)	8,368
S4	TX ("2019-nCoV" or 2019nCoV or nCoV2019 or "nCoV-2019" or "COVID-19" or COVID19 or "CORVID-19" or CORVID19 or "WN-CoV" or WNCov or "HCoV-19" or HCoV19 or "2019 novel*" or Ncov or "n-cov" or "SARS-CoV-2" or "SARSCoV-2" or "SARSCoV2" or "SARS-CoV2" or SARSCov19 or "SARS-Cov19" or "SARSCov-19" or "SARS-Cov-19" or Ncovor or Ncorona* or Ncorono* or NcovWuhan* or NcovHubei* or NcovChina* or NcovChinese* or SARS2 or "SARS-2" or SARSCoronavirus2 or "SARS-coronavirus-2" or "SARSCoronavirus 2" or "SARS coronavirus2" or SARSCoronavirus2 or "SARS-coronavirus-2" or "SARSCoronavirus 2" or "SARS coronavirus2")	2,410
S5	TX (respiratory* N2 (symptom* or disease* or illness* or condition*) N10 (Wuhan* or Hubei* or China* or Chinese* or Huanan*))	1,248
S6	TX (("seafood market*" or "food market*" or pneumonia*) N10 (Wuhan* or Hubei* or China* or Chinese* or Huanan*))	454

S7	TX ((outbreak* or wildlife* or pandemic* or epidemic*) N1 (Wuhan* or Hubei or China* or Chinese* or Huanan*))	673
S8	TX ("severe acute respiratory syndrome*")	3,686
S9	TX ("middle east respiratory syndrome*" or "middle eastern respiratory syndrome*" or MERSCoV or "MERS-CoV" or MERS)	7,934
S10	TX ("severe acute respiratory syndrome*" or SARS)	14,866
S11	TX ("SARS-CoV-1" or "SARSCoV-1" or "SARSCoV1" or "SARS-CoV1" or SARSCoV or SARS-CoV or SARS1 or "SARS-1" or SARScoronavirus1 or "SARS-coronavirus-1" or "SARScoronavirus 1" or "SARS coronavirus1" or SARScoronavirus1 or "SARS-coronavirus-1" or "SARScoronavirus 1" or "SARS coronavirus1")	480
S12	S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11	31,857
S13	TX ((back or neck) N1 (barrier? or protect* or shield* or enclos* or cover* or defend* or defense* or seal* or mask*))	3,144
S14	TX ((back or neck) N2 (expos* or vulnerab* or (risk adj2 transmission) or prone or unprotect* or non-protect* or susceptible or "at-risk"))	5,685
S15	S13 OR S14	8,759
S16	S12 AND S15	150
S17	TX biosafe*	1,259
S18	S12 AND S17	109
S19	TI (barrier* or protect* or shield* or enclos* or cover* or defend* or defense* or seal* or mask*)	89,051
S20	S12 AND S19	672

Sources

- Grey literature was included in this search
- Refer to the evidence search report for extensive sources.



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