Occupational Health Clinics for Ontario Workers

Centre de Santé des Travailleurs(ses) de l'Ontario

The historical context for the evidence for airborne transmission

John Oudyk MSc CIH ROH

Occupational Hygienist

October 7, 2022

Toronto 2003

Published articles on SARS1 experience:

"During the Toronto outbreaks of SARS, we investigated environmental contamination in SARS units, by employing novel air sampling and conventional surface swabbing." … "These data provide the first experimental confirmation of viral aerosol generation by a patient with SARS, **indicating the possibility of airborne droplet transmission**, which emphasizes the need for adequate respiratory protection, as well as for strict surface hygiene practices." … "Confirmation that the SARS virus can be shed into the air of a patient room will guide the response to any future SARS outbreaks."

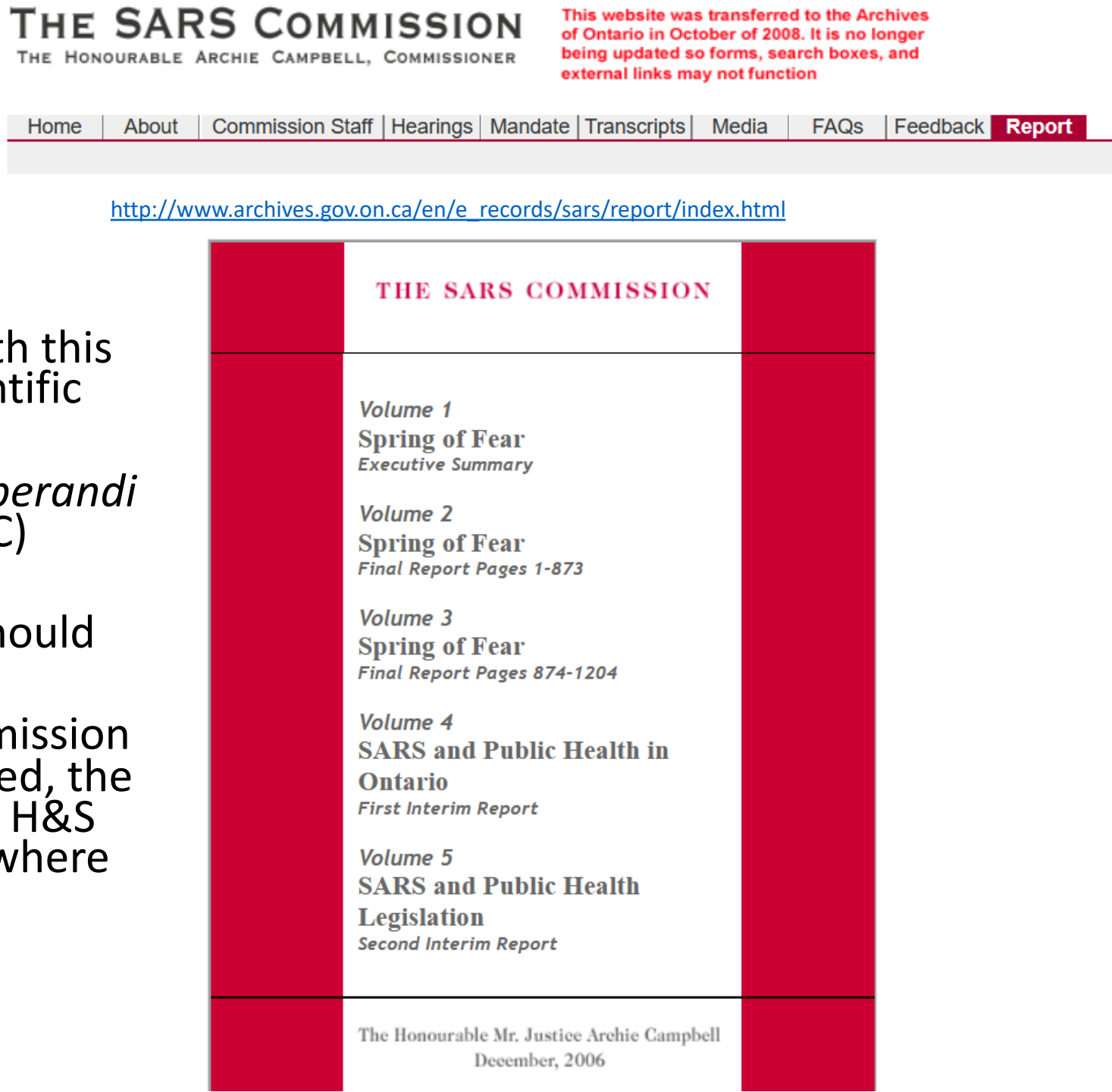
Booth TF, Kournikakis B, Bastien N, Ho J, Kobasa D, Stadnyk L, Li Y, Spence M, Paton S, Henry B, Mederski B. Detection of airborne severe acute respiratory syndrome (SARS) coronavirus and environmental contamination in SARS outbreak units. The Journal of infectious diseases. 2005 May 1;191(9):1472-7.

"When we compared use of N95 to use of surgical masks, the relative SARS risk associated with the N95 mask was half that for the surgical mask; however, because of the small sample size, the result was not statistically significant. Our data suggest that **the N95 mask offers more protection than a surgical mask**." **p=0.06**

Loeb M, McGeer A, Henry B, Ofner M, Rose D, Hlywka T, Levie J, McQueen J, Smith S, Moss L, Smith A. SARS among critical care nurses, Toronto. Emerging infectious diseases. 2004 Feb;10(2):251.

The response to **scientific** uncertainty

- The Campbell Commission dealt with this very issue of what to do about scientific **uncertainty** (confusion)
- Recognized the **conflict** in *modus operandi* of the two disciplines (H&S and IPAC)
- Recommended the "**precautionary principle**" (H&S *modus operandi*) should prevail
- While originally the Campbell Commission recommendations were implemented, the changes were gradually eroded and H&S was put back into the "back seat" (where we are now)



nH1N1 2009 – an opportunity to apply what we learned from SARS1

- This was our first chance to apply what we learned from SARS1
- For the first wave we did well
- N95's required for any HCW with suspected patient contact
- PAPR's recommended for AGMP's
- During the second wave and once the vaccines came out, the recommendations practically ignored and H1N1 blended into the seasonal flu
- Response to the first wave was generally considered a success (we learned something from SARS1 and were able to apply it); the second wave experience is usually ignored

RCTs in workplaces

ORIGINAL CONTRIBUTION JAMA-EXPRESS

Surgical Mask vs N95 Respirator for Preventing Influenza Among Health Care Workers

A Randomized Trial

Mark Loeb, MD, MSc
Nancy Dafoe, RN
James Mahony, PhD
Michael John, MD
Alicia Sarabia, MD
Verne Glavin, MD
Richard Webby, PhD
Marek Smieja, MD
David J. D. Earn, PhD
Sylvia Chong, BSc
Ashley Webb, BS
Stephen D. Walter, PhD

Context Data about the effectiveness of the surgical mask compared with the N95 respirator for protecting health care workers against influenza are sparse. Given the likelihood that N95 respirators will be in short supply during a pandemic and not available in many countries, knowing the effectiveness of the surgical mask is of public health importance.

Objective To compare the surgical mask with the N95 respirator in protecting health care workers against influenza.

Design, Setting, and Participants Noninferiority randomized controlled trial of 446 nurses in emergency departments, medical units, and pediatric units in 8 tertiary care Ontario hospitals.

Intervention Assignment to either a fit-tested N95 respirator or a surgical mask when providing care to patients with febrile respiratory illness during the 2008-2009 influenza season.

Main Outcome Measures The primary outcome was laboratory-confirmed influenza measured by polymerase chain reaction or a 4-fold rise in hemagglutinin titers.

Lab-confirmed flu

Table 2. Comparison of Laboratory-Confirmed Influenza Between the Surgical Mask and N95 Respirator Groups

				P Value
Laboratory-confirmed influenza[a]				.86
RT-PCR influenza A				.22
RT-PCR influenza B				.37
≥4-Fold rise in serum titers A/Brisbane/59/2007 (H1N1)[b]				.55
≥4-Fold rise in serum titers A/Brisbane/10/2007 (H3N2)[b]				.38
≥4-Fold rise in serum titers B/Florida/4/2006[b]				.46
≥4-Fold rise in serum titers A/TN/1560/09 (H1N1)[b]	17 (8.0)	25 (11.9)	3.89 (–1.82 to 9.59)	.18

The results of seroconversion to 2009 influenza A(H1N1) (10%) was unexpected given that the convalescent specimens were obtained from April 23 to May 15, 2009. This attack rate may suggest that 2009 influenza A(H1N1) was circulating in Ontario before April 2009. An alternative explanation for this high rate of seroconversion may be cross-reaction due to exposure to seasonal H1N1.

Abbreviations: CI, confidence interval; RT-PCR, reverse-transcriptase polymerase chain reaction.

[a] Influenza detected by 1 or more of the following: RT-PCR A, RT-PCR B, and ≥4-fold rise in serum titers to A/Brisbane/59/2007(H1N1), A/Brisbane/10/2007(H3N2), and B/Florida/4/2006. Serology includes only nonvaccinated nurses.

[b] Includes both vaccinated and nonvaccinated nurses. Two hundred ninety-four nurses were not vaccinated (147 in each group).

Influenza-like illness (ILI)

Given that there was no difference in laboratory-confirmed influenza between study groups, the higher proportion of nurses in the surgical mask group with influenza-like illness, although not statistically significant, was unexpected.

Table 4. Clinical Outcomes Between

	Surgical (n = 2			*P* Value
Physician visits for respiratory illness	13 (6.			.98
Influenza-like illness[a]	9 (4.2)	2 (1.0)	−3.29 (−6.31 to 0.28)	.06
Work-related absenteeism	42 (19.8)	39 (18.6)	−1.24 (−8.75 to 6.27)	.75

p=0.06

Research Proposal **(2020)** Medical Masks versus N95 Respirators for COVID-19 LOEB, MARK

https://www.clinicaltrials.gov/ct2/show/NCT04296643

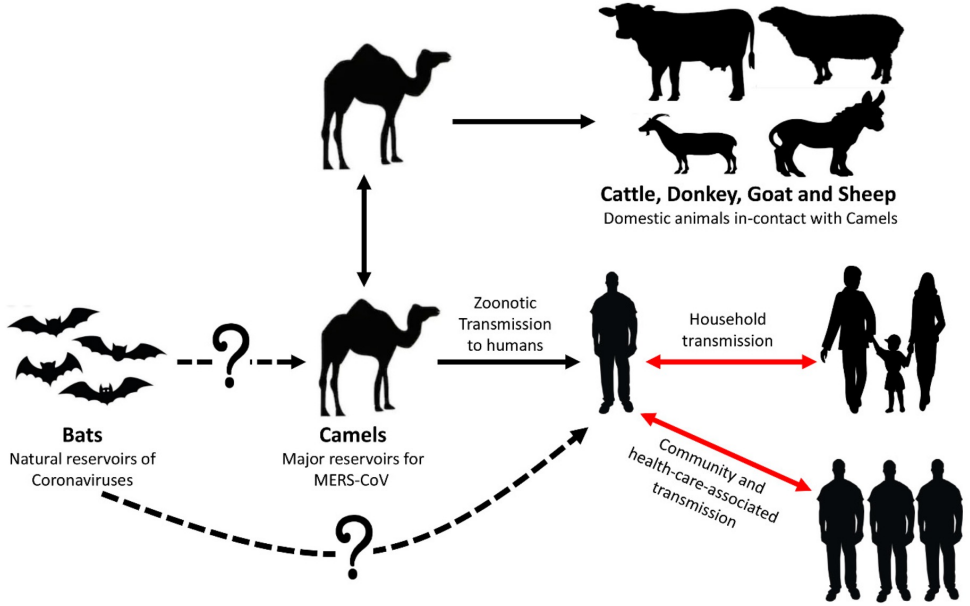
1.1 THE NEED FOR A TRIAL

1.1 What is the problem to be addressed? Little is known about the effectiveness of respiratory protective devices in protecting healthcare workers from 2019 novel coronavirus disease (COVID-19).

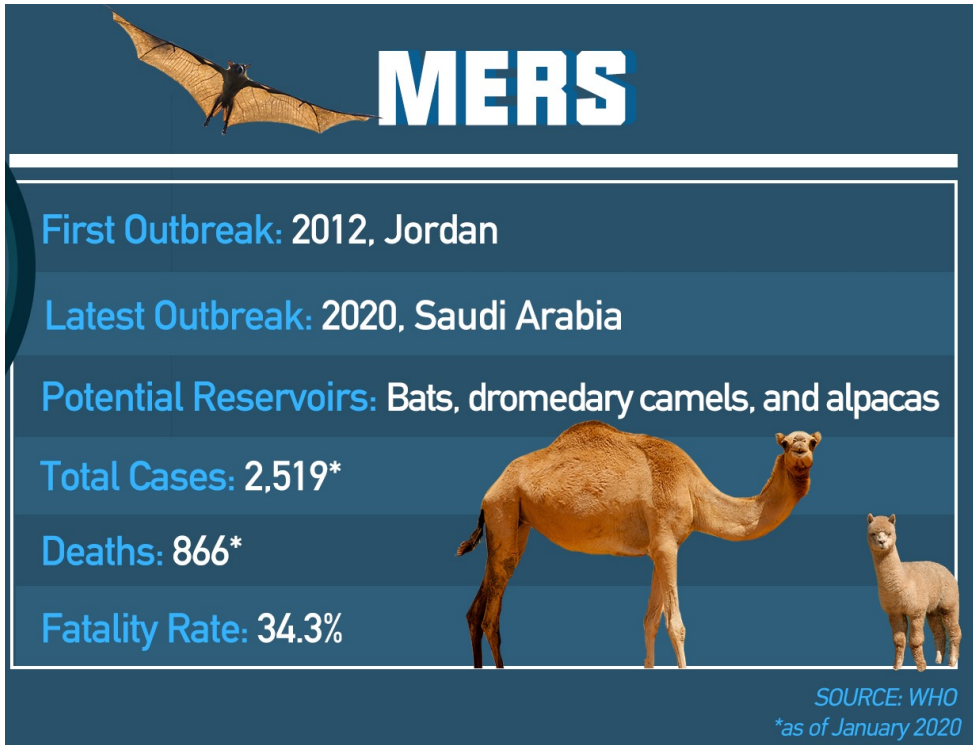
MERS 2012

… the change happens …

- "Human-to-human transmission is possible, but only a few such transmissions have been found among family members living in the same household. In health care settings, however, human-to-human transmission appears to be more frequent."
- "No vaccine or effective antiviral treatment is currently available for MERS-CoV"
- **Surgical masks** recommended as HCW protection



https://doi.org/10.3390/microorganisms8070991



https://news.cgtn.com/news/2020-03-03/Epidemics-and-Wildlife-Can-we-drink-camel-milk-amid-MERS-outbreaks--OvWGjcTkUU/index.html

https://www.who.int/health-topics/middle-east-respiratory-syndrome-coronavirus-mers#tab=tab_1

https://www.canada.ca/en/public-health/services/surveillance/human-emerging-respiratory-pathogens-bulletin/2018-04/mers.html

JIDC | THE JOURNAL OF INFECTION IN DEVELOPING COUNTRIES

J Infect Dev Ctries 2020; 14(2):191-198. doi:10.3855/jidc.10862

Original Article

Seroprevalence of Middle East Respiratory Syndrome Corona Virus in dromedaries and their traders in upper Egypt

Amal SM Sayed[1], Safaa S Malek[2], Mostafa FN Abushahba[1]

[1] *Department of Zoonoses, Faculty of Veterinary Medicine, Assiut University, Asyut, Egypt*
[2] *Department of Animal Medicine, Faculty of Veterinary Medicine, Assiut University, Asyut, Egypt*

Abstract

Introduction: Ca ...gress of serious diseases ...MERS-CoV) which cau ...camels and their traders
Methodology: S ...gender, and sampling lo ...lize the purified spike pr ...e virus.
Results: The da ...ly, like seroreactive can ...the 14 days prior to san ...various sampling localiti ...by any of the studied fa
Conclusions: Th ...Africa. Additionally, it reports that imported camels could be implicated in introducing MERS-CoV into Egypt. Accordingly, application of strict control measures to camel importation is a priority.

The data showed that 58.73% of imported camels and 25% of traders had antibodies specific to MERS-CoV. Interestingly, like seroreactive camels, all seropositive humans were apparently healthy without any history of developing severe respiratory disease in the 14 days prior to sampling.

Key words: Dromedary camels; MERS-CoV; ELISA; zoonosis.

Commentary 2014

Singapore Med J 2014; 55(6): 294-297
doi: 10.11622/smedj.2014076

Debate on MERS-CoV respiratory precautions: surgical mask or N95 respirators?

Jasmine Shimin Chung[1], MBBS, MRCP, *Moi Lin Ling*[2], MBBS, FRCPA, *Wing Hong Seto*[3], MRCP, FRCPath, *Brenda Sze Peng Ang*[4], MBBS, MPH, *Paul Anantharajah Tambyah*[5], MD, MBBS

ABSTRACT Since the emergence of Middle East respiratory syndrome coronavirus (MERS-CoV) in mid-2012, there has been controversy over the respiratory precaution recommendations in different guidelines from various international bodies. Our understanding of MERS-CoV is still evolving. Current recommendations on infection control practices are heavily influenced by the lessons learnt from severe acute respiratory syndrome. A debate on respiratory precautions for MERS-CoV was organised by Infection Control Association (Singapore) and the Society of Infectious Disease (Singapore). We herein discuss and present the evidence for surgical masks for the protection of healthcare workers from MERS-CoV.

Keywords: MERS-CoV, N95 respirators, surgical masks

South Korean MERS outbreak (2015)

- “186 confirmed cases, 38 deaths and 16,752 suspected cases”
- index case: “68-year-old male who had contracted the disease while on a business trip to multiple Middle East countries”
- “The outbreak was **entirely nosocomial**, and was largely attributable to **infection management and policy failures**, rather than biomedical factors.”

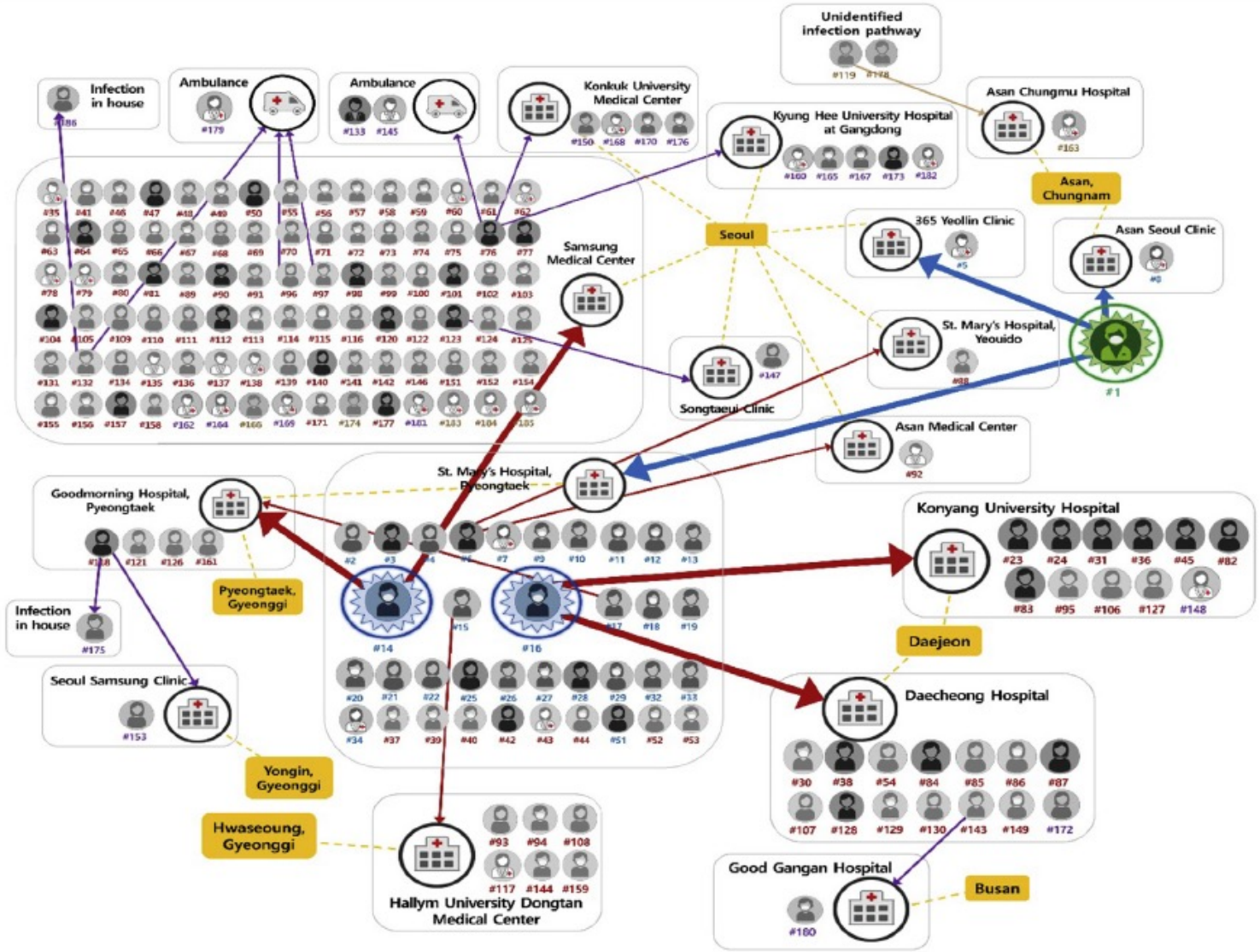


Figure 2. Distribution of transmission of Middle East respiratory syndrome coronavirus clusters and suspected super spreaders in South Korea (20th May to 25th November 2015).

Kim KH, Tandi TE, Choi JW, Moon JM, Kim MS. Middle East respiratory syndrome coronavirus (MERS-CoV) outbreak in South Korea, 2015: epidemiology, characteristics and public health implications. Journal of Hospital Infection. 2017 Feb 1;95(2):207-13.

2015

Clinical Infectious Diseases

MAJOR ARTICLE

IDSA Infectious Diseases Society of America hivma hiv medicine association OXFORD

https://pubmed.ncbi.nlm.nih.gov/27090992/

Extensive Viable Middle East Respiratory Syndrome (MERS) Coronavirus Contamination in Air and Surrounding Environment in MERS Isolation Wards

Sung-Han Kim,[1,ab] So Young Chang,[2,a] Minki Sung,[3,a] Ji Hoon Park,[2] Hong Bin Kim,[4] Heeyoung Lee,[5] Jae-Phil Choi,[6] Won Suk Choi,[7] and Ji-Young Min[2,b]

[1]Department of Infectious Diseases, Asan Medical Center, University of Ulsan College of Medicine, Seoul, [2]Respiratory Viruses Research Laboratory, Institut Pasteur Korea, Seongnam-si, Gyeonggi Province, [3]Department of Architectural Engineering, Sejong University, Seoul, [4]Division of Infectious Diseases, Department of Internal Medicine, and [5]Center for Preventive Medicine and Public Health, Seoul National University Bundang Hospital, Seongnam-si, Gyeonggi Province, [6]Division of Infectious Diseases, Department of Internal Medicine, Seoul Medical Center, and [7]Division of Infectious Diseases, Department of Internal Medicine, Korea University College of Medicine, Seoul, Republic of Korea

Conclusions. These data provide experimental evidence for extensive viable MERS-CoV contamination of the air and surrounding materials in MERS outbreak units. Thus, our findings call for epidemiologic investigation of the possible scenarios for contact and airborne transmission, and raise concern regarding the adequacy of current infection control procedures.

Keywords. MERS; transmission; contamination.

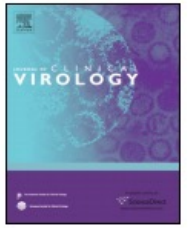
Toronto 2015

Conclusions: Patients with respiratory virus infection emit virus into the air which disperses to >1 m and may reach the breathing zone of a HCW. This pilot study highlights the feasibility and importance of conducting a larger-scale study to identify determinants of exposure and transmission from patient to HCW.

Contents lists available at ScienceDirect

Journal of Clinical Virology

journal homepage: www.elsevier.com/locate/jcv



Short communication

Influenza virus emitted by naturally-infected hosts in a healthcare setting

Samira Mubareka[a,*], Andrea Granados[b], Ushma Naik[c], Ilyse Darwish[c], Todd A. Cutts[d], George Astrakianakis[e], Jonathan B. Gubbay[b], Adriana Peci[b], James A. Scott[f]

[a] Sunnybrook Research Institute, 2075 Bayview Avenue suite B103, Toronto, ON M4N 3M1, Canada
[b] Public Health Ontario, 661 University Avenue, Suite 1701, Toronto, ON M5G 1M1, Canada
[c] Sunnybrook Research Institute, 2075 Bayview Avenue, Toronto, ON M4N 3M1, Canada
[d] National Microbiology Laboratory, Public Health Agency of Canada, 1015 Arlington Street, Winnipeg, MB R3E 3R2, Canada
[e] School of Population and Public Health, University of British Columbia, Rm 366C 2206 East Mall, Vancouver, BC V6T 1Z3, Canada
[f] Division of Occupational and Environmental Health, Dalla Lana School of Public Health, University of Toronto, 223 College Street, Toronto, ON M5T 1R4, Canada

ARTICLE INFO

Article history:
Received 12 August 2015
Received in revised form 30 October 2015
Accepted 1 November 2015

Keywords:
Influenza virus
Bioaerosol
Healthcare
Transmission
Exposure

ABSTRACT

Background: The emergence of novel respiratory viruses such as avian influenza A(H7N9) virus and the Middle East Respiratory Syndrome Coronavirus (MERS-CoV) highlights the importance of understanding determinants of transmission to healthcare workers (HCWs) and the public.
Objectives: We aim to determine the viral content of the air emitted by symptomatic inpatients or long-term care residents with laboratory-confirmed influenza virus infection (emitters), and in the breathing zones of healthcare workers who attend to them.
Design: A prospective pilot study of patients with laboratory-confirmed influenza virus infection was undertaken. Air within 1 m of the patient was sampled using a high volume air sampler. In addition, a lower volume air sampler was placed <1 m from the patient, with another >1 m from the patient. Viral RNA was recovered from the samplers and submitted for quantitative real time PCR. In addition, personal button samplers were provided to HCWs.
Results: The air emitted by 15 participants with laboratory-confirmed influenza virus infection was sampled. Of the patients infected with influenza A, viral RNA was recovered from the air emitted by 9/12 patients using the low-volume sampler; no viral RNA was detected from air emitted by patients with influenza B ($n = 3$). Influenza virus RNA was recovered from one HCW's sampler.
Conclusions: Patients with respiratory virus infection emit virus into the air which disperses to >1 m and may reach the breathing zone of a HCW. This pilot study highlights the feasibility and importance of conducting a larger-scale study to identify determinants of exposure and transmission from patient to HCW.

OH&S/IPAC Summit (2016/17)

An attempt to work together during "peace time" (between pandemics)

- April 20, 2016 IPAC/Occupational Health Meeting – Attendees: David Williams, Clint Shingler, Nancy Johnson, John Oudyk, Peter Donnelly, Brian Schwartz
- to design a one-day workshop of 20-30 people from IPC, OHS, engineering and other relevant domains that achieves the goal noted
  - a facilitated one-day session … involving multiple stakeholders with divergent skills and interests which achieved a similar goal
  - a constructive problem-solving approach focused on innovative technologies, systems and processes should be stressed
- A working group had numerous meetings and was assisted by professional facilitators and created this event – experts from all over Canada and the US were invited along with practitioners and worker representatives

Occupational Health and Safety & Infection Prevention and Control Innovation Forum

Pink Room, Women's College Hospital, 76 Grenville Street, Toronto

Tuesday, May 30, 2017 8:00am – 4:00pm

Toronto 2019

JOURNAL OF OCCUPATIONAL AND ENVIRONMENTAL HYGIENE
https://doi.org/10.1080/15459624.2019.1591626

Taylor & Francis
Taylor & Francis Group

Check for updates

Influenza virus RNA recovered from droplets and droplet nuclei emitted by adults in an acute care setting

Lily Yip[a], Mairead Finn[a], Andrea Granados[b,c], Karren Prost[a], Allison McGeer[c,d], Jonathan B. Gubbay[b,c], James Scott[e] and Samira Mubareka[a,c]

- "The conventional paradigm is to classify respiratory pathogen transmission as droplet vs. airborne, with clear policies and procedures for each purported mode of transmission. **Where there is doubt, both droplet and airborne precautions are generally employed**. Large respiratory droplets are >10 µm in diameter and are involved in short-range (<2 m) droplet spread. **Droplet nuclei are ≤5 µm and are responsible for short- or long-range (>2 m) airborne transmission;[15] these respirable particles are small enough to be inhaled into the alveoli.** The relative contribution of each route to overall transmission of influenza is unknown, leading to debate regarding the important mode(s) of transmission and appropriate means of transmission prevention." *(page 342)*

frontiers in Public Health

MINI REVIEW
published: 21 February 2019
doi: 10.3389/fpubh.2019.00023

2019

Bioaerosols and Transmission, a Diverse and Growing Community of Practice

Samira Mubareka[1,2], Nicolas Groulx[2], Eric Savory[3], Todd Cutts[4], Steven Theriault[4], James A. Scott[5], Chad J. Roy[6], Nathalie Turgeon[7], Elizabeth Bryce[8], George Astrakianakis[9], Shelley Kirychuk[10], Matthieu Girard[11], Gary Kobinger[12], Chao Zhang[3] and Caroline Duchaine[7]*

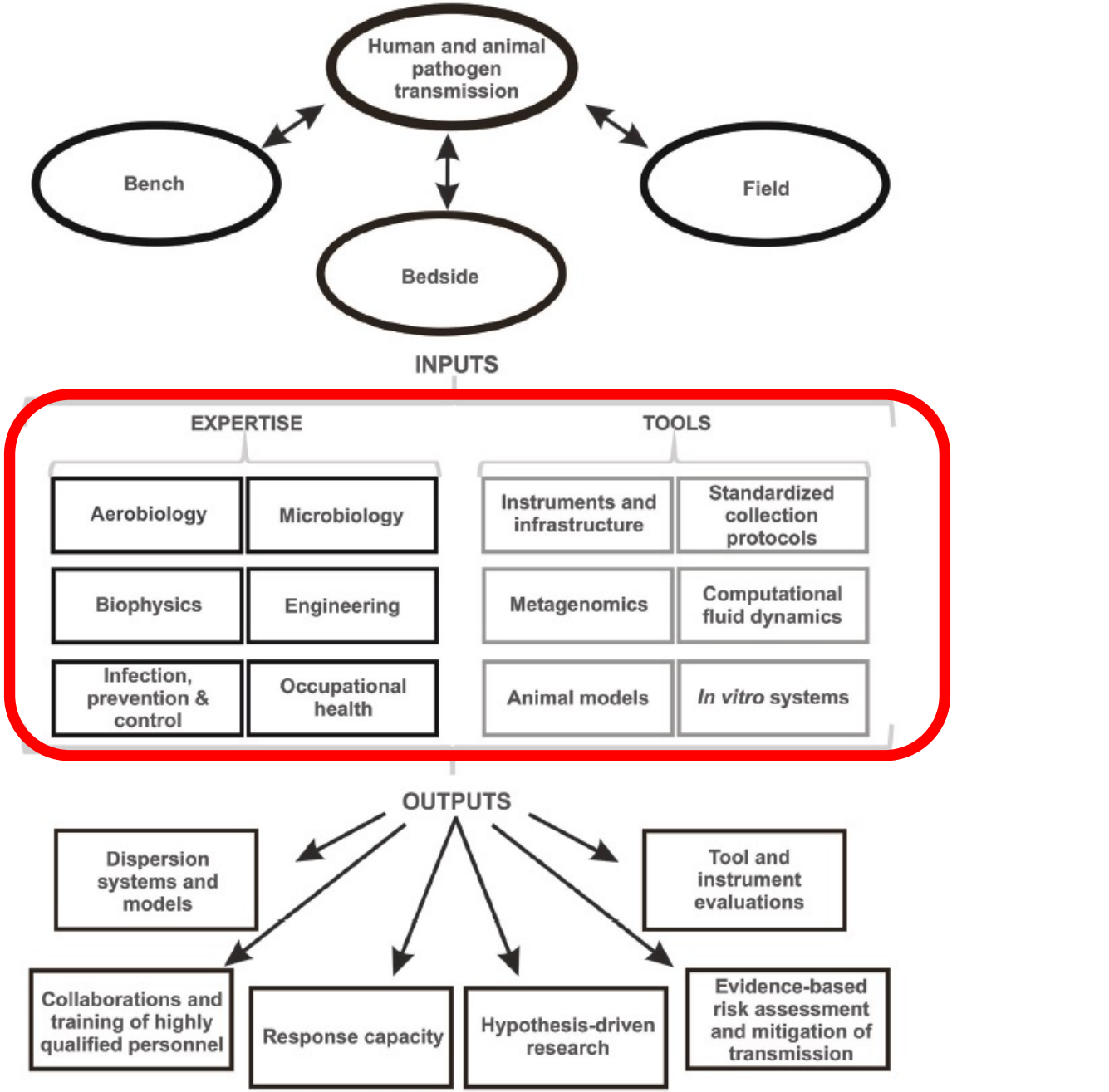


FIGURE 1 | Summary of the research fields, assets, and deliverables for collaborative bioaerosol research.

Ontario: Jan & Feb 2020

- In Ontario, prior to March 9, 2020, the prescribed protection for COVID-19 included an N95 respirator for all healthcare encounters with a patient suspected or known to have COVID-19.
- This was a hold-over from the 2009 H1N1 pandemic experience. At that time N95s were recommended for any new, unknown influenza type pathogen.
- Thus, at the beginning of the pandemic experience in Ontario which began in late January 2020, all HCWs working with patients with COVID were required to wear N95s (or PAPRs) in addition to their droplet and contact precautions.

Ontario: March 2020

Mar 3/20 Globe & Mail:

"…numerous infectious disease experts say mounting evidence shows COVID-19 spreads through droplets, such as when an infected person sneezes and coughs, and that airborne precautions are not appropriate nor are they supported by evidence. Instead, they say health professionals should use "droplet precautions, " which refer to gowns, eye guards, gloves and regular surgical masks."

"Ontario is the only province recommending airborne precautions. B.C. uses droplet precautions and none of the COVID-19 cases there have spread to health-care workers."

Mar 9/20: PHO downgrades protection for HCWs – removes the requirement to use airborne precautions

Checking the references:

Critique of PHO evidence against airborne transmission

Rationale/Evidence:	disposition
1. WHO-China Joint report (Feb 28)	- no scientific evidence provided; appeal to authority (unsupported "expert" opinion)
2. no HCW's among 1st ten US COVID-19 cases	- jumping to conclusions (now 300,000+ HCW's) - assumes close-contact excludes airborne
3. no BC HCW's using droplet precautions infected (up to Jul 16)	- no longer the case as of Mar 9! (2nd rev. Apr 28) - actually provides evidence to the contrary
4. lack of transmission during travel	- "the absence of evidence is not evidence of absence" fallacy; subsequent studies contradict
5. inconsistent air sampling results	- verification fallacy (difficulty capturing virus) - study selection bias
6. Restaurant in Guangzhou	- paper recognized insufficient follow-up - subsequent paper contradicts original conclusion

Checking the references:
Critique of PHO evidence for droplet transmission

Rationale/Evidence:	disposition
1. ECDC Risk assessment (Jan 31/20)	- document acknowledges no evidence for airborne transmission but recommends airborne precautions (citing the Precautionary Principle) – contrary to what it was cited for
2. Imai et al - Transmissibility of 2019-nCoV (Jan 25/20)	- word “droplet” not mentioned at all in the whole document - “close contact” assumed to exclude aerosol transmission
3. APHA text on infection control	- textbook (appeal to authority) – published prior to COVID - issue of air transmission for SARS/MERS is in scientific dispute
4. Wilson et al. (Apr 16 2020)	- recommends HCW be protected against airborne transmission - presented evidence is contrary to what it was cited for
5. four contact tracing studies suggesting little transmission outside the household	- again, assumes “close contact” excludes aerosol transmission - 2 of the 4 studies only looked at household transmission - studies done during lockdown periods (confined to household)

https://www.ohcow.on.ca/response-to-downgrade-of-ppe-precautions-for-covid-19.html

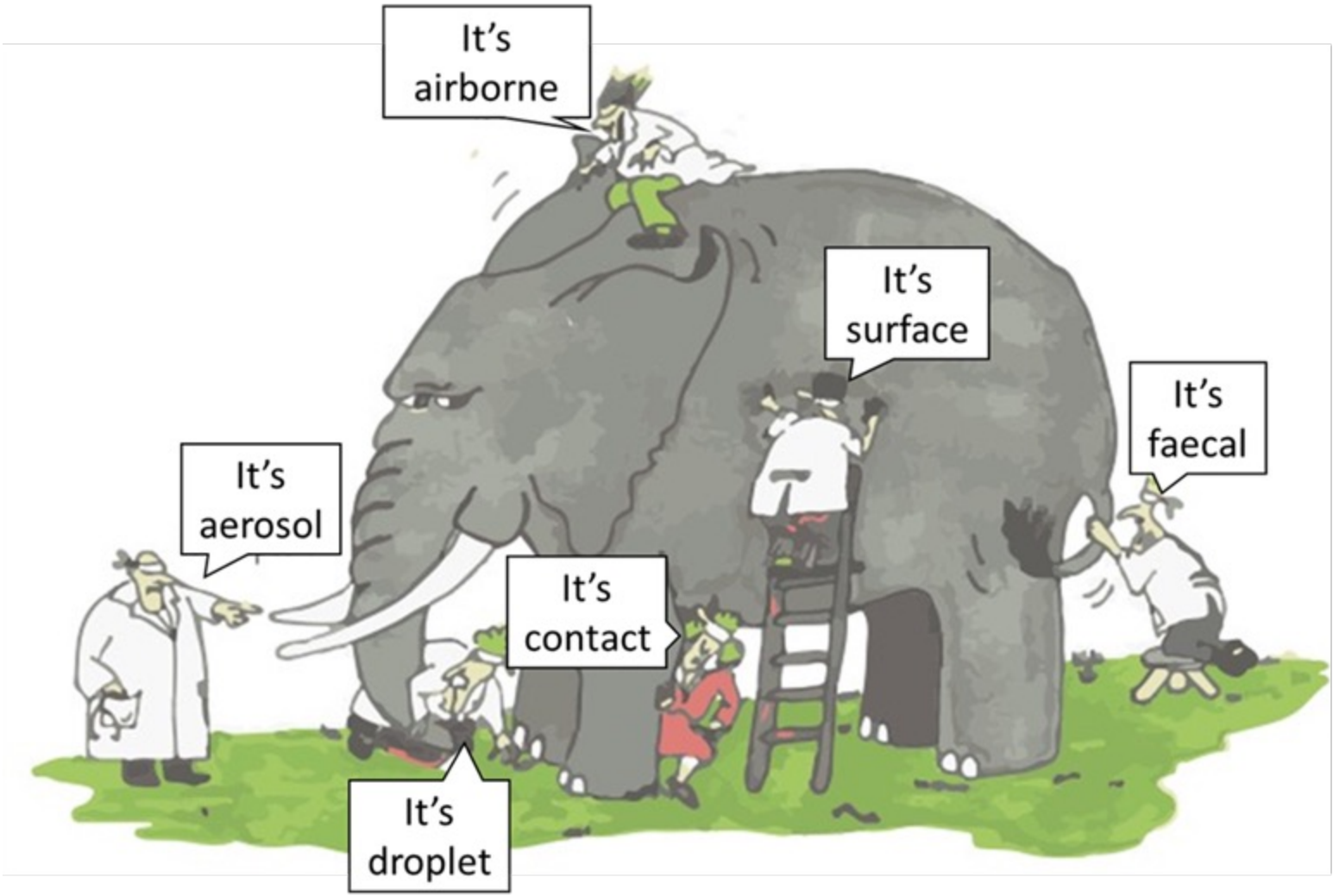
“Airborne Transmission of SARS-CoV-2Theoretical Considerations and Available Evidence” JAMA (July 13/20)

“The balance of evidence, however, seems inconsistent with aerosol-based transmission of SARS-CoV-2 particularly in well-ventilated spaces. What this means in practice is that keeping 6-feet apart from other people and wearing medical masks, high-quality cloth masks, or face shields when it is not possible to be 6-feet apart (for both source control and respiratory protection) should be adequate to minimize the spread of SARS-CoV-2 (in addition to frequent hand hygiene, environmental cleaning, and optimizing indoor ventilation).

To be sure, there are rarely absolutes in biological systems, people produce both droplets and aerosols, transmission may take place along a spectrum, and even medical masks likely provide some protection against aerosols.[6,10] It is impossible to conclude that aerosol-based transmission never occurs and it is perfectly understandable that many prefer to err on the side of caution, particularly in health care settings when caring for patients with suspected or confirmed COVID-19. However, the balance of currently available evidence suggests that long-range aerosol-based transmission is not the dominant mode of SARS-CoV-2 transmission.”

Klompas, Baker, & Rhee, JAMA Viewpoint (July 13, 2020) “Airborne Transmission of SARS-CoV-2Theoretical Considerations and Available Evidence” JAMA. 2020;324(5):441-442.

Confusion and misinformation about PPE: the 6 blind people and the elephant



Public Health Ontario | Santé publique Ontario

Jan 29, 2021

TECHNICAL BRIEF

IPAC Recommendations for Use of Personal Protective Equipment for Care of Individuals with Suspect or Confirmed COVID-19

01/29/2021

Please note that the Ministry of Health's Directive 5 is the provincial baseline standard for provision of personal protective equipment for hospitals, long term care homes and retirement homes.

Key Findings

- Given updated information on COVID-19, Droplet and Contact Precautions continue to be recommended for the routine care of patients* with suspected or confirmed COVID-19.
- Airborne Precautions should be used when aerosol generating medical procedures (AGMPs) are planned or anticipated to be performed on patients with suspected or confirmed COVID-19.

Background

After several months of global clinical experience and updated scientific and epidemiological evidence, routes of transmission for COVID-19 reveal the following:

- COVID-19 cases and clusters demonstrate that Droplet/Contact transmission are the routes of transmission. The scientific evidence is summarized in What We Know So Far About....Routes of Transmission.[1]
- The majority of cases are linked to person-to-person transmission through close direct contact with someone who is positive for COVID-19. The mechanism of transmission is likely through direct large aerosol droplets or indirect contact of contaminated surfaces.
- Aerosols are liquid droplets which can travel through the air. COVID-19 forms predominately large aerosol droplets which are unlikely to travel beyond two meters. These aerosols can be generated by coughs and sneezes, however the presence of aerosols does not constitute airborne transmission. There is currently no evidence that COVID-19 is transmitted through the airborne route.
- Experimental data have demonstrated that if a sufficient quantity of small aerosols are generated, COVID-19 can survive as an aerosol under ideal simulated conditions. These experiments do not provide evidence that airborne transmission occurs. However, they do provide a theoretical basis

"There is currently no evidence that COVID-19 is transmitted through the airborne route."

Masking Policy

« Go back to COVID-19 Information at UHN (/Covid19)

Why we're asking our patients, visitors and vendors to wear a mask

Updated Policy: Effective November 23, 2020

Everyone entering UHN must wear a medical mask. You will be given a mask by screening staff. If you are wearing a mask from home (including an N95 or K95 mask), screening staff will give you a medical mask to wear instead. Patients must

PHO (Feb 9 2021): “PPE Myth-Busting”

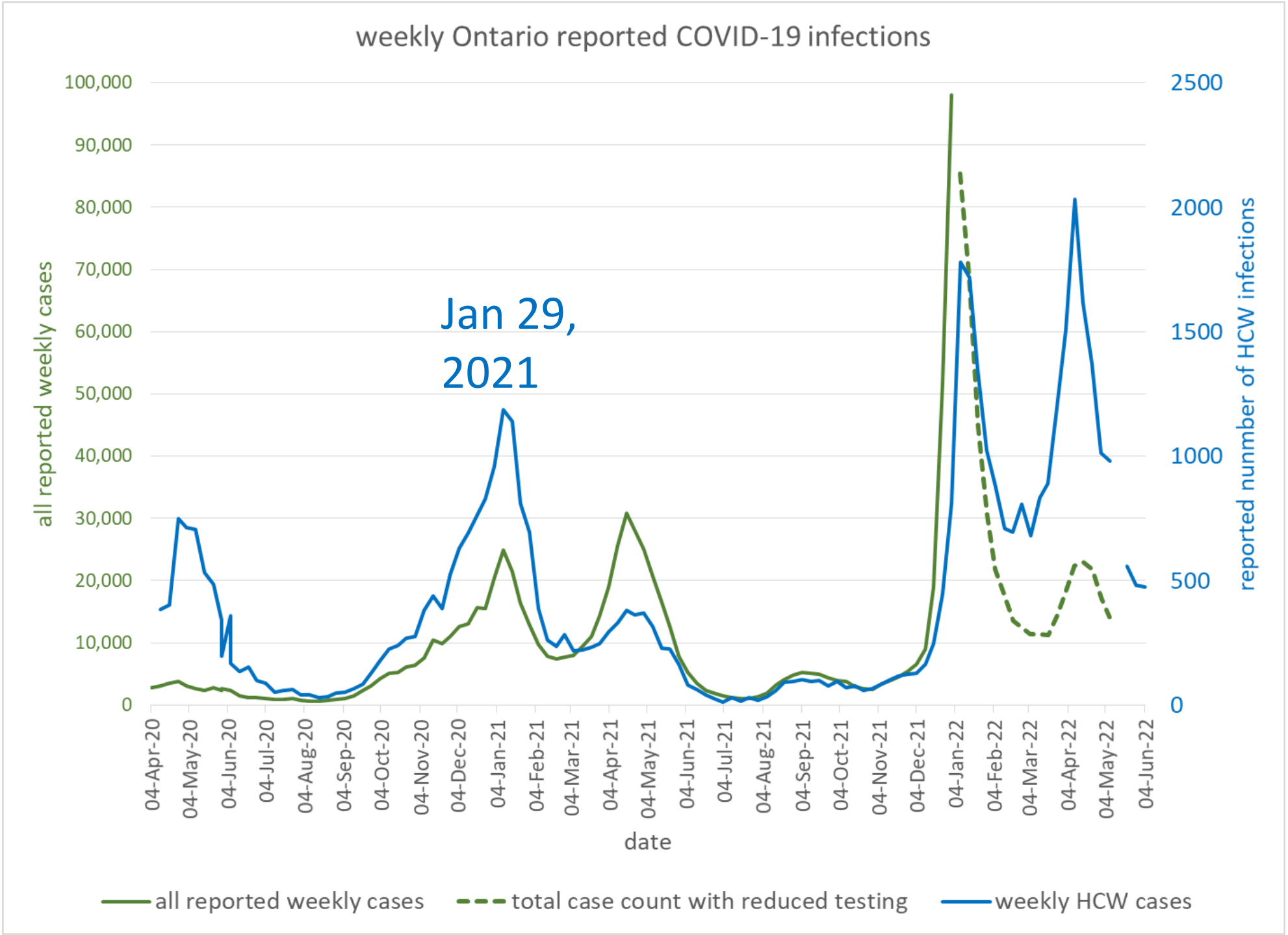
Myth: We need to wear N95 respirators when caring for patients/residents/clients with COVID-19.

Truth: Wearing an N95 respirator when it is not necessary may increase risks.

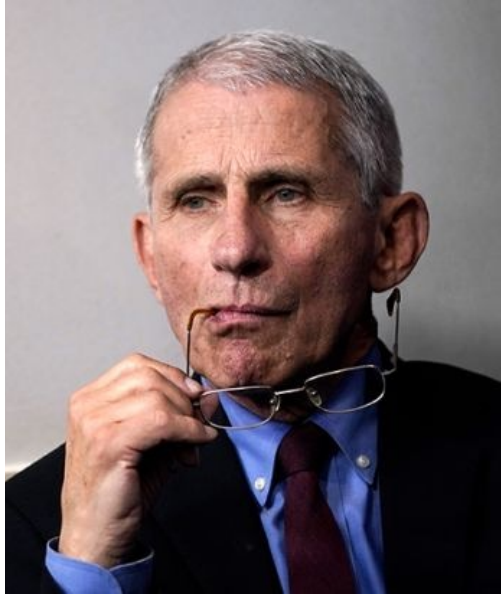
- N95 respirators are typically less comfortable and more challenging to breathe with than medical masks.
- There is an increased risk of self-contamination during the removal.
- Extended use may increase the risk of needing to touch or adjust it.
- N95 respirator use doesn’t eliminate the need for other PPE

http://mhlhin.on.ca/forhsps/ppe/knowledge-exchange

Ontario HCW infections 2020-22:



Dr. Fauci
(2020.09.10 Harvard Medical Grand Rounds):



"We really got to realize that from day one, you don't know it all. And you've got to be flexible enough to change your recommendations, your guidelines, your policies, depending upon the information and the data that evolves. Because, if you look at what we knew in February compared to what we know now, there really is a lot of differences that are there right now — the role of masks, the role of aerosol, the role of indoor vs outdoor, you know, closed spaces. **You've just got be humble enough to realize that we do not know it all from the get-go** and even as we get into it."

https://partners.mediasite.com/mediasite/Play/17db07327ba3458cb647cb511c3aa2f71d?fbclid=IwAR2LCxreCth3wweD9HHFgILRP6aUusiTFuvnRIPub_g45MjIFGudZwYxNSI

Dr. Klompas
(2020.09.10 Harvard Medical Grand Rounds):

"…what's been remarkable is how much has changed and how much has been assumed … and has rapidly been overturned and that what we all, I think, need to appreciate is what we think is true today might not be true tomorrow, and therefore, as we go about saying what we ought to do today, that should be in line with the recognition that it might be completely wrong. That, therefore we need to be expansive; we need to embrace the sort of, the precaution principle as we set about creating our next steps. I think that's the lesson to then apply to the inevitable next pandemic that we face again – **is to go in there not with certainty but with humility**."

https://partners.mediasite.com/mediasite/Play/17db07327ba3458cb647cb511c3aa2f71d?fbclid=IwAR2LCxreCth3wweD9HHFgILRP6aUusiTFuvnRIPub_g45MjIFGudZwYxNSI

Dr. Michael Klompas, MD

Associate Professor, Harvard Medical School, Infectious Disease

Brigham and Women's Hospital, Division of Infectious Diseases, Boston, MA

Specialties: Infectious Disease

Clinical Interests: emerging infectious diseases, infectious disease, pneumonia, sepsis

Biography: Dr. Michael Klompas is an Infectious Disease physician, Hospital Epidemiologist, and Professor of Population Medicine. He has published widely on surveillance, diagnosis, prevention, and treatment of hospital-acquired pneumonia, ventilator-associated events, and sepsis. He was a member of the ATS-IDSA guideline panel on Management of Hospital-Acquired Pneumonia, is currently co-chair of the SHEA panel on Strategies to Prevent Ventilator-Associated Pneumonia, and serves on the Surviving Sepsis Campaign guideline panel.

Medical School

- University of Toronto, Faculty of Medicine

https://physiciandirectory.brighamandwomens.org/details/1011/michael-klompas-infectious_disease-boston

Bibliography:

325 publications

1. **Klompas M**, Rhee C. Optimizing and Unifying Infection Control Precautions for Respiratory Viral Infections. J Infect Dis. 2022 08 24; 226(2):191-194. PMID: 35535586; PMCID: PMC9384050.

   Citations: Altmetric 242 Fields: Com

2. **Klompas M**, Baker MA, Rhee C. Coronavirus Disease 2019's Challenges to Infection Control Dogma Regarding Respiratory Virus Transmission. Clin Infect Dis. 2022 Aug 24; 75(1):e102-e104. PMID: 35271714.

   Citations: Altmetric 15 Fields: Com

3. Baker MA, Rhee C, Tucker R, Badwaik A, Coughlin C, Holtzman MA, Hsieh C, Maguire A, Mermel Blaeser E, Seetharaman S, Solem O, Vaidya V, **Klompas M**. Rapid Control of Hospital-Based Severe Acute Respiratory Syndrome Coronavirus 2 Omicron Clusters Through Daily Testing and Universal Use of N95 Respirators. Clin Infect Dis. 2022 Aug 24; 75(1):e296-e299. PMID: 35137035; PMCID: PMC8903387.

   Citations: PMC 2 Altmetric 229 Fields: Com

4. **Klompas M**, McKenna C, Ochoa A, Ji W, Chen T, Young J, Rhee C. Ultrashort course antibiotics for suspected pneumonia with preserved oxygenation. Clin Infect Dis. 2022 Jul 27. PMID: 35883250.

   Citations: Altmetric 89 Fields: Com

5. **Klompas M**, Pandolfi MC, Nisar AB, Baker MA, Rhee C. Association of Omicron vs Wild-type SARS-CoV-2 Variants With Hospital-Onset SARS-CoV-2 Infections in a US Regional Hospital System. JAMA. 2022 07 19; 328(3):296-298. PMID: 35704347; PMCID: PMC9201738.

   Citations: Altmetric 109 Fields: Med Translation: Humans Cells

6. **Klompas M**, Ye S, Vaidya V, Ochoa A, Baker MA, Hopcia K, Hashimoto D, Wang R, Rhee C. Association Between Airborne Infection Isolation Room Utilization Rates and Healthcare Worker Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Infections in 2 Academic Hospitals. Clin Infect Dis. 2022 07 06; 74(12):2230-2233. PMID: 34599821; PMCID: PMC8500060.

   Citations: PMC 1 Altmetric 30 Fields: Com Translation: Humans Cells PH

REVIEW

Rhee, C., Baker, M. A., & Klompas, M. (2022). Current Opinion in Infectious Diseases, 35(4), 353-362.

CURRENT OPINION

Prevention of SARS-CoV-2 and respiratory viral infections in healthcare settings: current and emerging concepts

Chanu Rhee[a,b], *Meghan A. Baker*[a,b], *and Michael Klompas*[a,b]

Purpose of review

COVID-19 has catalyzed a wealth of new data on the science of respiratory pathogen transmission and revealed opportunities to enhance infection prevention practices in healthcare settings.

Recent findings

New data refute the traditional division between droplet vs airborne transmission and clarify the central role of aerosols in spreading all respiratory viruses, including Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), even in the absence of so-called 'aerosol-generating procedures' (AGPs).