

Why are multiple voices essential for protection in a complex pandemic?

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on behalf of the Canadian Aerosol Transmission Coalition

CPHA/Public Health 2024 – April 25, 2024

We have no conflict of interest to declare in relation to this presentation.



- ❑ **different disciplines, skills** and others concerned about aerosol transmission came together in late 2020
- ❑ wanted to **use lessons from SARS 1** and Campbell (SARS Commission) report – including precautionary principle

- ❑ **feared** aerosol transmission and workers would be ignored again
- ❑ emphasis on **work** (too-often ignored social determinant of health)
- ❑ **expanded** to include community-based groups, people from disability organisations, unions, others

AFFILIATED ORGANIZATIONS





- ❑ wrote political and public health officials, with support from hundreds
- ❑ produced **science-based information** about aerosol/airborne prevention and precaution measures (hand-outs, webinars, media interviews)
- ❑ after wide-spread consultations, produced basic **pandemic preparation and response proposals**, now being developed in detail
- ❑ responded to 2023 federal "evaluation" of government pandemic responses

Transmission truth matters for the right prevention measures

FACT CHECK: COVID-19 is NOT airborne

The virus that causes COVID-19 is mainly transmitted through droplets generated when an infected person coughs, sneezes, or speaks. **These droplets are too heavy to hang in the air. They quickly fall on floors or surfaces.**

You can be infected by breathing in the virus if you are within 1 metre of a person who has COVID-19, or by touching a contaminated surface and then touching your eyes, nose or mouth before washing your hands.

To protect yourself, keep at least 1 metre distance from others and disinfect surfaces that are touched frequently. Regularly clean your hands thoroughly and avoid touching your eyes, mouth, and nose.



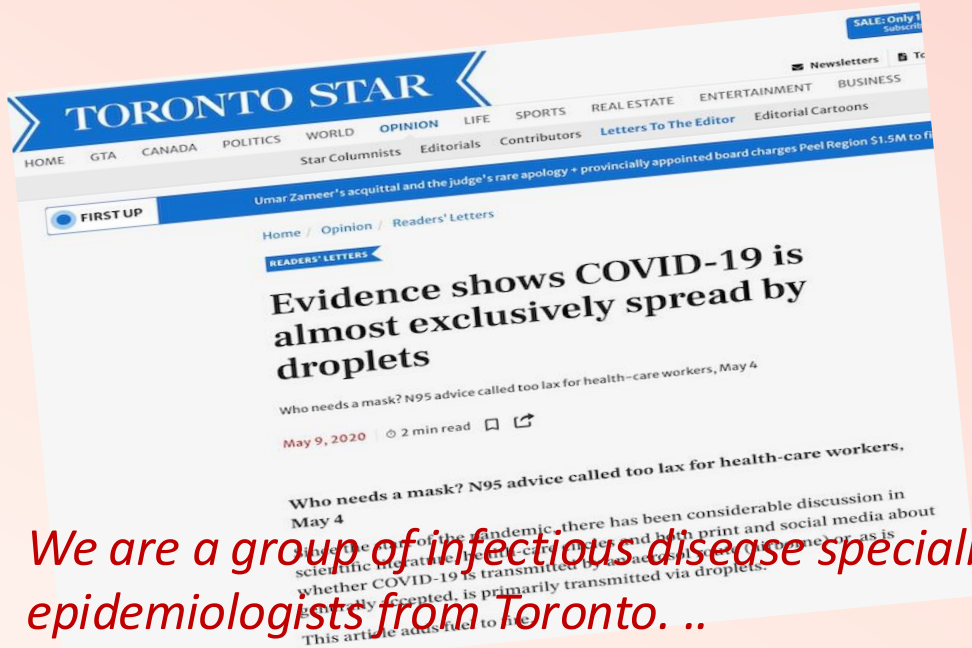
This message spreading on social media is incorrect. Help stop misinformation. Verify the facts before sharing.



World Health Organization

March 28 2020

#Coronavirus #COVID19



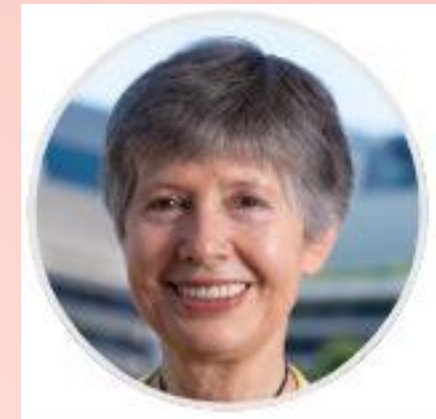
We are a group of infectious disease specialists and epidemiologists from Toronto. ...

*Our current assessment of the **evidence: COVID-19 is almost exclusively spread via droplets**. When there is risk of droplet aerosolization, such as with certain medical procedures, spread can be airborne.*

*But the **evidence shows that COVID-19 is primarily spread via droplet, with clear protection offered by distance, physical barriers to hands and face, and hand hygiene. ...***

May 2020

https://www.thestar.com/opinion/letters-to-the-editor/evidence-shows-covid-19-is-almost-exclusively-spread-by-droplets/article_bad1323d-7a20-501b-999c-a53dff646b13.html



“An aerosol is a particle in the air,” said Lidia Morawska, an engineer and the director of the International Laboratory for Air Quality and Health at Queensland University of Technology. “A droplet is a liquid aerosol.” To her, the distinction between droplets and aerosols doesn’t make any sense. To her, they are all aerosols.

Vox, Oct 5, 2020

<https://www.vox.com/science-and-health/2020/7/13/21315879/covid-19-airborne-who-aerosol-droplet-transmission-cdc>

INTERFACE FOCUS

royalsocietypublishing.org/journal/rsfs

Research



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Accepted: 13 September 2021

One contribution of 19 to a theme issue 'COVID-19: science, history, culture and imagination'.

How did we get here: what are droplets and aerosols and how far do they go? A historical perspective on the transmission of respiratory infectious diseases

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The COVID-19 pandemic has exposed major gaps in our understanding of the transmission of viruses through the air. These gaps slowed recognition of airborne transmission of the disease, contributed to muddled public health policies and impeded clear messaging on how best to slow transmission of COVID-19. In particular, current recommendations have been based on four tenets: (i) respiratory disease transmission routes can be viewed mostly in a binary manner of 'droplets' versus 'aerosols'; (ii) this dichotomy depends on droplet size alone; (iii) the cut-off size between these routes of transmission is 5 μm ; and (iv) there is a dichotomy in the distance at which transmission by each route is relevant. Yet, a relationship between these assertions is not supported by current scientific knowledge. Here, we revisit the historical foun-

<https://royalsocietypublishing.org/doi/full/10.1098/rsfs.2021.0049>



Although ideas about droplet size and range of spread are seemingly well accepted, their foundation is muddled and misleading, and is not consistent with physics.

The science/evidence says we inhale this virus easily because it's in the air. Small particles carrying the virus can be near us (**aerosols**) or further away (**airborne**).

WIRED

SECURITY POLITICS GEAR BACKCHANNEL BUSINESS SCIENCE MORE ▾

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PHOTOGRAPH: NAILA RUECHEL

MEGAN MOLTENI

BACKCHANNEL MAY 13, 2021 6:00 AM

The 60-Year-Old Scientific Screwup That Helped Covid Kill

All pandemic long, scientists brawled over how the virus spreads. *Droplets! No, aerosols!* At the heart of the fight was a teensy error with huge consequences.

<https://www.wired.com/story/the-teeny-tiny-scientific-screwup-that-helped-covid-kill/>

Who said what and when?



- ✓ **early on**, scientists mostly from non-medical fields (e.g., occupational hygienists, ventilation engineers, aerosol specialists, respiratory protection specialists, physicists)
- ✓ **by late 2021**, the Public Health Agency of Canada (PHAC), Centre for Disease Control and Prevention (CDC), Public Health Ontario, etc.
- ✓ **four years later**, the WHO (explicitly)

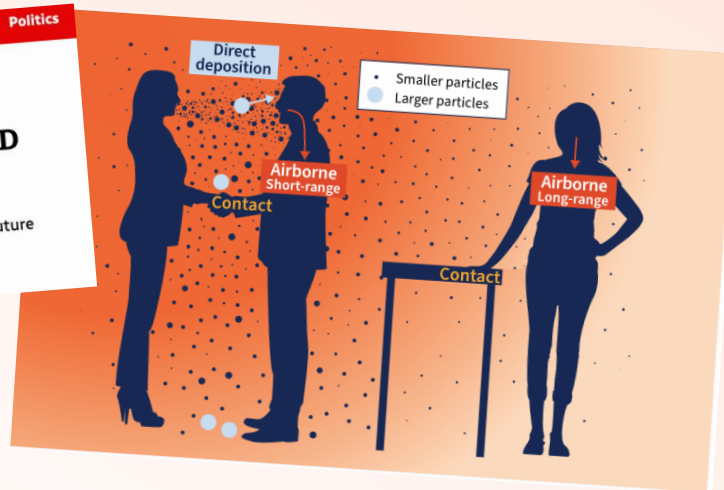
<https://www.publichealthontario.ca/en/about/blog/2021/covid-19-transmission>

<https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/prevention-risks.html#h>

<https://www.acgih.org/covid-19-fact-sheet-virus-in-air/>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8504878/>

<https://iris.who.int/bitstream/handle/10665/376346/9789240090576-eng.pdf?sequence=1>



What is to be done?

The Precautionary Principle



Mr. Justice Archie Campbell

"The point is not who is right and who is wrong about airborne transmission. **The point is not science, but safety.**

Scientific knowledge changes constantly. Yesterday's scientific dogma is today's discarded fable. When it comes to worker safety ... we should not be driven by the scientific dogma of yesterday or even the scientific dogma of today.

We should be driven by the precautionary principle that reasonable steps to reduce uncertainty. Until this principle is mandated and enforced

(SARS



https://www.archives.gov.on.ca/en/e_records/sars/report/index.html

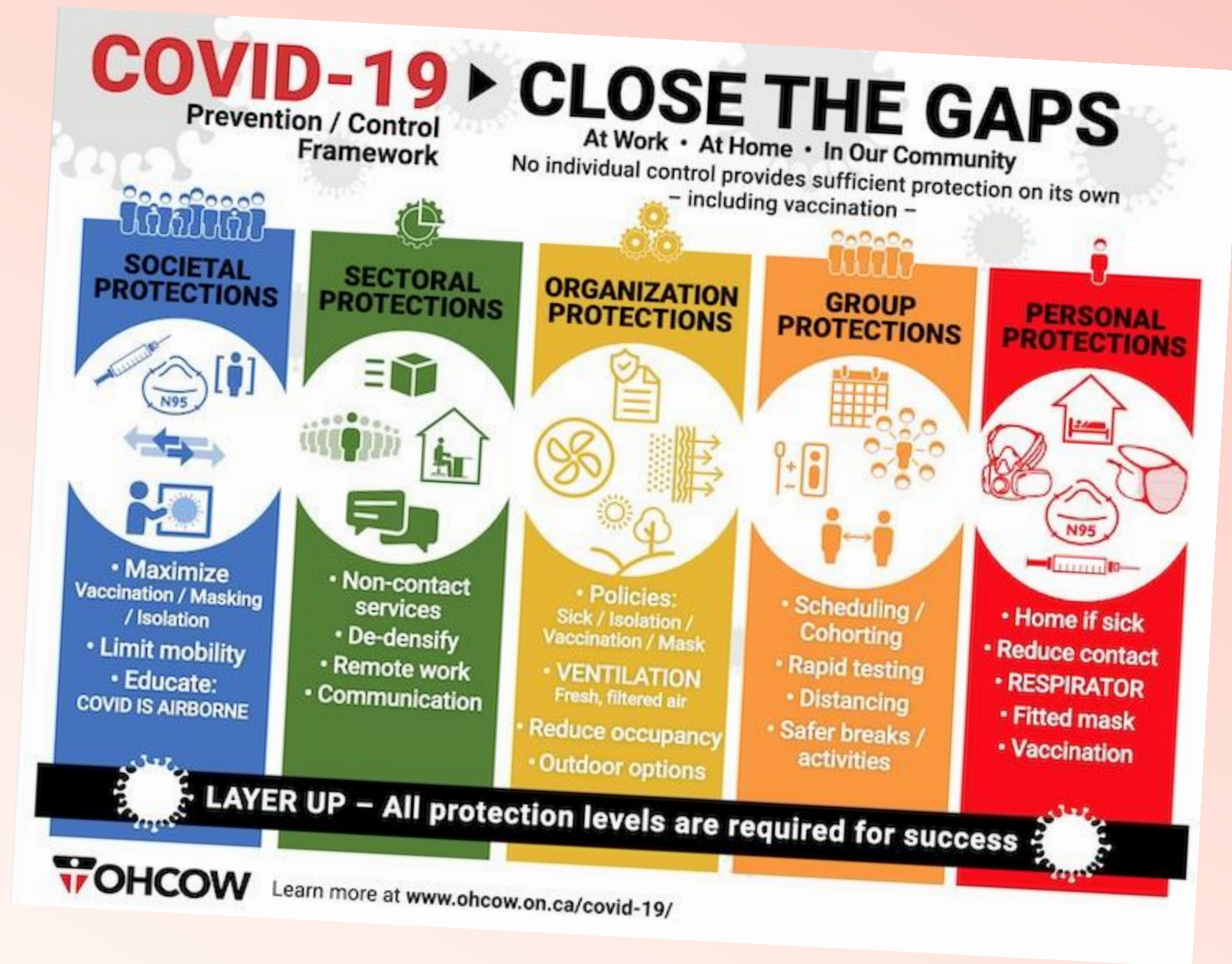
Start with "public health prudence"

- "the principle of public health prudence"
- "when faced with uncertainty, it is **better to err in favor of human life and health** than in favor of any competing value"
- restated as an informal NIOSH operating policy: "faced with scientific uncertainty, if we must err, it will **always be on the side of too much protection for the worker rather than too little.**"
- supported in a 1980 court decision that OSHA and the courts "**cannot let workers suffer while it awaits the Godot of scientific certainty**"

NIOSH Recommended Guidelines for Personal Respiratory Protection of Workers in Health Care Facilities Potentially Exposed to Tuberculosis, 1992. <https://stacks.cdc.gov/view/cdc/86071>

Layered solutions -- Vaccines are necessary, but not sufficient

*.. and layered solutions –
especially in complex health-
related situations -- require
many voices and skills* such as
occupational hygiene, ventilation
engineering, physics, aerosol
science, evolutionary biology,
respiratory protection specialists,
and more



Healthy (fresh and filtered) air has many benefits

Classroom Ventilation Posting

1a. type of ventilation system
☒ HVAC constant flow ☐ unit ventilator ☐ natural ventilation/hot water/steam radiators

1b. room dimensions
 35' length (in feet) 23' width (in feet) 9' height (in feet)
 area (in square feet (ft²)): 805 volume (in cubic feet (ft³)): 7245

1c. room occupancy
 35 room maximum capacity 20 room typical capacity 2 select which capacity (1: max, 2: typical)
 6' distancing achievable

2a. room ventilation rate
 805 HVAC design flow rate (in cfm) 8.1 cfm OA/person
 20% proportion outdoor air supply (in %) HVAC measured flow rate (in cfm)
 6.7 total air turnovers per hour
 1.3 outdoor air changes per hour (OA ach)

3. filters
 11 MERV rating date filter was last changed: can't remember
 3.7 equivalent clean air ach

4. supplementary portable air filters
 231 CADR @ top speed (in cfm of cleaned air) 65 dB noise @ top speed
 51 CADR @ lowest speed (in cfm of cleaned air) 40 dB noise @ low speed
 119 CADR @ typical speed (in cfm of cleaned air) 35 dB noise @ typical speed
 1 number of units 3 select speed (1: max, 2: min, 3: typical)
 1.0 equivalent clean air ach background noise somewhat exceeds ASHRAE recommendations

5. supplementary fans
 1000 flow rate (in cfm)
 RIA outdoor air (OA) or recirculating indoor air (RIA)
 25% typical % time fan is on when room occupied
 0.0 equivalent clean air ach

TOTAL equivalent ACH: 6.1

CO₂ ventilation performance indicator (enter measurement)
 peak carbon dioxide (CO₂) concentration (in ppm):

no problem: <600 ppm CO ₂
possible problem: 600-800 ppm CO ₂
probable problem: 800-1000 ppm CO ₂
more outdoor air needed: 1000+ ppm CO ₂

target: >6 to 12 ach
 good: 5-6 ach
 fair: 4-5 ach
 bare minimum: 3-4 ach
 poor: <3 ach

<https://www.ohcow.on.ca/occupational-illness/covid-19/ventilation-calculation-tool/>



CORE RECOMMENDATIONS FOR SAFER INDOOR AIR

- Mitigation of Airborne Disease Transmission** ✓
Target a minimum of six air changes per hour in occupied indoor spaces using any combination of ventilation, filtration, and ultraviolet germicidal irradiation systems.
- Ventilation** ✓
Bring buildings into compliance with current ventilation standards established by ASHRAE (American Society of Heating, Refrigeration and Air-Conditioning Engineers) and the Canadian Standards Association (CSA) confirmed through CO₂ monitoring.
- Filtration** ✓
Upgrade filters in air handling units to MERV-13 or higher where possible, or use a portable HEPA filter or DIY CR box in each occupied space when air pollution is a concern.
- Ultraviolet Germicidal Irradiation (UVGI)** ✓
Use upper room UVGI systems installed by qualified professionals in health care settings and congregate living settings. Consider its use in high-risk settings and places with high occupant density.
- Avoid Additive Air Cleaning and Alternative Methods** ✓
Do not use additive air cleaning methods or similar products, such as ionization, until there is a standardized way to their safety and effectiveness.
- Transparency and Public Education** ✓
Share information about your facility's air quality with occupants including sharing the strategies you are using to ensure safe indoor air and install CO₂ monitors with readable displays.

Ontario Society of Professional Engineers
ospe.on.ca/indoor-air-quality

ASHRAE STANDARD

ASHRAE Standard 241-2023

Control of Infectious Aerosols

Approved by the ASHRAE Standards Committee on June 24, 2023.

This Standard is under continuous maintenance by a Standing Standard Project Committee (SSPC) for which the Standards Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely, documented, consensus action on requests for change to any part of the Standard. Instructions for how to submit a change can be found on the ASHRAE website (www.ashrae.org/continuous-maintenance).

The latest edition of an ASHRAE Standard may be purchased from the ASHRAE website (www.ashrae.org) or from ASHRAE Customer Service, 180 Technology Parkway, Peachtree Corners, GA 30092. E-mail: orders@ashrae.org. Fax: 678-539-2129. Telephone: 404-636-8400 (worldwide), or toll free 1-800-527-4723 (for orders in US and Canada). For reprint permission go to www.ashrae.org/permissions.

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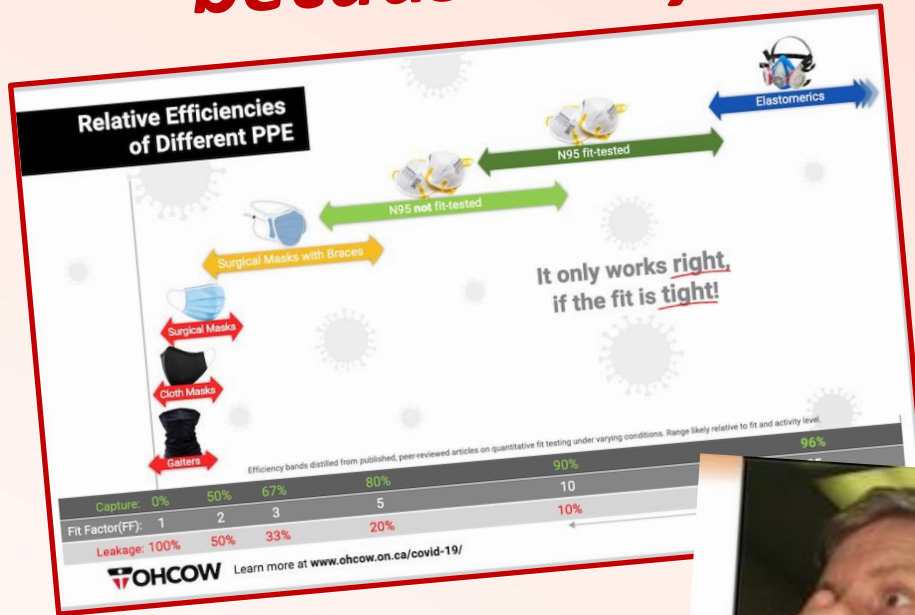
This standard includes links to online supporting files.

https://ospe.on.ca/wp-content/uploads/2022/11/IAQ_Checklist-copy.pdf

<https://www.ashrae.org/about/news/2023/ashrae-publishes-standard-241-control-of-infectious-aerosols>

Sometimes that means respirators

-- because they work



Amongst other things, **authorities** providing direction and guidance **failed to:**

- ☐ understand or learn basic **principles of respiratory protection** (e.g., fit matters)
- ☐ **consult** with those with expertise (e.g., hygienists, respiratory protection specialists, manufacturers, CSA)





- ❑ acknowledge existence of, and use, **CSA Z94.4** (*Selection, use and care of respirators*) and Z94.4.1 (certification of respiratory protection)
- ❑ allow **enforcement of workplace regulations** for respirator selection and use, basic knowledge and practiced without hesitation outside healthcare

Respiratory protective equipment

6.15(1) An employer must ensure that respiratory protective equipment provided to a worker is selected, used and maintained in accordance with CAN/CSA-Z94.4-11, *Selection, Use, and Care of Respirators*.

https://www.gov.mb.ca/labour/safety/pdf/whs_workplace_safety_act_and_regs.pdf

Citizen scientists are essential voices



<https://protectnb.ca/>

Our members are:

- ✓ across the lifespan (kids to seniors)
- ✓ retired activists, healthcare workers
- ✓ disabled people
- ✓ people with chronic health conditions, Long COVID
- ✓ 2SLGBTQA+ people
- ✓ caregivers for children, seniors, people with cancer, disabled people

Providing multiple voices

- nursing
- public health
- medicine (physicians)
- engineering
- pharmacy
- health sciences information
- advocates
- parents
- church volunteers
- educators (classroom teachers, guidance, instructional design)



https://www.aerosoltransmissioncoalition.ca/_files/ugd/cdec4_3aecb64bda714576a3f267e5e00ef457.pdf

Collaboration

- Aerosol Transmission Coalition
- Canadian COVID Society precursors
- Clean Air Crew
- POP and ad hoc groups
- meeting with government, NGOs, health charities

Investigative journalism

- Dozens of FOI requests
- **Long COVID FOI shows** provincial PH received **evidence scans** from PHAC/Chief Science advisor every 2 weeks

Research

Applied to regional health authority research program to pilot HEPA filters and respirators in clinics

Mutual aid

- **Mask bloc (& tests)**
- Cash fundraisers for PwLC
- Donate/loan air cleaners

Legislation & policy

- 3/22 petition in legislature to keep masks in schools (1,500 signatures)
- **6/23 mobilized unanimous support for *Clean Air Act***

POPNB

Grassroots volunteer community group

Direct action

- 02/22 kindness for healthcare workers
- 04/22 “Die in”
- COVID memorials

Sci comm & knowledge translation

Podcast, long COVID billboard, stickering campaign, website, SoMe, webinars

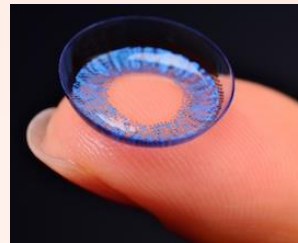
Three metaphors to help inter-disciplinary dialogue in public health

Training in a discipline often acts as a “**flashlight**,” highlighting certain features of reality and leaving others in shadow.



Discipline's sense of normal science is the metaphorical “**box**” into which we hope nature will fit, determining how we advance the frontier by recognizing the familiar in the unfamiliar.

Scientific training is a “**lens**” through which we perceive and understand the world.



To work with multiple voices and across disciplines, remember that **people from other fields and those affected by a health issue may understand key concepts differently**. Learn from the sociology of scientific knowledge.

<https://ajph.aphapublications.org/doi/10.2105/AJPH.2018.304681>

What does it come down to?



Covid levels remain low but new variants are coming, as is bird flu

Christina Pagel on where we are and where we are going

INDEPENDENT SAGE
APR 22



- ✓ **Public health** – including OHS and other skills – needs to focus on **primary prevention** for collective protection.
- ✓ **Multiple voices** -- including citizen scientists and occupational health specialists -- are essential for public health activities, especially in pandemics. They **produce** protective **transdisciplinary** (synergistic, holistic) **results**.
- ✓ Workers need these transdisciplinary results. **Protecting workers protects everyone.**
- ✓ **Start now**, using lessons from this pandemic, SARS Commission, etc. It's **about the future too** (most viruses are in the air).
- ✓ **Healthy (fresh and clean) indoor air is the “new poop”.**

We need prevention-focused public health goals and strategies that:



- ✓ are based on the **precautionary principle**
- ✓ recognise the **importance of aerosol and airborne transmission** of viruses and other hazards, and "clean the air" solutions
- ✓ use multiple **sciences** ("evidence" > RCTs)
- ✓ are **transdisciplinary** (multiple voices, skills, sciences, solutions/layers, groups included/recognised)
- ✓ deal with the **needs of workers** and others who are **vulnerable** (e.g., enforce OHS, human rights Convention)
- ✓ are **flexible**, respond to variants/situations
- ✓ are developed with, and implemented and evaluated by, **multiple voices, skills, experiences, training, those affected, etc.**

Specific policy proposals coming

Small groups are working on each of these topics, based on the consultation proposal document, and thinking across disciplines and experiences:

- ✓ using the precautionary principle
- ✓ elimination or mitigation/control?
- ✓ layered prevention strategies
- ✓ institutional reform
- ✓ protecting vulnerable individuals and groups

We will circulate the document for comments and consensus. **Let us know if you would like to know more or get involved and/or join us:**
aerosoltransmissioncoalition@gmail.com

