LONG COVID WEB

Long COVID: Going Upstream

Long COVID Web – Webinars

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Anne Bhéreur, MD, CCFP(PC), FCFP

November 14, 2023

Who We Are / Conflicts of Interest

Lyne Filiatrault, MDCM, FRCP

- University of British Columbia:
  - Former Clinical Assistant Professor, Department of Emergency Medicine.
- Vancouver General Hospital:
  - Former Emergency Physician and ED Patient Quality & Safety Director.
  - SARS 2003: Our ED team played a key role in Vancouver's successful response.
- Member of:
  - Protect Our Province BC.
  - Canadian Aerosol Transmission Coalition.
  - Safe Air, Safe Schools / Air Sain, Écoles Saines.

Anne Bhéreur, MD, CCFP(PC), FCFP

- Université de Montréal:
  - Associate Clinical Professor, Department of Family Medicine and Emergency Medicine,.
- CIUSSS du Nord-de-l'Île-de-Montréal:
  - Family & Palliative Care Physician.
  - Absent since Dec. 2020 → Long COVID.
- Physician-researcher on Long COVID:
  - Long COVID Web - Canada:
    - Patient Advisory Council & Steering Committee & Member of pillars.
  - Research teams & committees.
- Member of:
  - COVID-Stop.
  - Protect Our Province Québec.

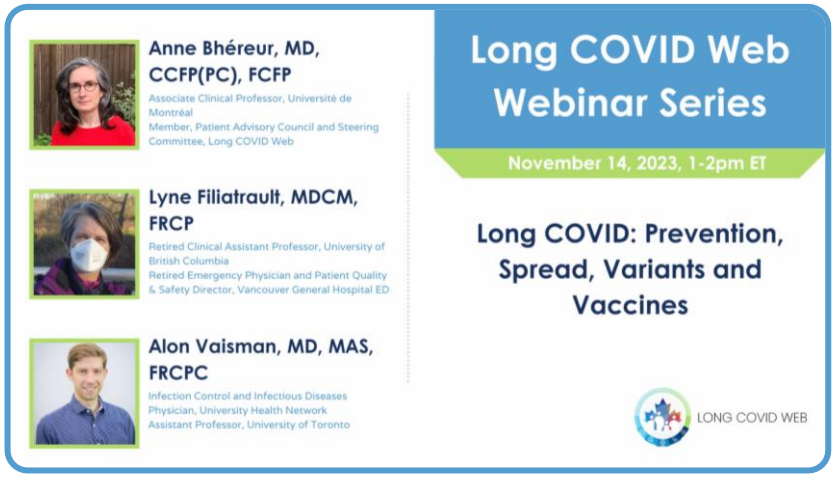
Scientists and citizens initiatives to inform on COVID-19.

Overview

Clickable links to go directly to the section!

1. COVID-19 Pandemic: Where are we at?
2. Lessons Learned
3. Breaking Chains of Transmission
4. Going Upstream to Get to a Better Place

References



Long COVID Web: Webinar Series- Session 2

https://www.youtube.com/watch?v=7B3LqIZ_1CU

https://www.youtube.com/@LongCOVIDWeb

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COVID-19 Pandemic

Where are we at?

COVID-19 is **not** over…

Eric Feigl-Ding
@DrEricDing

Welp—Remember how @CDCgov claimed there was no "outbreak" at their CDC conference 3 weeks ago? ➡️Now we learn 181 cases of #COVID19 arose of 1800+ CDC staffers/guests.... So basically 1 in 10 folks at a single CDC conference caught COVID. Yet @CDCDirector Walensky dismantles reporting and they gaslight us it was nothing. #CovidIsNotOver
washingtonpost.com/health/2023/05...

HEALTH

Tally of covid-19 cases after CDC conference climbs to 181

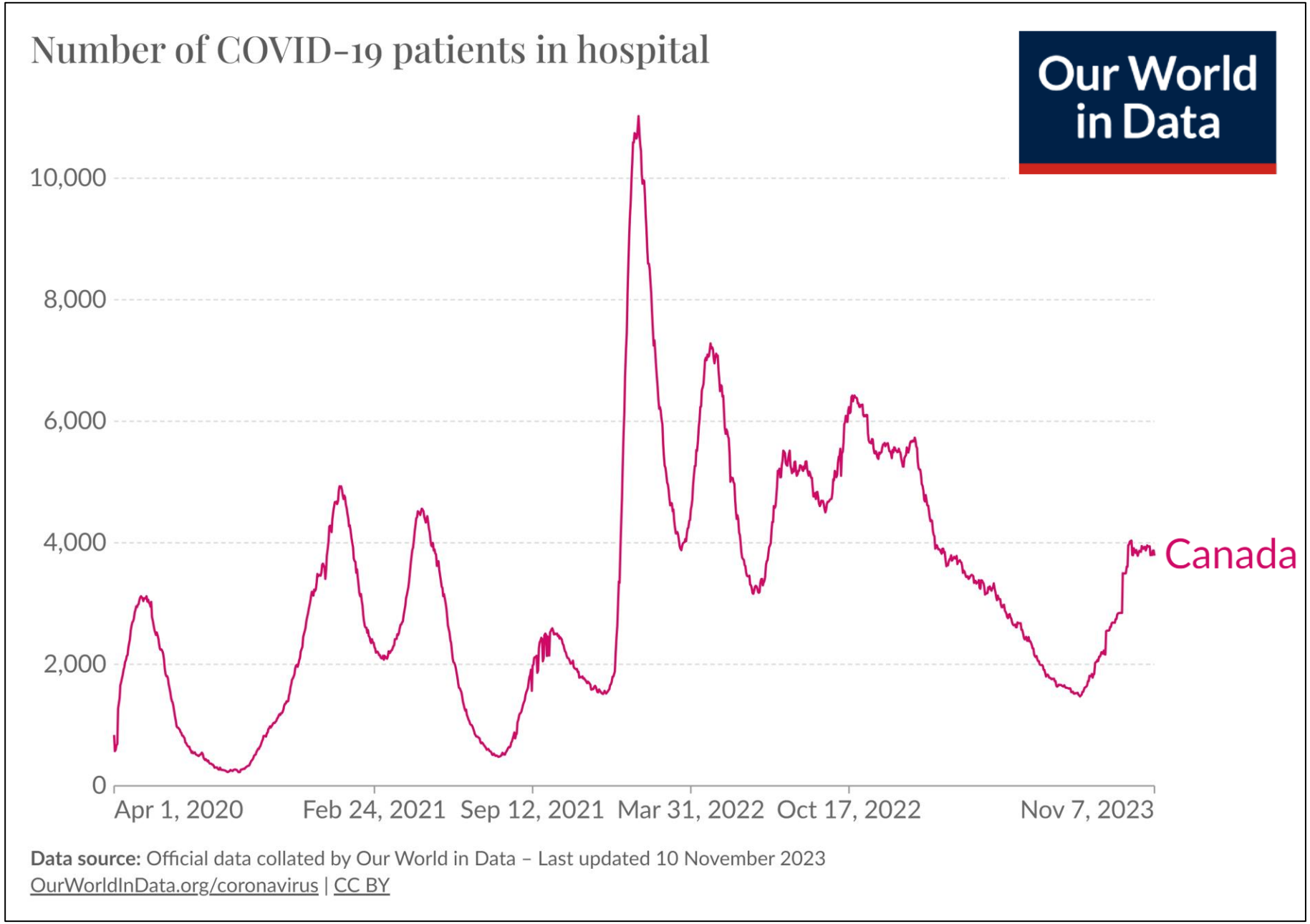
By Lena H. Sun

May 26, 2023 at 1:00 p.m. EDT

May 26, 2023

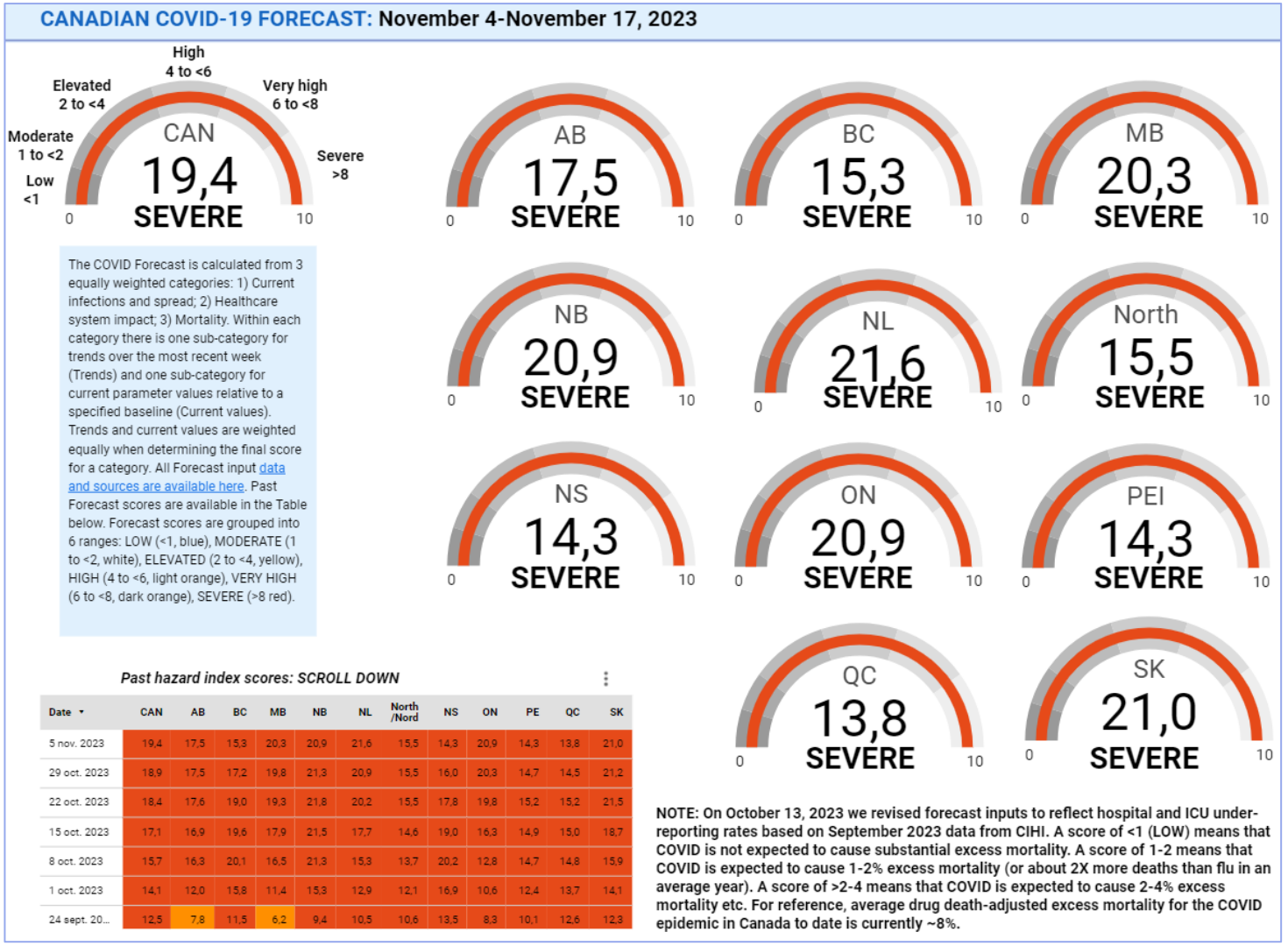
https://twitter.com/drericding/status/1662192084722360325

COVID-19 Pandemic: Where are we?



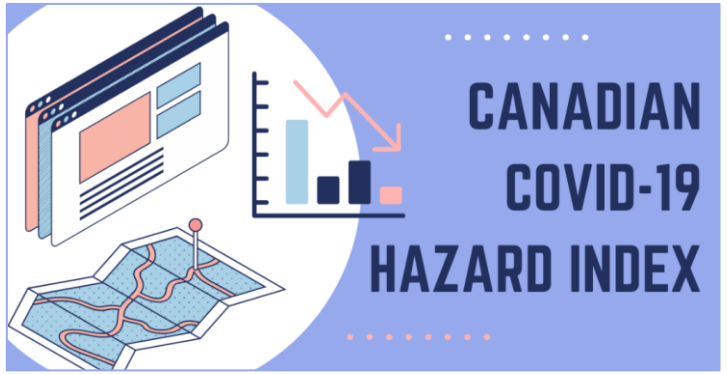
Reference

Canadian COVID Forecast



Date	CAN	AB	BC	MB	NB	NL	North /Nord	NS	ON	PE	QC	SK
5 nov. 2023	19,4	17,5	15,3	20,3	20,9	21,6	15,5	14,3	20,9	14,3	13,8	21,0
29 oct. 2023	18,9	17,5	17,2	19,8	21,3	20,9	15,5	16,0	20,3	14,7	14,5	21,2
22 oct. 2023	18,4	17,6	19,0	19,3	21,8	20,2	15,5	17,8	19,8	15,2	15,2	21,5
15 oct. 2023	17,1	16,9	19,6	17,9	21,5	17,7	14,6	19,0	16,3	14,9	15,0	18,7
8 oct. 2023	15,7	16,3	20,1	16,5	21,3	15,3	13,7	20,2	12,8	14,7	14,8	15,9
1 oct. 2023	14,1	12,0	15,8	11,4	15,3	12,9	12,1	16,9	10,6	12,4	13,7	14,1
24 sept. 20...	12,5	7,8	11,5	6,2	9,4	10,5	10,6	13,5	8,3	10,1	12,6	12,3

COVID-19 Resources Canada



Dr. Tara Moriarty & team of volunteers...

Reference

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Lessons Learned

Still To Be Learned

Lesson 1: SARS was Aerosol Spread

Metropole Hotel

The SARS Commission Report 2006

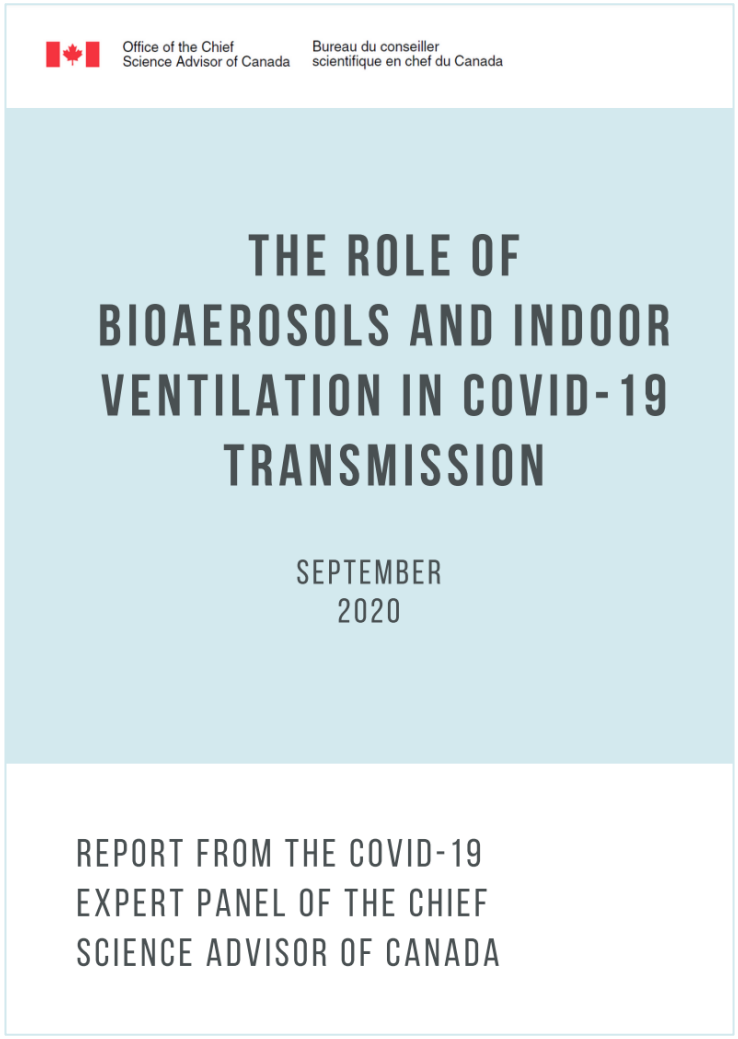
"If SARS is spread primarily by droplet and is only rarely airborne, as some Ontario infection control specialists still insist, how could this one man infect 17 others with whom he had no known direct contact?"

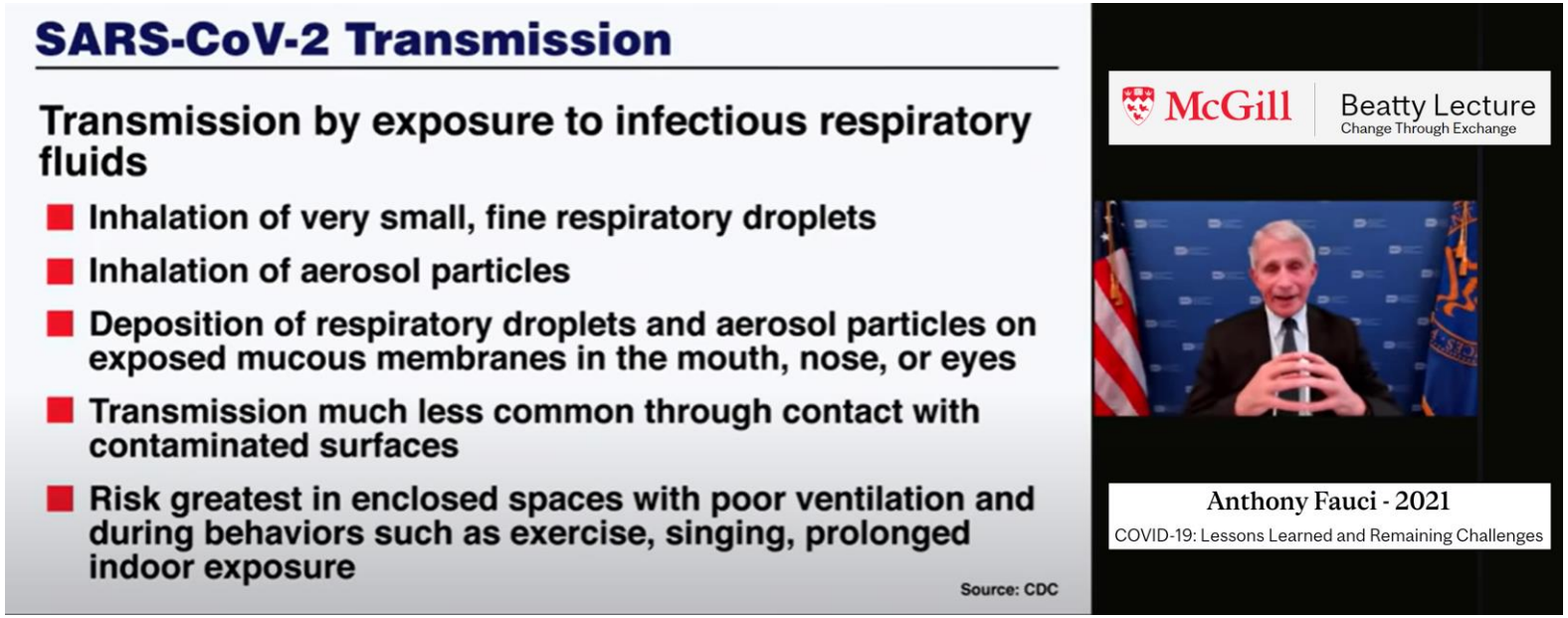
The Honourable Justice Archie Campbell, Commissioner

Metropark Hotel Mongkok, CC BY-SA 4.0, via Wikimedia Commons

References

Lesson 2: SARS-CoV-2 Spreads by Aerosols





Reference

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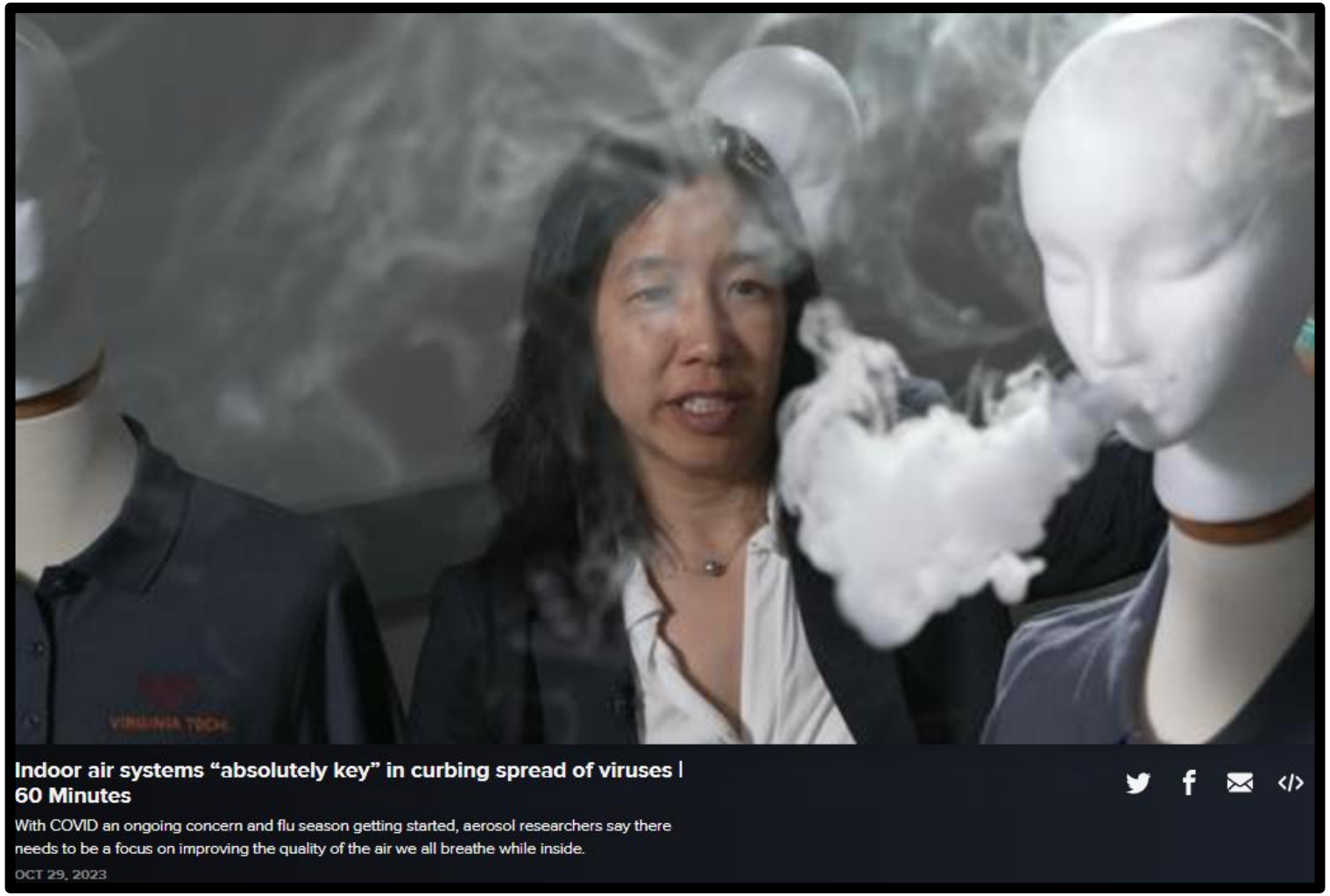
Airborne transmission



CBS NEWS 60 MINUTES

October 29, 2023

Reference

Indoor Aerosol Spread

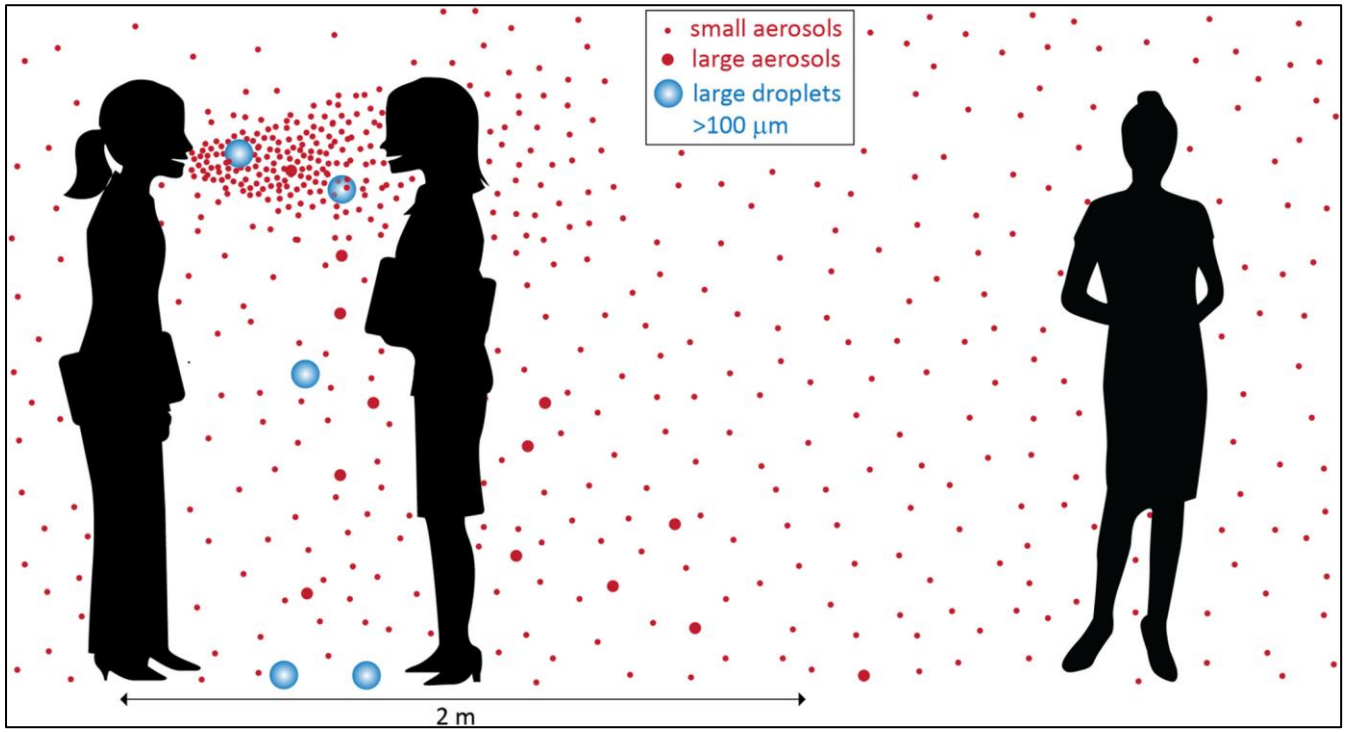


Illustration of droplets and aerosols released during talking; these may carry viruses if the person is infected. The large droplets fall rapidly to the ground in close proximity. The small aerosols are much more concentrated in close proximity, and they can remain floating in the air and spread throughout the room, leading to (reduced) exposure at a distance.
Adapted from Tang et al.

INDOOR AIR
International Journal of Indoor Environment and Health
REVIEW | Open Access

What were the historical reasons for the resistance to recognizing airborne transmission during the COVID-19 pandemic?

Jose L. Jimenez, Linsey C. Marr, Katherine Randall, Edward Thomas Ewing, Zeynep Tufekci, Trish Greenhalgh, Raymond Tellier, Julian W. Tang, Yuguo Li, Lidia Morawska, Jonathan Mesiano-Crookston, David Fisman, Orla Hegarty, Stephanie J. Dancer, Philomena M. Bluyssen, Giorgio Buonanno, Marcel G. L. C. Loomans, William P. Bahnfleth, Maosheng Yao, Chandra Sekhar, Pawel Wargocki, Arsen K. Melikov, Kimberly A. Prather

First published: 21 August 2022

Exposure is
maximal in close proximity.

Inside, there is (reduced) exposure further away.

As time goes by, exposure increases even if far from source.

References

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Lesson 3: Asymptomatic transmission

JAMA Network | Open™ January 7, 2021

SARS-CoV-2 Transmission From People Without COVID-19 Symptoms

MA Johansson, JC Butler et al.

- 59% of all SARS-CoV-2 infections result from asymptomatic transmission
  - 35% from presymptomatic individuals
  - 24% from individuals who never develop symptoms

References

Lesson 4: Many viruses, not just an acute infection

Both SARS-CoV-2 and non-COVID-19 ARIs are associated with a wide range of symptoms more than 4 weeks after the acute infection. Research on post-acute sequelae of ARIs should extend from SARS-CoV-2 to include other pathogens.

eClinicalMedicine
Part of THE LANCET *Discovery Science*

Long-term symptom profiles after COVID-19 *vs* other acute respiratory infections: an analysis of data from the COVIDENCE UK study

Giulia Vivaldi • Paul E. Pfeffer • Mohammad Talaei • Tariro Jayson Basera • Seif O. Shaheen • Adrian R. Martineau

Open Access • Published: October 06, 2023 • DOI: https://doi.org/10.1016/j.eclinm.2023.102251

nature medicine

Review Article | Published: 18 May 2022

Unexplained post-acute infection syndromes

Jan Choutka, Viraj Jansari, Mady Hornig & Akiko Iwasaki

References

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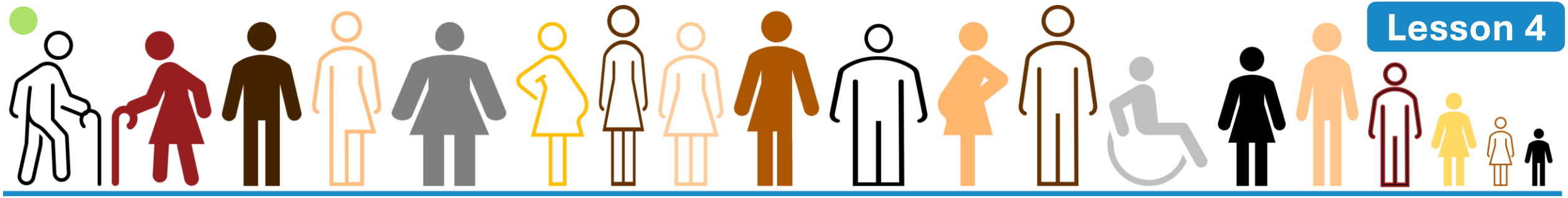

Long COVID...

- Can happen to anyone...
  - Including you!
- First infection...
  Or reinfections...

Every
SARS-CoV-2 infection
is a gamble!

@BerlinBuyers

https://twitter.com/BerlinBuyers/status/1716122803705946135

https://twitter.com/BerlinBuyers/status/1657024460812169228

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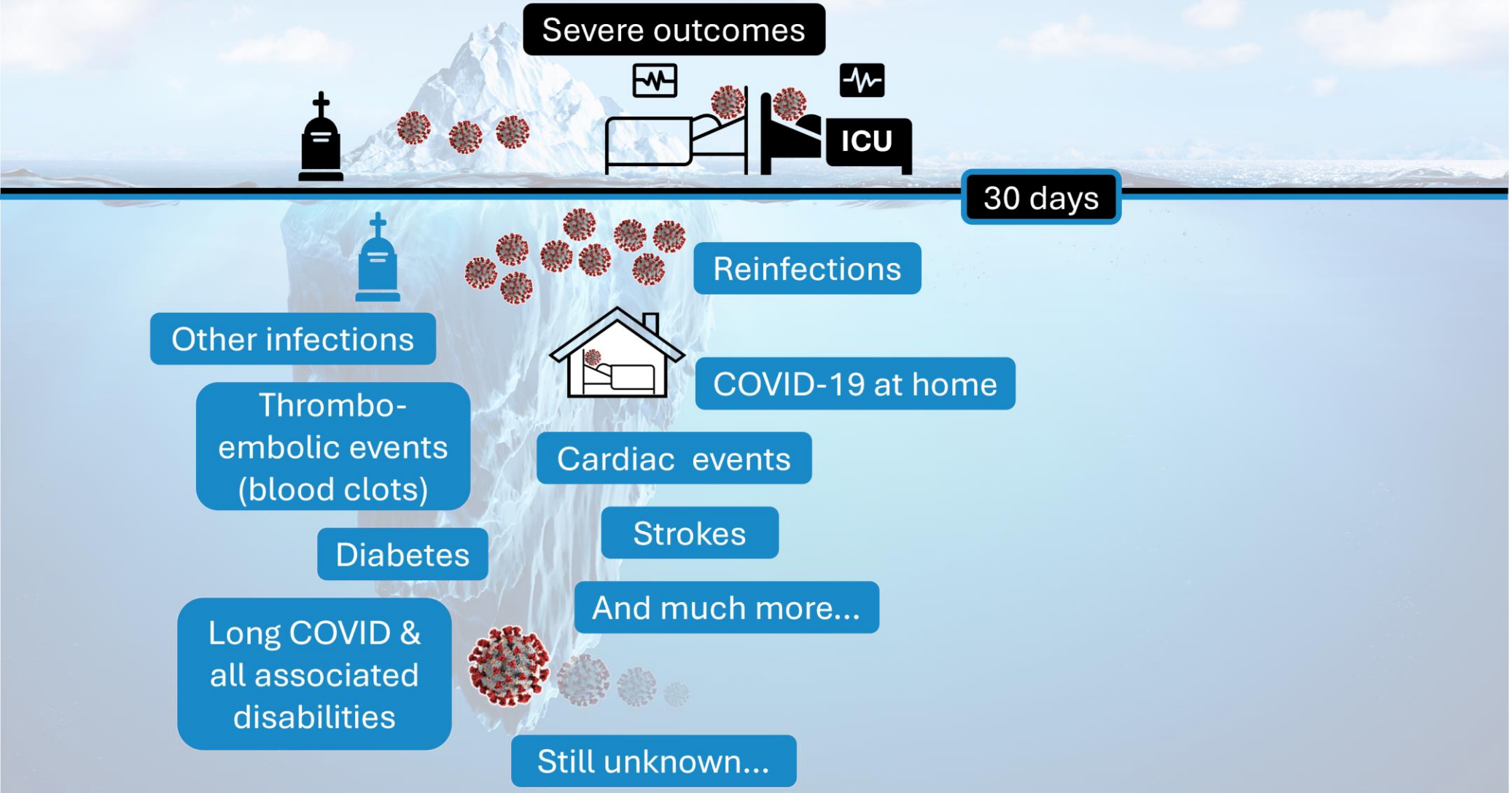
COVID-19… The “whole” iceberg!



Lesson 5: Collaboration

Lesson 5

- Population
- Engineers
- Occupational & Industrial hygiene
- Public Health specialists
- Communicators
- And many more…
- Infection Prevention & Control specialists
- Researchers
- Knowledge Mobilization specialists
- Behaviour specialists
- Policy makers
- Aerosol & Environmental Scientists
- Persons with lived experience
- Health Care professionals

LONG COVID WEB

Breaking Chains of Transmission

Means less SARS-CoV-2 infections for everyone!

Sharing viruses is not caring!

Symptoms → Stay home

If not possible:
Protect others by masking.*
Avold vulnerable people.

* Details on masking later in presentation.

Beware of asymptomatic transmission

No symptoms

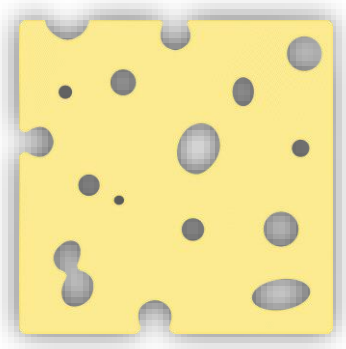
Doesn't mean

Not infected
nor
No transmission of infection

How does Symptom Screening work then?

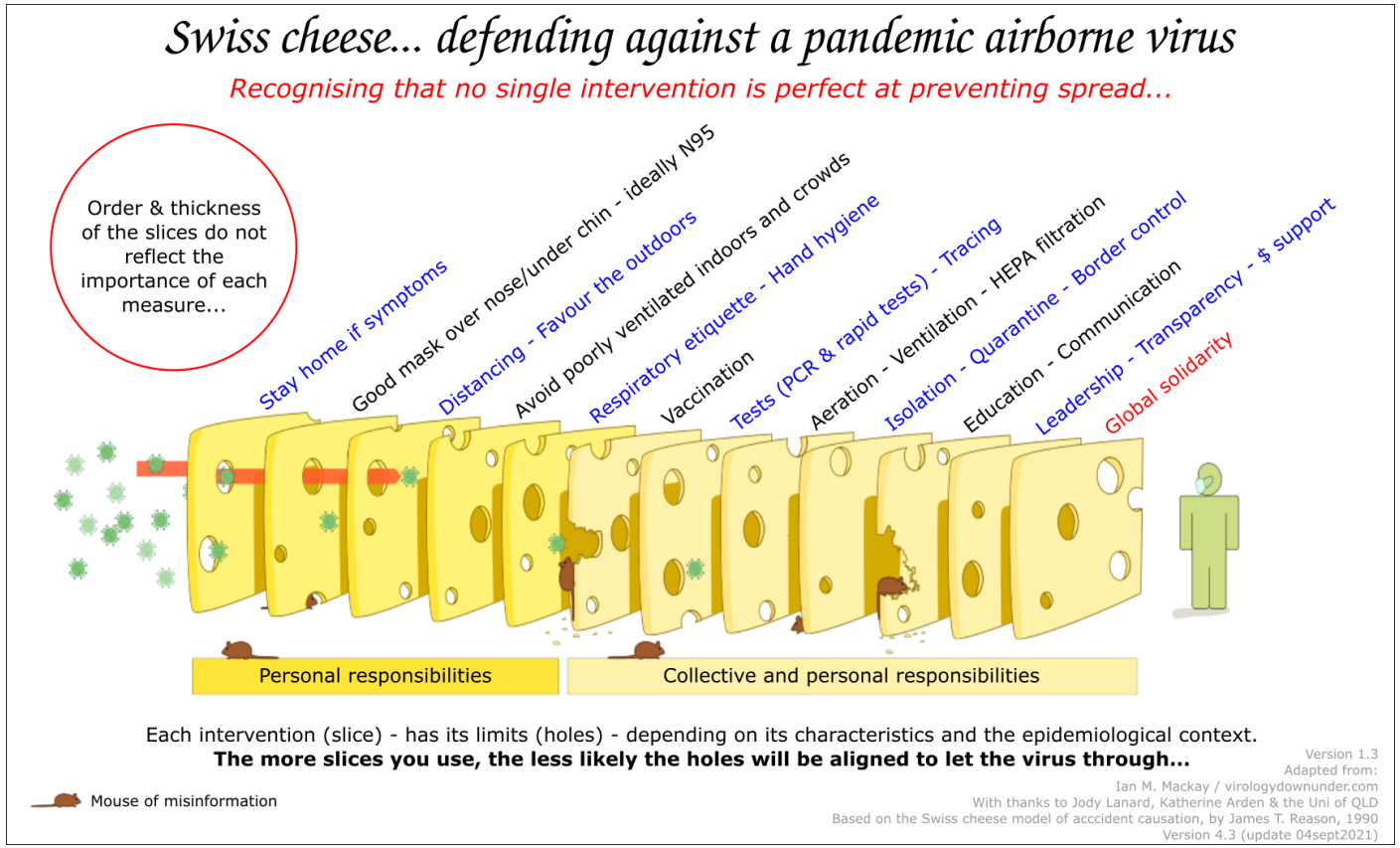
It's not enough!

Protection… A multi-layer toolbox!



One slice is not enough…

- Doesn’t mean elimination of risk for everyone.
  - Reducing risk is not 100%, but still useful.
  - Adapting to personal context of vulnerability.
    - Taking the whole picture into consideration!!!



Not all layers are addressed in this presentation.
Doesn’t mean testing and other layers are not still useful.
Bigger figure in references!

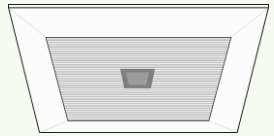
References

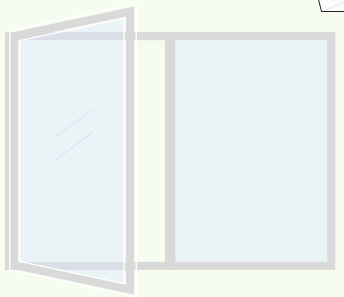
Choose the right target!

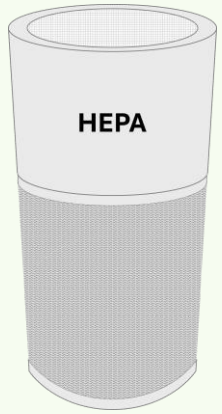
Droplets / Contact

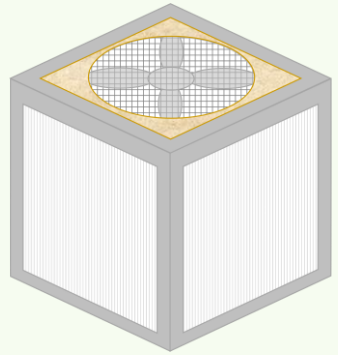
Droplets / Contact
BESIDE THE TARGET
for COVID-19

Aerosols

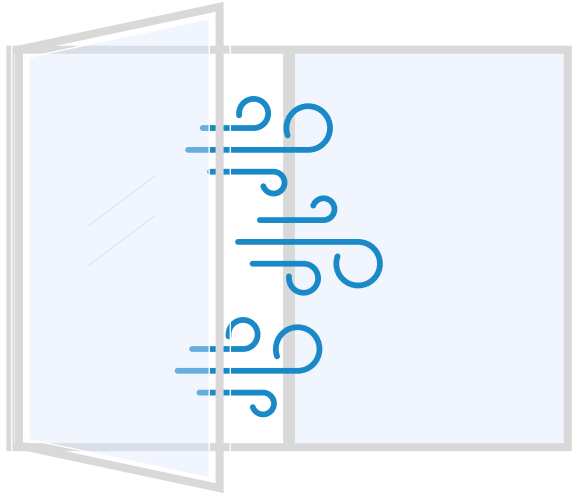




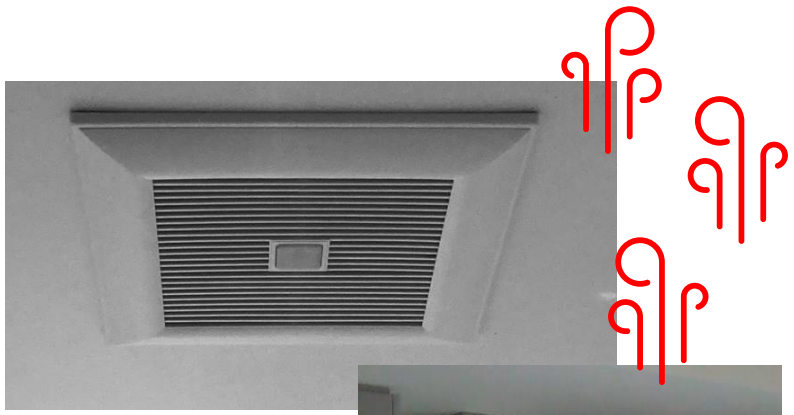




Ventilation



- Natural.
- Mechanical:
  - Optimize fresh air intake.
  - Verify the filtration capacity of the system.

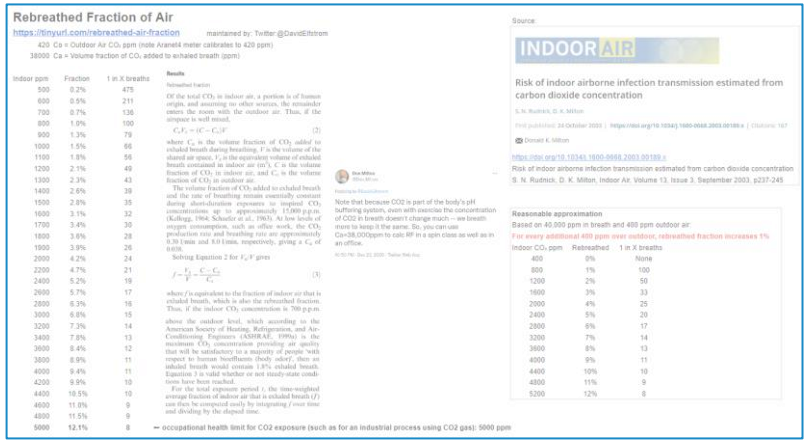


Fresh-air intake vent

Range hood: Copyrighted free use, via Wikimedia Commons
HVAC: P199, Public domain, via Wikimedia Commons

CO_2 monitoring

Rebreathed Fraction of Air
maintained by: Twitter:@DavidElfstrom



AIR-SCORE

nousaerons.fr

How good is the air renewal in this room?

A	**Excellent**	CO_2 level < 600 ppm
B	**Good**	600 ppm < CO_2 level < 800 ppm
C	**Medium**	800 ppm < CO_2 level < 1000 ppm
D	**Poor**	1000 ppm < CO_2 level < 1500 ppm
E	**Inadequate**	CO_2 level > 1500 ppm

Based on an outside CO_2 reference of 410 ppm.

Interpretation is different when air filtration is added…

- An easy proxy measure:
  - Rebreathing air → Breathing other people's aerosols!

References

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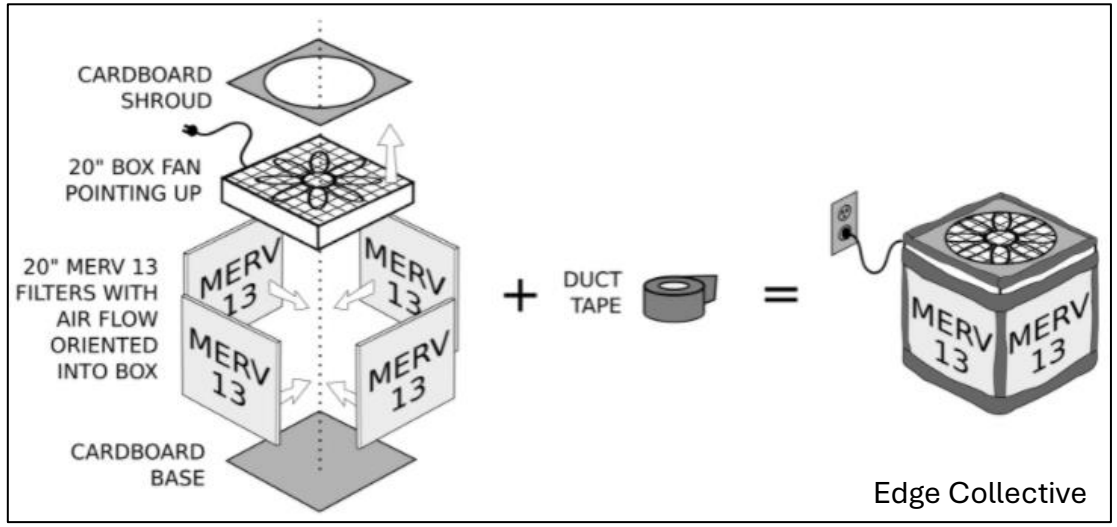
Filtration *

No discrimination!
Viruses…
Smoke…
Air pollution…

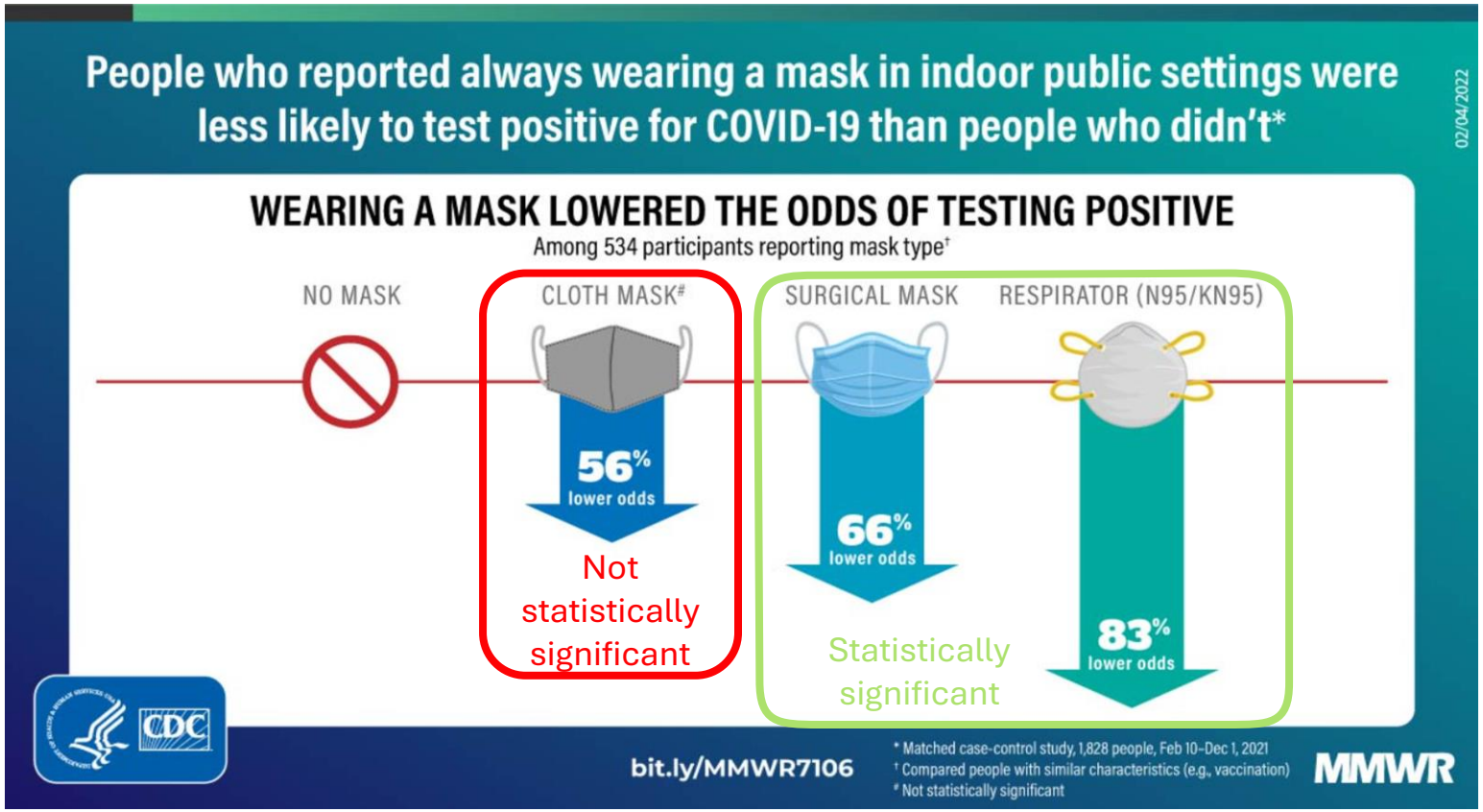
- HEPA air purifiers.
- DIY air purifiers:
  - Corsi-Rosenthal boxes.



* CO_2 is not cleared by HEPA / MERV 13 filtration.
Filtration changes interpretation of CO_2 levels in risk assessment.

References

Personal air filtration



References

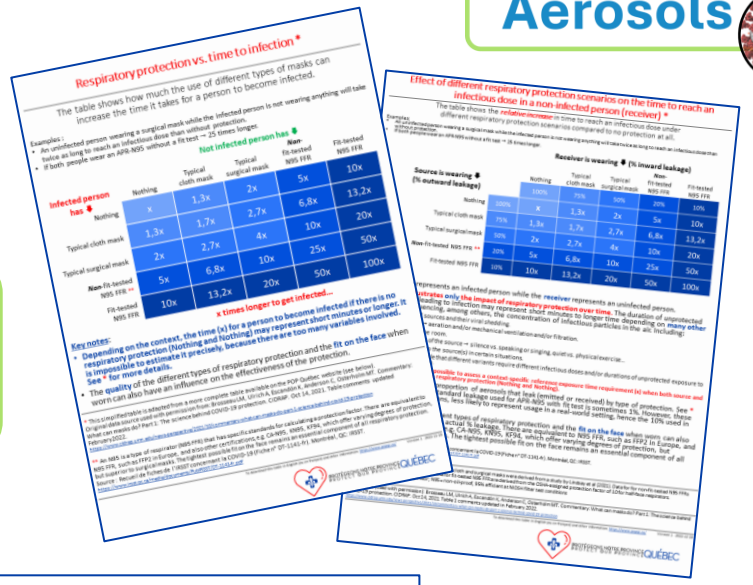
Aerosols

Personal air filtration

Better masking
2-way masking

→

Longer protection from infection



Always, for everyone?

Be informed. Evaluate risk. Decide.

Lead by example…

Not infected person has ⬇

Infected person has ⬇		Nothing	Typical cloth mask	Typical surgical mask	*Non*-fit-tested N95 FFR	Fit-tested N95 FFR
	100%	x	1,3x	2x	5x	10x
Nothing	100%	x	1,3x	2x	5x	10x
Typical cloth mask	75%	1,3x	1,7x	2,7x	6,8x	13,2x
Typical surgical mask	50%	2x	2,7x	4x	10x	20x
Non-fit-tested N95 FFR **	20%	5x	6,8x	10x	25x	50x
Fit-tested N95 FFR	10%	10x	13,2x	20x	50x	100x

x times longer to get infected…

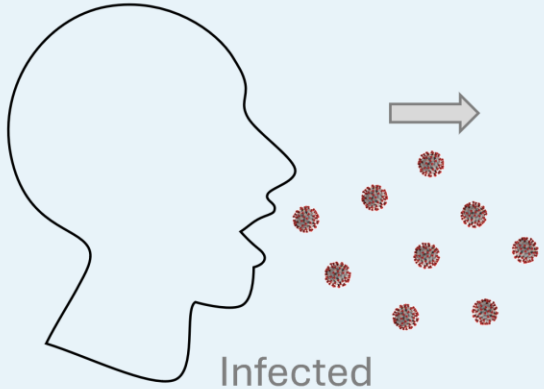
Simplified & detailed versions with explanations.

References

LONG COVID WEB

Hierarchy of Controls

Source



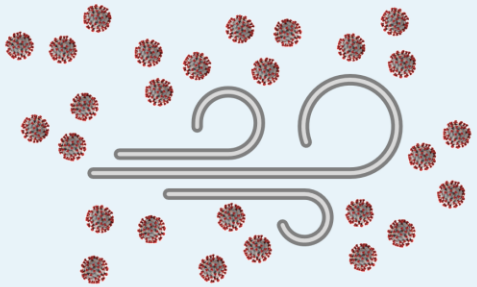
Decrease concentration

- Eliminate sources (testing)
- Limit number of sources
- Use source control (preferably respirators)
- Enclose (isolate) the source

Minimize time

- Limit time source spends in space

Pathway

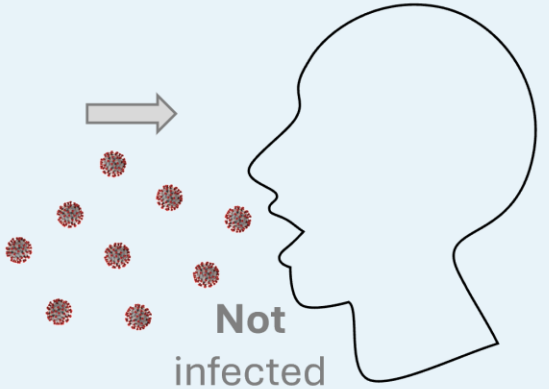


Decrease concentration

- Increase building ventilation & clean recirculated air
- Use local exhaust ventilation to collect particules (e.g., portable air cleaners)
- Prevent air movement from source to receptors (e.g., negative pressure)

Lower airflow means longer time to clear particules from a space

Receptor



Decrease concentration

- Use respiratory protection to lower inhaled concentration
- Enclose receptor to exclude infectious particules

Consider exposure time

- Need higher levels of respiratory protection for higher concentrations or longer time spent in shared space

Adapted with permission from Lisa Brosseau, ScD, CIH. World Health Network – Clean Indoor Air Expo, Oct. 24, 2023.

Clean Indoor Air Revolution

- Ventilation:
  - Natural.
  - Mechanical.
- Filtration:
  - Merv 13
  - HEPA air purifiers.
  - Corsi-Rosenthal boxes.
- Indoor air quality monitoring:
  - CO_2 monitors.

References

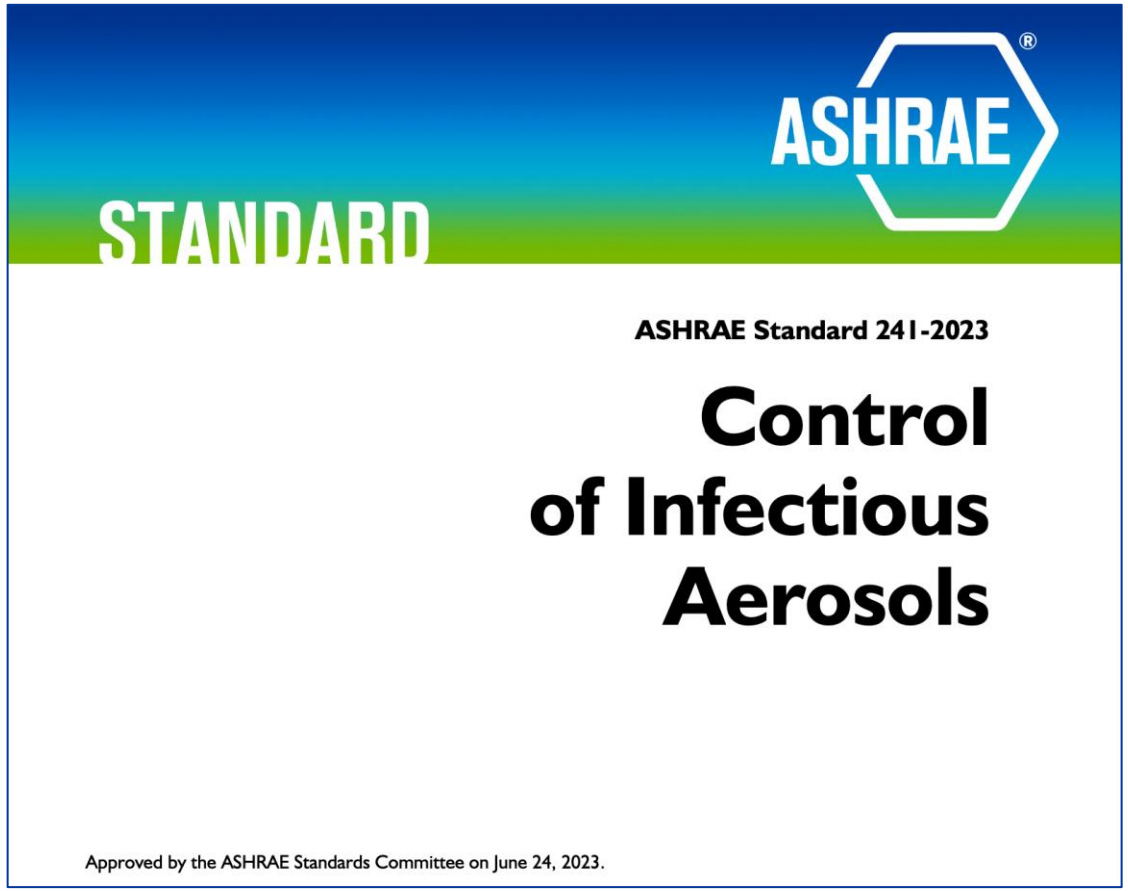
Air Quality Standards

ASHRAE's statement on airborne transmission of SARS-CoV-2/COVID-19

Transmission of SARS-CoV-2 through the air is sufficiently likely that airborne exposure to the virus should be controlled. Changes to building operations, including the operation of heating, ventilating, and air-conditioning systems, can reduce airborne exposures.

April 20, 2020

ASHRAE Created an Epidemic Task Force



References

Standards, Policies, Codes & Legislation

Belgium Clean Air Law: A Law to Improve Indoor Air Quality in Enclosed Spaces Open to the Public

This is an auto-translation of the original law in French and Dutch.

01.12.2022 – Moniteur Beige

LAWS, DECREES, ORDINANCES AND REGULATIONS

FEDERAL PUBLIC SERVICE PUBLIC HEALTH, SAFETY OF THE FOOD CHAIN AND ENVIRONMENT

6 NOVEMBER 2022. – A Law to Improve Indoor Air Quality in Enclosed Spaces Open to the Public

PHILIP, King of the Beiges,
To all, present and future, Greetings.
The House of Representatives has adopted and we sanction the following:

Reference

LONG COVID WEB

Going Upstream to Get to a Better Place

Resilience... Adaptation...

We've learned last summer of the need to evaluate the Air Quality Index before planning outdoor activities...*

* Picture: Smog in Québec, Nicolas Ouellette, CC BY-SA 3.0, via Wikimedia Commons

What is your area's COVID-19 forecast?

COVID-19 Resources Canada

Canadian COVID Forecast Nov 4 - 17, 2023

CANADA

SEVERE: 19.4 *(no change)*

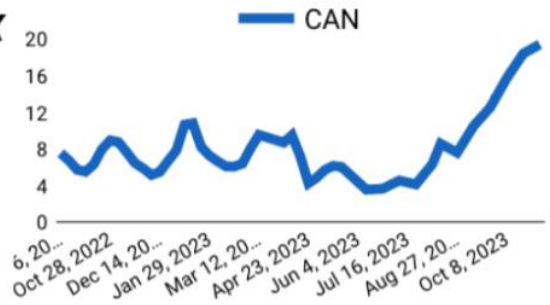
About 1 of every 23 people is infected

~1,154,000 - 1,594,000 infections this week

COVID INDEX SCORE

What the numbers mean:
Low <1, Moderate 1-2, Elevated 2-4, High 4-6, Very high 6-8, Severe >8

COMPARED TO LOWEST POINT IN COVID PANDEMIC IN CANADA



How much higher are key indicators compared to the lowest point in the COVID pandemic in Canada?

Waste water, infections	SEVERE	*23.1X higher*
Long COVID estimate	SEVERE	*15.0X higher*
Hospitalizations, ICU	SEVERE	*11.4X higher*
Deaths	SEVERE	*23.9X higher*

HOW TO HELP

EVERYONE:

-**UPDATE** vaccines
-**WEAR** N95-type masks
-**AVOID** indoor social gatherings
-**AVOID** crowded non-essential places

If you ARE HIGH RISK:

ALSO AVOID outdoor social gatherings

Who is HIGH RISK?

-People 60 and older, babies <1 year, pregnant
*-**ALL AGES**: immunecompromised **OR** medically at-risk **OR** no vaccine or infection last 6 months*

Recommendations are based on the COVID-19 Risk Index from the Peterborough ON Public Health Unit.

COVID-19 Resources Canada

COVID-19 Resources Canada is a grassroots organization of volunteer scientists supporting Canadian COVID responses. Sources, data and methods for the COVID Index are available at www.covid19resources.ca

Reference

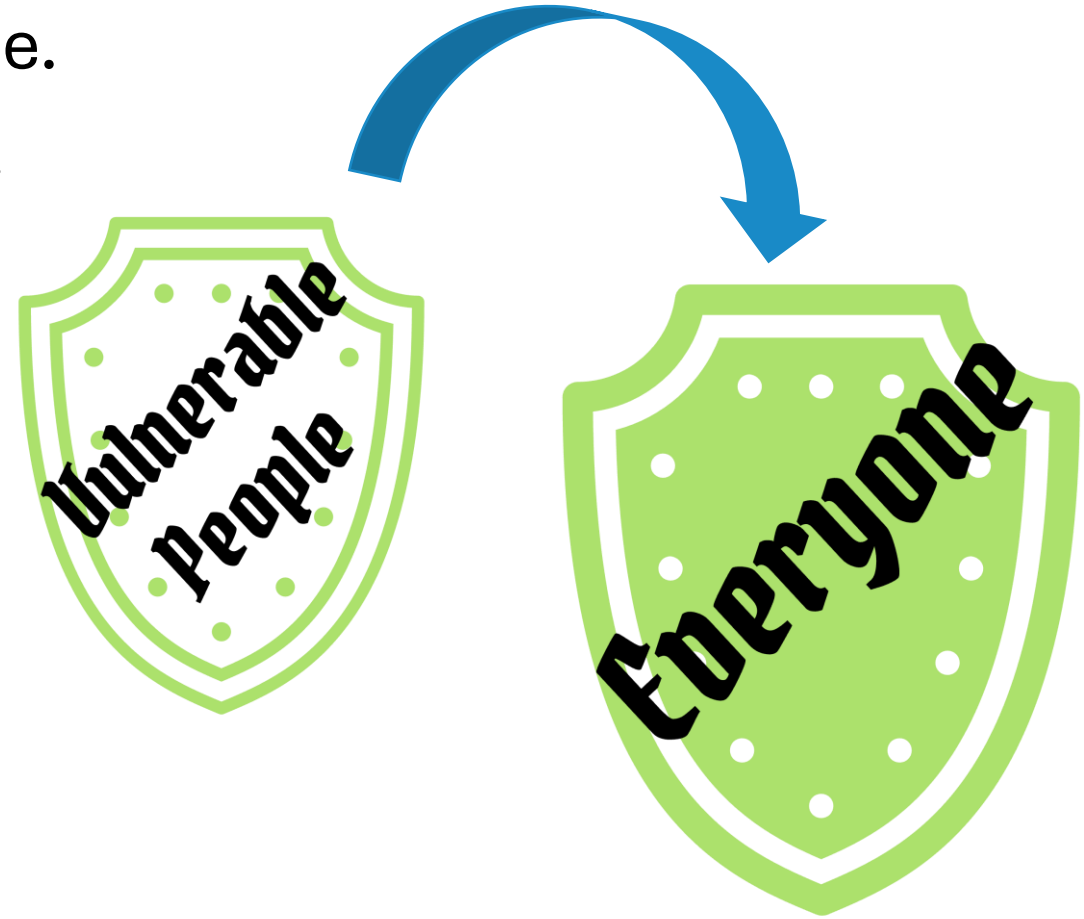
LONG COVID WEB

Long COVID: Going Upstream

A Parabole

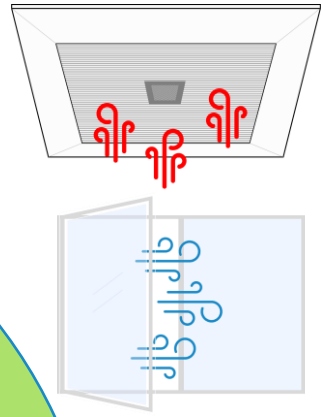
Public Health

- **Promotion** of health and wellbeing at the population level.
- **Prevention** of disease.
- **Protection** of health.



Bottom line...

Make an informed decision
Use appropriate tools

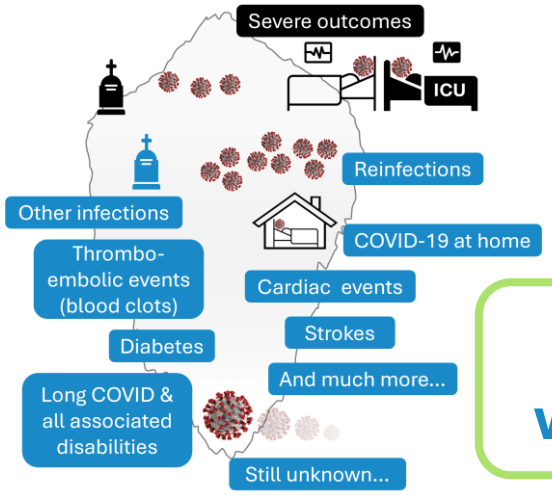


Protect yourself
Protect others
Protect pwLC*

* person with Long COVID

Lead by example

Consider the whole iceberg...



Evaluate the situation & context

We Can Do It! - J. Howard Miller, 1942, from National Museum of American History

LONG COVID WEB

“A Canada without post COVID-19 condition”

- Long COVID’s Web vision!
  - Find a cure… YES!
  - But, less infections means:
    - Less consequences of COVID-19.
    - Less Long COVID!

Transmission CAN be mitigated!

- Members of LCW can lead by example!

LONG COVID WEB

References

All references used in slides... and more!

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    - https://whn.global/airborne-transmission-and-infection-prevention/
      - Jose-Luis Jimenez, PhD – Overview of Airborne transmission – 8 minutes.
      - Lisa Brosseau, ScD, CIH – Aerosol-transmissible diseases – What's your risk and how to minimize it (Control banding as a method for identifying the level of risk) – 13 minutes.
- COVID-19 Resources

Reference – Pandemic data

- Our World in Data : https://ourworldindata.org/
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- McGill University – Beatty Lecture
- Indoor air systems “absolutely key” in curbing spread of viruses | 60 Minutes, CBS News. October 29, 2023:
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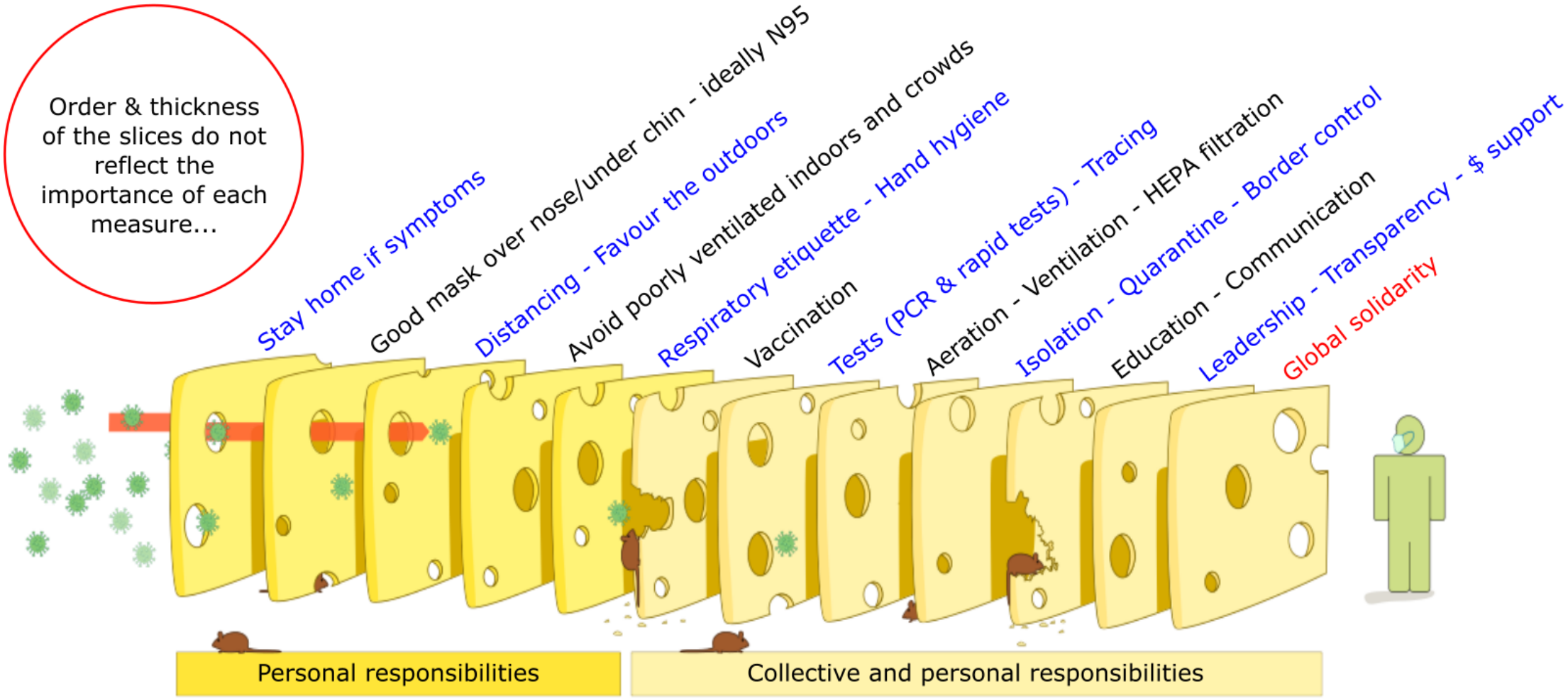
Swiss cheese... defending against a pandemic airborne virus

Recognising that no single intervention is perfect at preventing spread...

Order & thickness of the slices do not reflect the importance of each measure...



Each intervention (slice) - has its limits (holes) - depending on its characteristics and the epidemiological context.

The more slices you use, the less likely the holes will be aligned to let the virus through...

Mouse of misinformation

Version 1.3
Adapted from:
Ian M. Mackay / virologydownunder.com
With thanks to Jody Lanard, Katherine Arden & the Uni of QLD
Based on the Swiss cheese model of acccident causation, by James T. Reason, 1990
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- Rebreathed Fraction of Air:
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- It's Airborne – Joey Fox:
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References – Filtration

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      - https://cleanaircrew.org/ufaq/how-was-the-optimum-shroud-developed-by-david-elfstrom/
      - (https://twitter.com/DavidElfstrom/status/1457390753550843908)
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Mieux comprendre… Pour mieux agir!
Better understanding… for better action!

Monument aux pêcheurs (Roger Langevin, 1990), Étang-du-Nord, Îles-de-la-Madeleine - Personal album, 2007.

Merci!

LONG COVID WEB