

# CLAIRE

## Congres 2024

5 Juni

Luchtkwaliteit & infectiepreventie  
Prof. dr. ir. Atze Boerstra

CLAIRE congress, 5 juni 2024

# *Luchtkwaliteit & infectiepreventie*

prof. dr. ir. Atze Boerstra

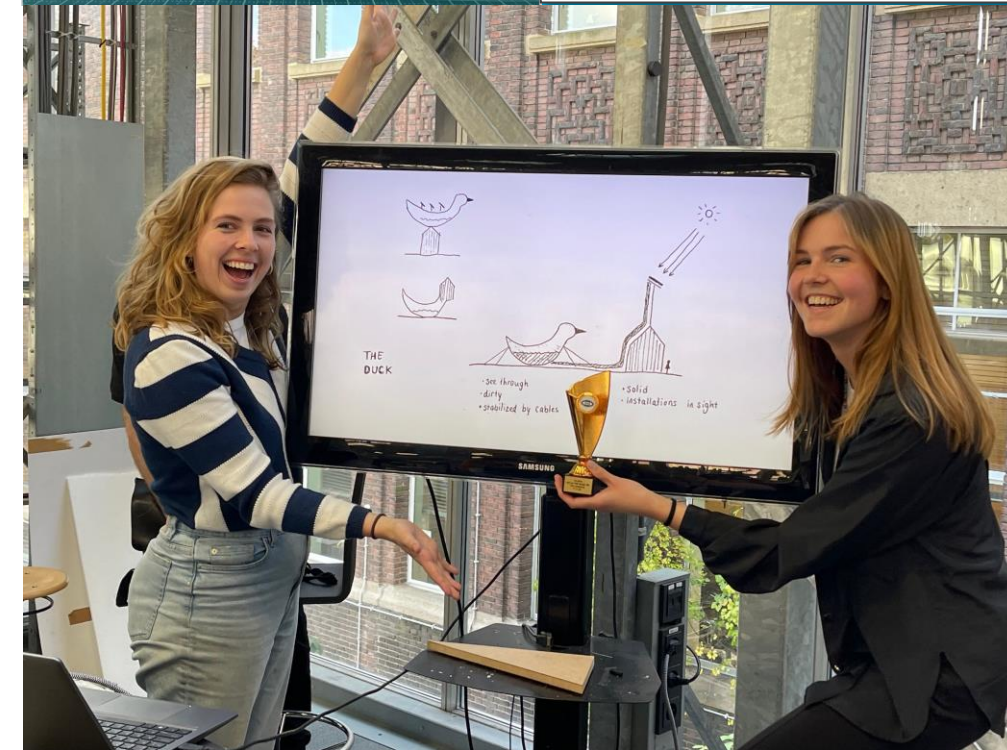
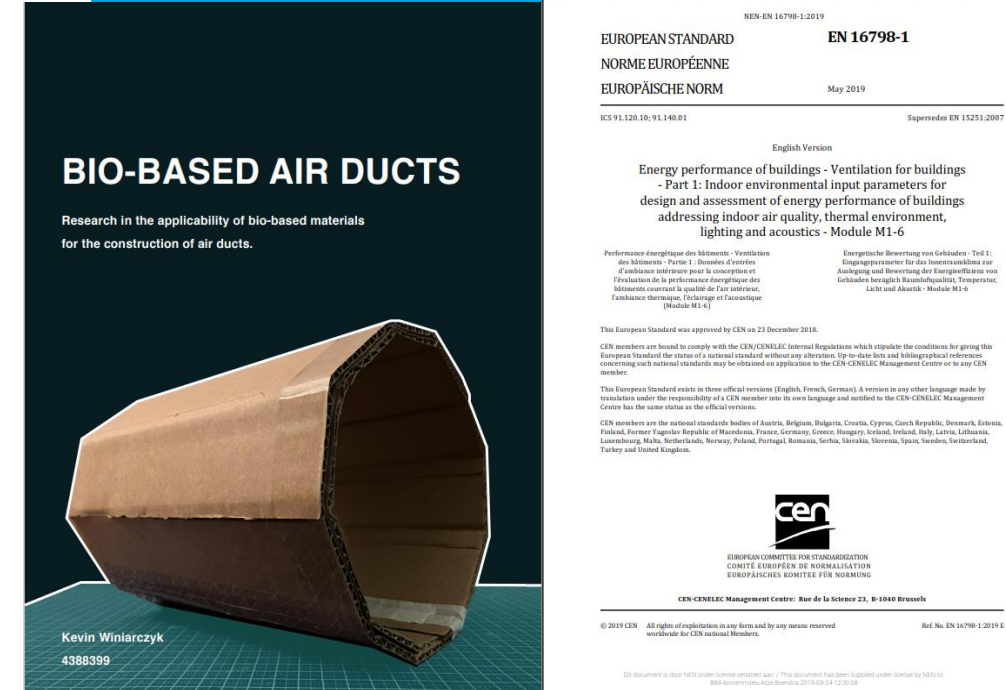
Chair Building Services Innovation

Faculty of Architecture and  
the Built Environment, TU Delft

# Mijn focus gebieden @ TU Delft

Onderwijs en onderzoek t.a.v.:

- HVAC systeem ontwerp
- Historische installaties voor koeling, verwarming en ventilatie
- Circulaire gebouwinstallaties
- (Adaptief) thermisch comfort
- Natuurlijke, mechanische en hybride ventilatie
- Normen en richtlijnen (binnenklimaat, installaties)
- **Ventilatie, luchtreiniging & luchtweginfecties**



# Binnenmilieu-advisering en infectiepreventie ('1<sup>e</sup> keer')

Healing hospital Erasmus MC, Rotterdam, levendige discussies over:

- Ventilatie-Eisen
- Locatie buitenluchtaanzuig
- Monitoring binnenluchtkwaliteit
- Schoonmaakbaarheid ventilatiesysteem
- Wel-geen recirculatie toepassen
- Idem warmtewielen
- .....



# Voorbeelden van infectieziekten die o.a. via de lucht overgedragen worden

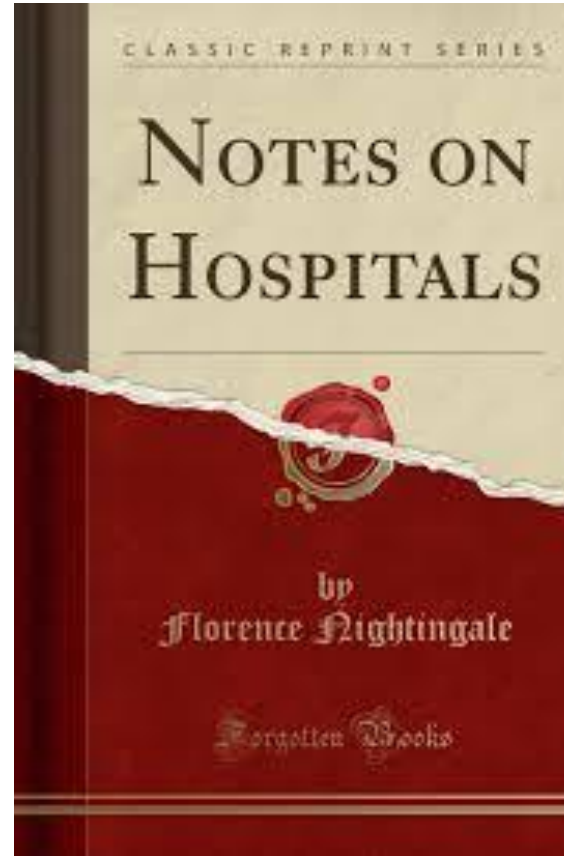
- COVID (SARS-CoV-1 & -2)
- Tuberculose
- Mazelen
- Waterpokken
- Influenza (bv. Spaanse Griep)
- .....



US Public Health Service, oktober 1918: *'Influenza is always spread from person to person, the germs being carried with the air along with very small droplets of mucus, expelled by coughing or sneezing, forcefull talking by someone who already has the germs of the disease. We advice to wear masks, to get fresh air and to avoid crowded spaces.'*

Quote (rechts) is van Randall et al, 2021,  
<https://doi.org/10.1098/rsfs.2021.0049>

# Inzicht infectieziekte-overdacht Florence Nightingale



## **Environmental theory:**

*'There are five essential points in securing the health of buildings:*

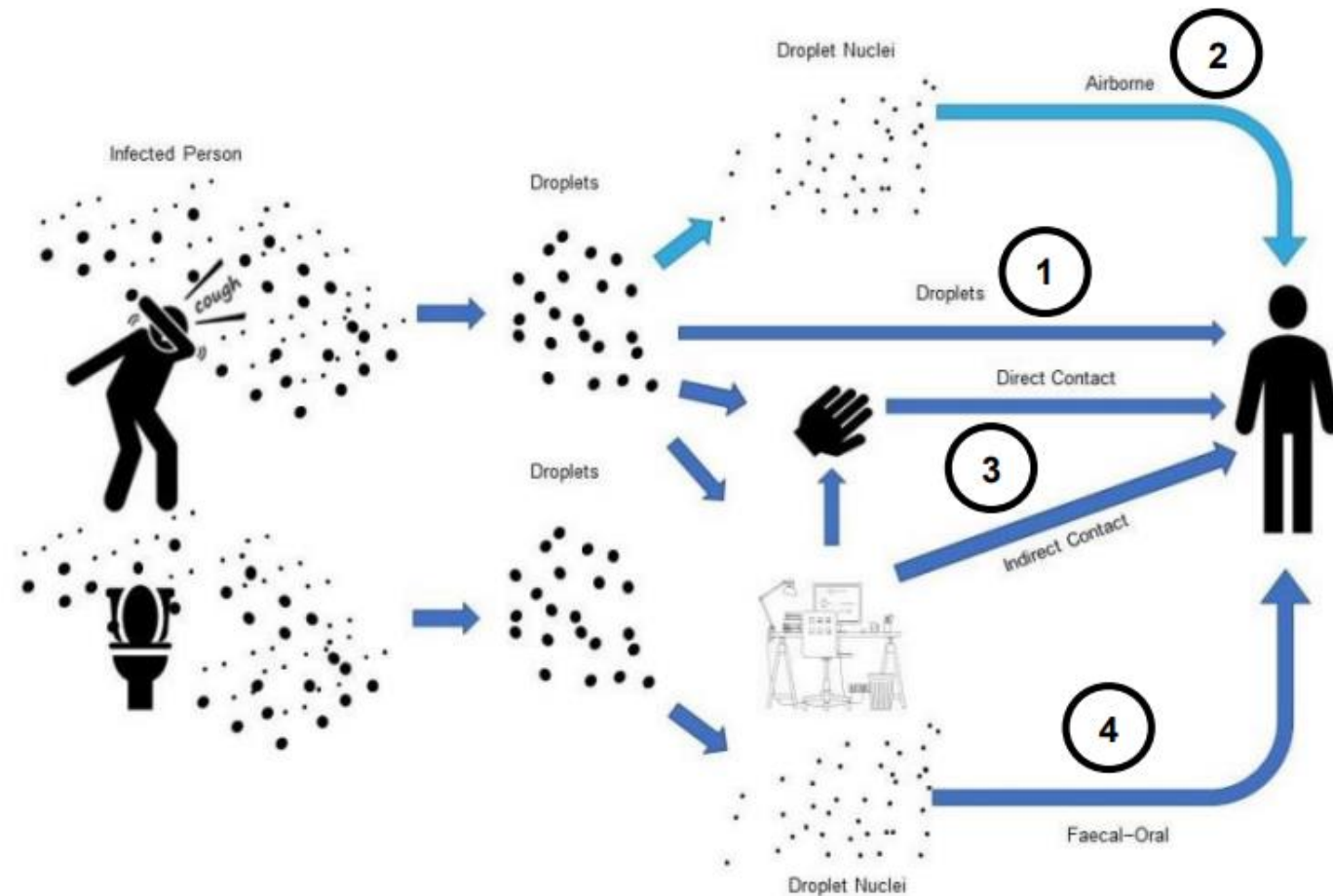
- **Pure air**
- *Pure water*
- *Efficient drainage*
- *Cleanliness*
- *(Sun) light.*

*Without these, no building can be healthy.'*

Source: Nightingale, 1859

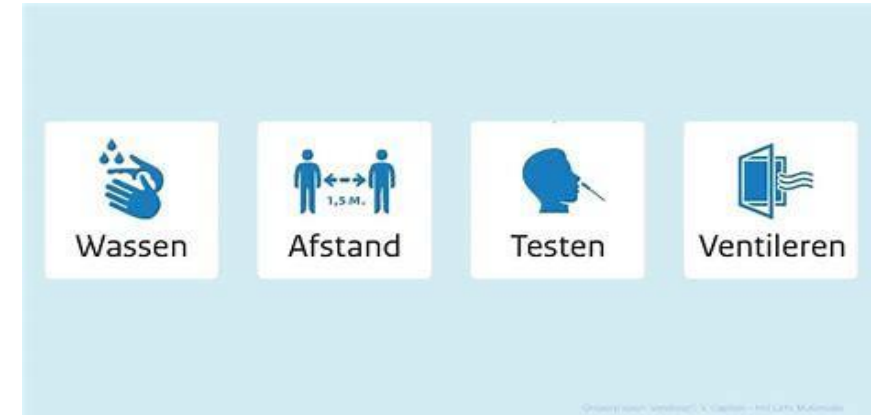
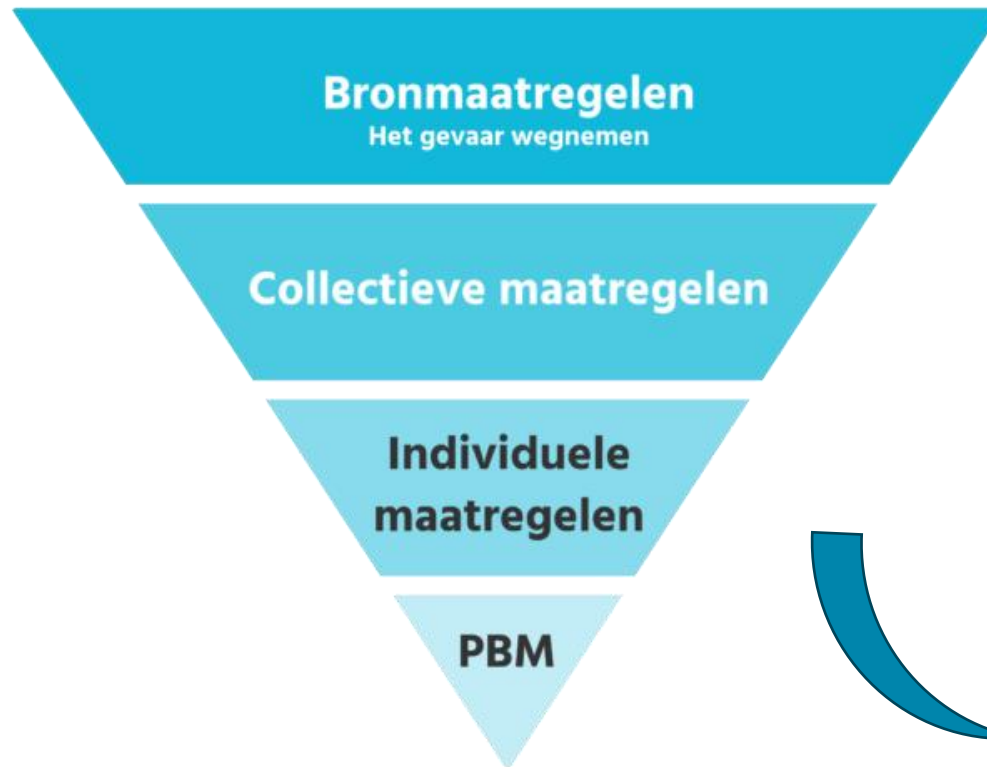


# Virus-infectieroutes (ingenieurs/arbo-perspectief)





# Arbeidshygiënische strategie & maatregelen infectiepreventie



# Relatie ziekteverzuim en ventilatie (pre-covid)

Milton, Glencross & Walters, 2000; University of Maryland, School of Public Health:

*'We found a **consistent association** of increased sick leave with lower levels of outdoor air supply (comparison group of office workers with 24 l/s per person vs 12 l/s per person)*

*'The apparent **reduction in sick leave rates** associated with increased ventilation (35%) is similar to the reduction in sick leave observed during the flu season with influenza vaccination of a healthy working population (36-43%).'*

## Risk of Sick Leave Associated with Outdoor Air Supply Rate, Humidification, and Occupant Complaints

DONALD K. MILTON<sup>1\*</sup>, P. MARK GLENCROSS<sup>1,2</sup> AND MICHAEL D. WALTERS<sup>2</sup>

**Abstract** We analyzed 1994 sick leave for 3,720 hourly employees of a large Massachusetts manufacturer, in 40 buildings with 115 independently ventilated work areas. Corporate records identified building characteristics and IEQ complaints. We rated ventilation as moderate ( $\approx 25$  cfm/person,  $12 \text{ l s}^{-1}$ ) or high ( $\approx 50$  cfm/person,  $24 \text{ l s}^{-1}$ ) outdoor air supply based on knowledge of ventilation systems and  $\text{CO}_2$  measurements on a subset of work areas, and used Poisson regression to analyze sick leave controlled for age, gender, seniority, hours of non-illness absence, shift, ethnicity, crowding, and type of job (office, technical, or manufacturing worker). We found consistent associations of increased sick leave with lower levels of outdoor air supply and IEQ complaints. Among office workers, the relative risk for short-term sick leave was 1.53 (95% confidence 1.22–1.92) with lower ventilation, and 1.52 (1.18–1.97) in areas with IEQ complaints. The effect of ventilation was independent of IEQ complaints and among those exposed to lower outdoor air supply rates the attributable risk of short-term sick leave was 35%. The cost of sick leave attributable to ventilation at current recommended rates was estimated as \$480 per employee per year at Polaroid. These findings suggest that net savings of \$400 per employee per year

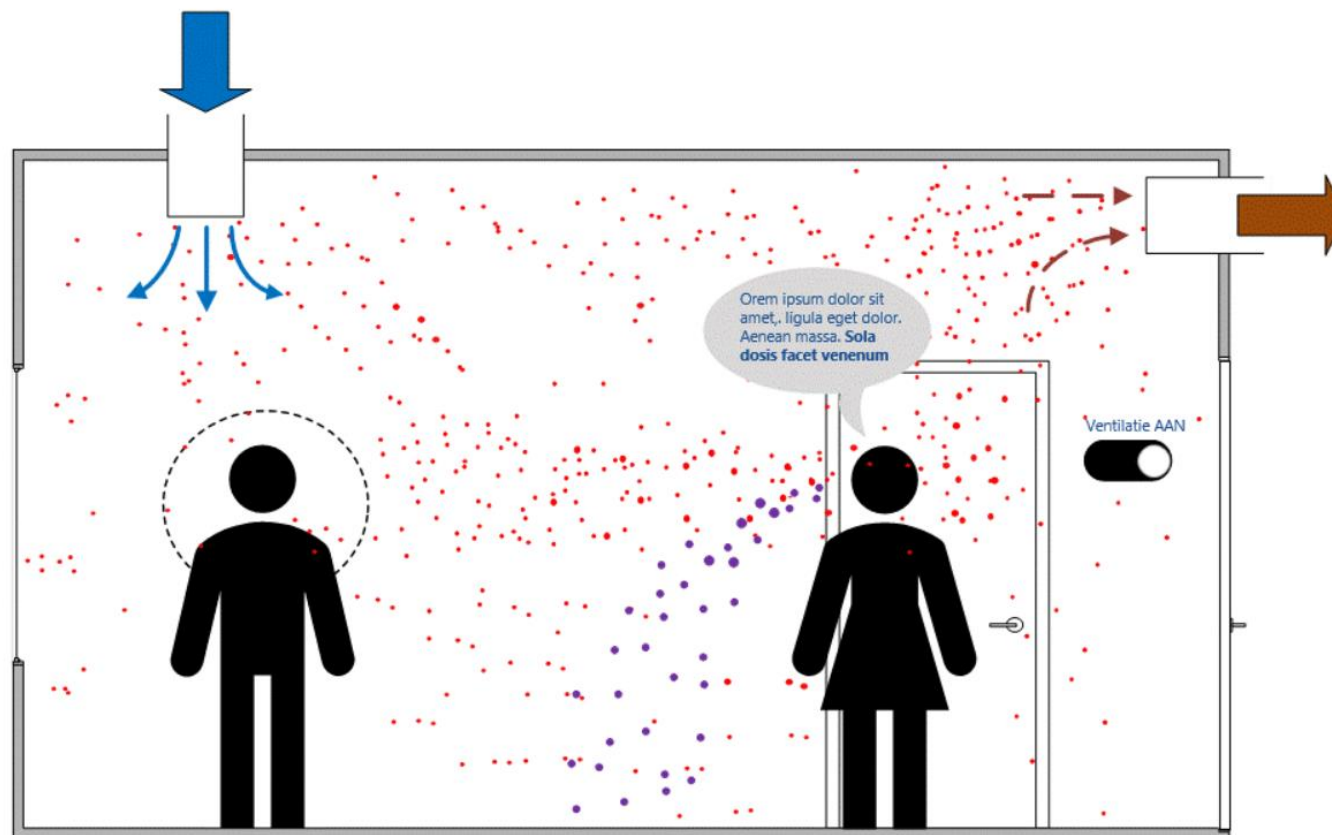
of ventilation rates compared [moderate with approximately 12, and high with approximately 24 l/s-person] are at the upper end of rates seen in these facilities. That indicates that benefits continue to accrue when ventilation is increased above 10 l/s-person, and that experimental studies to validate and to determine mechanisms for these observational findings should be a priority for indoor air research.

Received for review 28 October 1999. Accepted for publication 5 January 2000.  
© Indoor Air (2000)

### Introduction

Studies of indoor environmental quality and health generally concentrate on the relationship of building environments either to common symptoms or to asthma and rare illnesses such as hypersensitivity pneumonitis. Non-specific building related symptoms (BRS) have been associated with a variety of building

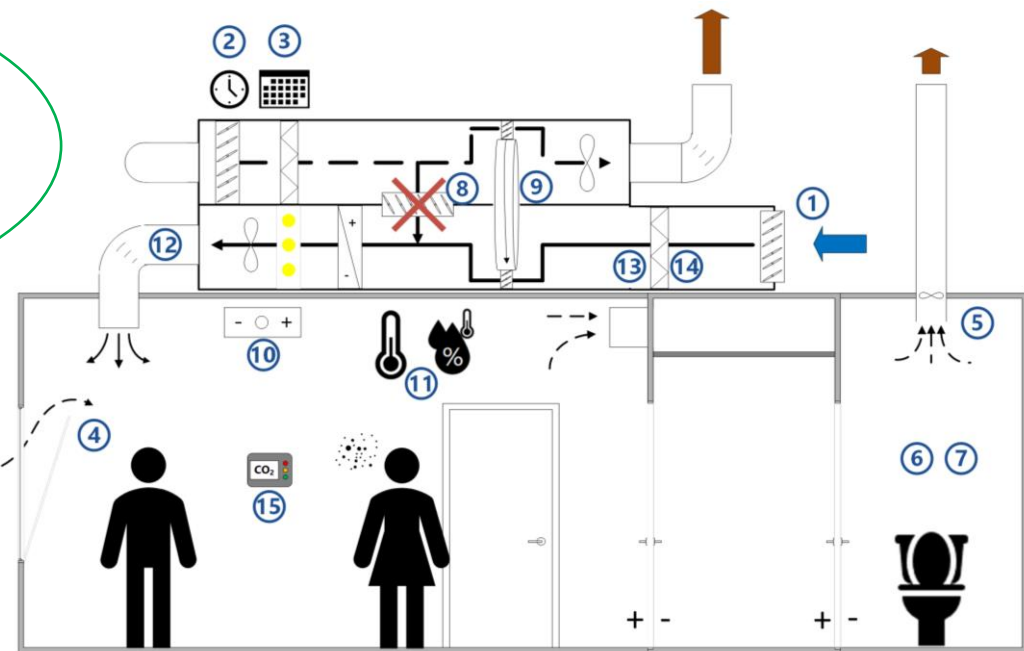
# Ventileren = verdunnen = verlagen blootstelling



# Ventileren oplossing voor alles?

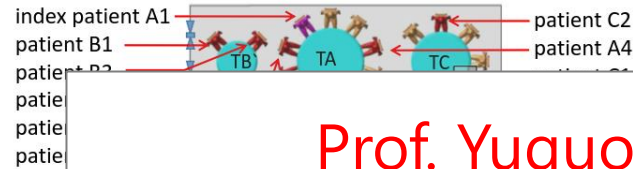
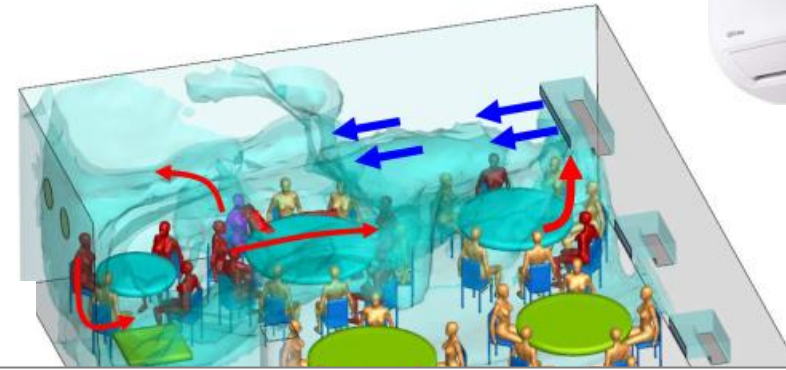
**NEE**, adequate ventilatie (in sommige gevallen gecombineerd met aanvullende luchtreinigingstechnieken) is deel van de oplossing, maar e.e.a. zal **ALTIJD** onderdeel moeten zijn van een totaalpakket aan maatregelen

1. Ventilation rates
2. Ventilation operation times
3. Overrule of demand control settings
4. Window opening
5. Toilet ventilation
6. Windows in toilets
7. Flushing toilets
8. Recirculation
9. Heat recovery equipment
10. Fan coils and split units (decentral recirculation)
11. Heating, cooling and possible humidification setpoints
12. Duct cleaning
13. Outdoor air and extract air filters
14. Maintenance works
15. IAQ monitoring

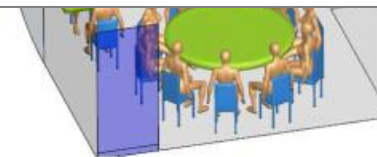
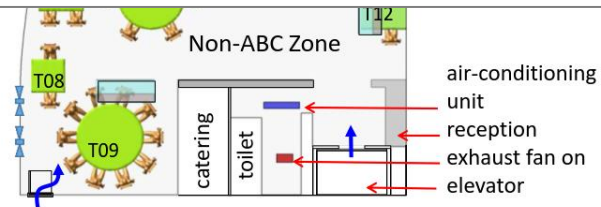


# Intermezzo: Guangzhou restaurant study

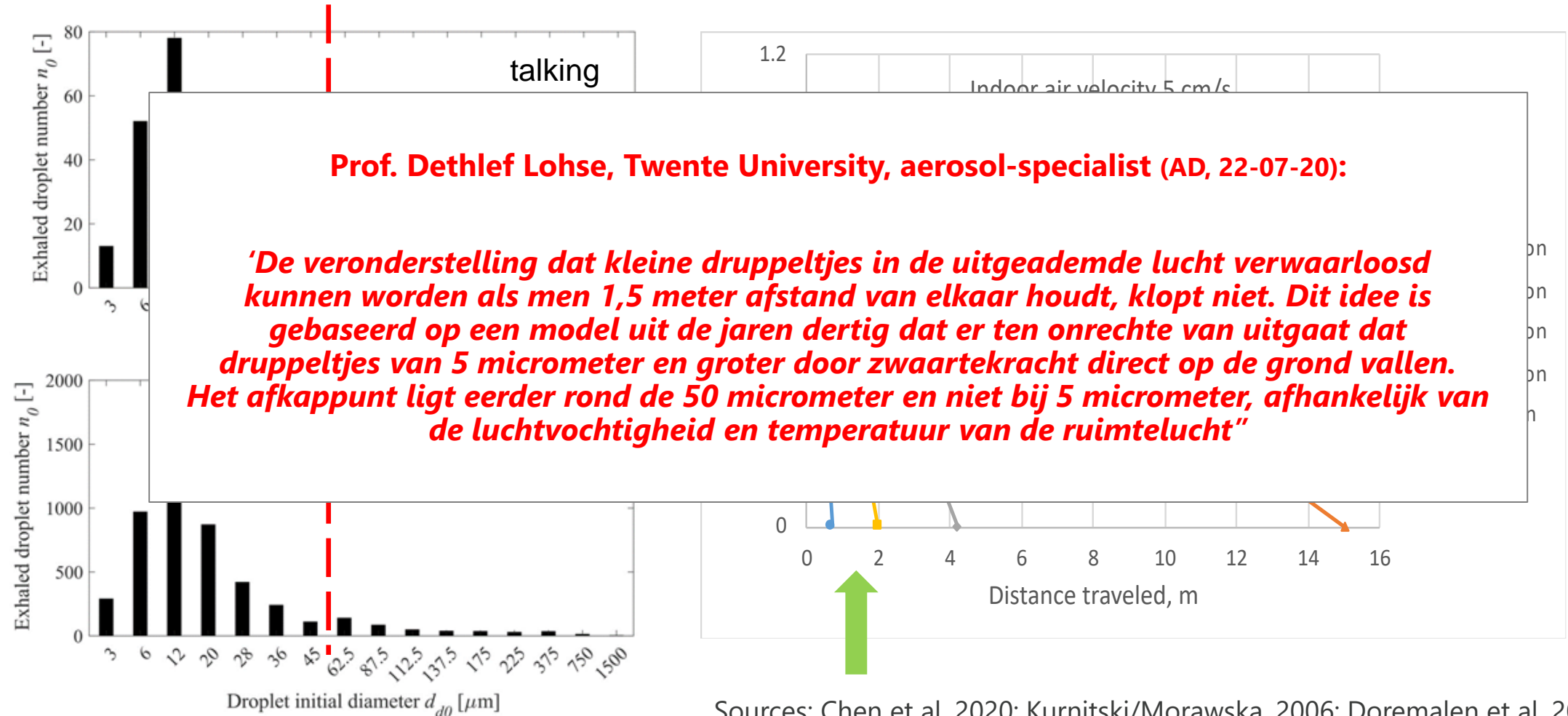
*'Worst cited study in the history of mankind*



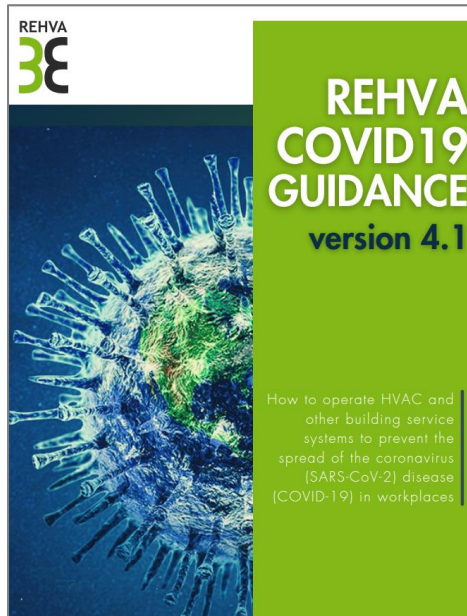
Prof. Yuguo Li, Hongkong University:  
*'Core problem here was that main ventilation system was off due to extreme cold weather; because of that very limited fresh air supply, around 1 l/s pp'*



# Hoe zit het met grote druppels vs. aerosolen en die 1,5 m?



# Samenvatting van mijn ervaringen jan. '20 – juli '21



SCIENCE sciencemag.org

**POLICY FORUM**

**OVERLINE**

## A paradigm shift to combat indoor respiratory infection

Building ventilation systems must get much better

By Lidia Morawska, Joseph Allen, William Bahnfleth, Philomena M. Bluyssen, Atze Boerstra, Giorgio Buonanno, Junji Cao, Stephanie J. Dancer, Andres Floto, Francesco Franchimon, Trisha Greenhalgh, Charles Haworth, Jaap Hogeling, Christina Isaxon, Jose L. Jimenez, Jarek Kurnitski, Yuguo Li, Marcel Loomans, Guy Marks, Linsey C. Marr, Livio Mazzarella, Arsen Krikor Melikov, Shelly Miller, Donald K. Milton, William Nazaroff, Peter V. Nielsen, Catherine Noakes, Jordan Peccia, Kim Prather, Xavier Querol, Chandra Sekhar, Olli Seppänen, Shin-ichi Tanabe, Julian W. Tang, Raymond Tellier, Kwok Wai Tham, Pawel Wargocki, Aneta Wierzbicka, Maosheng Yao

There is great disparity in the way we think about and address different sources of environmental infection. Governments have for decades promulgated a large amount of legislation and invested heavily in food safety, sanitation, and drinking water for public health

all aspects of food and water processing, as well as wastewater and sewage. Public health officials, environmental health officers, and local councils are trained in surveillance, sampling, and investigation of clusters of potential food and waterborne outbreaks, often alerted by local microbi-

substantially reduced pathogen count are essential for public health.

It is now known that respiratory infections are caused by pathogens emitted through the nose or mouth of an infected person and transported to a susceptible host. The pathogens are enclosed in fluid-based particles aerosolized from sites in the respiratory tract during respiratory activities such as breathing, speaking, sneezing, and coughing. The particles encompass a wide size range, with most in the range of submicrometers to a few micrometers(1).

Although the highest exposure for an individual is when they are in close proximity, community outbreaks for COVID-19 infection in particular most frequently occur at larger distances through inhalation of airborne virus-laden particles in indoor spaces shared with infected individuals (2). Such airborne transmission is potentially the dominant mode of transmission of numerous respiratory infections. There is also strong evidence on disease transmission—for example, in restaurants, ships, and schools—suggesting that the way buildings are designed, operated, and maintained influences transmission.

bba

wie wat hoe waarom cases blog

### Het vierde icoontje van Rutte

door: Atze Boerstra (directeur bba binnenmilieu)

Vorig jaar rond deze tijd schreef ik een blog getiteld: "Ventileren! Maatregelen nr. 1 om gebouwen corona-proof te maken! Het onderwerp is actueler dan ooit, mede in het licht van de tentallen honore uitbraken waar we helaas de afgelopen weken mee geconfronteerd zijn.

Nee, dit wordt geen 'I told you so' verhaal waarin ik ga uitleggen welke fouten er volgens mij zijn gemaakt rond dit dossier. Liever kijk ik vooruit. Het goede nieuws is namelijk dat de Tweede Kamer op woensdag 14 juli bijna unaniem meerdere moties heeft aangenomen waardoor nu eindelijk wel is gewaarborgd (de regering kan er niet meer omheen) dat we serieus met de aerogene besmettingsroute en ventilatie aan de slag gaan.

Het betreft o.a. moties van Geert Wilders (PVV) en Jin Paternotte (D66) waar het geven van prioriteit aan ventilatie als basismaatregel, over het water informeren van de burger en het vaststellen van een vierde icoontje van Rutte. De Tweede Kamer heeft ook een motie van de heer van Veenstandaard aangenomen. Het is een motie van mijn collega Professor Philo Bluyssen die in het weekend van 10/11 juli het initiatief nam om met een groep van 20 hoogleraren (inclusief onder andere Professor Philo Bluyssen) een standaard voor de ventilatie van gebouwen te ontwikkelen. Het is een motie die ook een 'v' heeft gekregen van de Tweede Kamer. Het is een motie die ook een 'v' heeft gekregen van de Tweede Kamer. Het is een motie die ook een 'v' heeft gekregen van de Tweede Kamer.

“... en natuurlijk, zorg voor voldoende frisse lucht”

# Guildford meeting 'Group 36 Plus' (o.l.v. Prof. Lidia Morawska)



Recording EN You are viewing Lidia Morawska's screen View Options Sign in View

## The four key pillars of change:

- 1. Removing political barriers in mandating IAQ standards.** Governance and legislation systems in different countries result in different barriers. Innovative and progressive solutions instituted by some countries in recent years mandating some elements of IAQ can be used as models for other countries. The political benefits resulting from such changes can be demonstrated.
- 2. Demonstrating the economic and social benefits of good IAQ.** Cost-benefit analyses of improving IAQ are scarce, but those conducted so far have demonstrated that benefits in terms of reduced health care costs and absenteeism, and improved productivity and mental health by far outweigh the cost of better design of new buildings and improvements to existing buildings.
- 3. Developing a broad consensus about the most effective designs of future buildings.** Future designs should holistically address IAQ and other requirements including thermal comfort, building energy efficiency and greenhouse gas emissions, and operational resilience in relation to the local climate and the purpose of the building.
- 4. Developing cost-effective technologies and innovative engineering approaches to retrofit existing buildings** for improved IAQ, focusing on communities and sectors disproportionately burdened by air pollution.

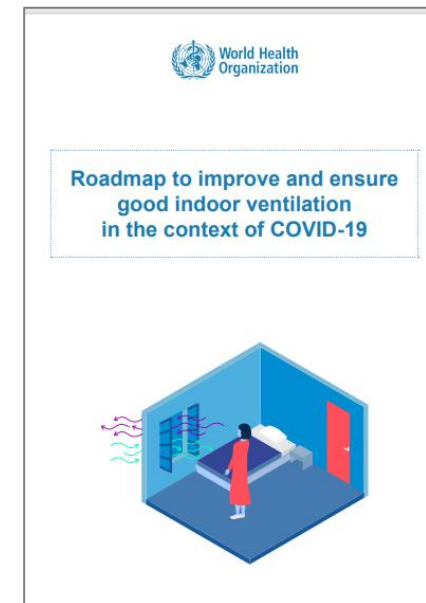
Mute Start Video Participants 6 Q&A Chat Share Screen Summary Reactions Apps Whiteboards Notes More Leave



# 'How much ventilation is enough?

Ventilatie-eisen NEN-EN 16798-1:

<b>Category</b>	<b>Expected Percentage Dissatisfied</b>	<b>Airflow per non-adapted person l/(s per person)</b>
I	15	10
II	20	7
III	30	4
IV	40	2,5



# *Wat praktijkervaringen*

# Skagit Valley uitbraak

- Skagit Valley zangkoor, zangrepetitie maart 2020
- > 80% van de aanwezigen besmet door 1 person gedurende een bijeenkomst van 2,5 uur (ondanks handen wassen, redelijk onderling afstand houden, etc)
- Waarschijnlijke ‘hoofdoorzaak’: ventilatiesysteem dat aanzienlijk deel van de tijd ‘uit’ stond



Received: 16 June 2020 | Revised: 26 August 2020 | Accepted: 15 September 2020  
DOI: 10.1111/ina.12751

ORIGINAL ARTICLE WILEY

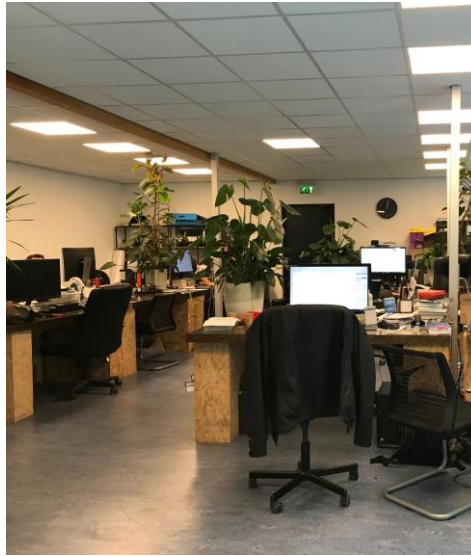
## Transmission of SARS-CoV-2 by inhalation of respiratory aerosol in the Skagit Valley Chorale superspreading event

Shelly L. Miller<sup>1</sup> | William W. Nazaroff<sup>2</sup> | Jose L. Jimenez<sup>3</sup> | Atze Boerstra<sup>4</sup> |  
Giorgio Buonanno<sup>5</sup> | Stephanie J. Dancer<sup>6</sup> | Jarek Kurnitski<sup>7</sup> | Linsey C. Marr<sup>8</sup> |  
Lidia Morawska<sup>9</sup> | Catherine Noakes<sup>10</sup>

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<sup>3</sup>Department of Chemistry and CIRES, University of Colorado, Boulder, CO, USA  
<sup>4</sup>REHVA (Federation of European Heating, Ventilation and Air Conditioning Associations), BSA Binnenmilieu, Den Haag, The Netherlands  
<sup>5</sup>Department of Civil and Mechanical Engineering, University of Cassino and Southern Lazio, Cassino, Italy  
<sup>6</sup>Edinburgh Napier University and NHS Lanarkshire, Edinburgh, UK  
<sup>7</sup>REHVA Technology and Research Committee, Tallinn University of Technology, Tallinn, Estonia  
<sup>8</sup>Civil and Environmental Engineering, Virginia Tech, Blacksburg, VA, USA  
<sup>9</sup>International Laboratory for Air Quality and Health (ILAQH), WHO Collaborating Centre for Air Quality and Health, School of Earth

**Abstract**  
During the 2020 COVID-19 pandemic, an outbreak occurred following attendance of a symptomatic index case at a weekly rehearsal on 10 March of the Skagit Valley Chorale (SVC). After that rehearsal, 53 members of the SVC among 61 in attendance were confirmed or strongly suspected to have contracted COVID-19 and two died. Transmission by the aerosol route is likely; it appears unlikely that either fomite or ballistic droplet transmission could explain a substantial fraction of the cases. It is vital to identify features of cases such as this to better understand the factors that promote superspreading events. Based on a conditional assumption that transmission during this outbreak was dominated by inhalation of respiratory aerosol generated by one index case, we use the available evidence to infer the emission rate of aerosol infectious quanta. We explore how the risk of infection would vary with several influential factors: ventilation rate, duration of event, and deposition onto surfaces. The results indicate a best-estimate emission rate of  $970 \pm 390$  quanta/h. Infection risk would be reduced by a factor of two by increasing the aerosol loss rate to  $5 \text{ h}^{-1}$  and shortening the event duration from 2.5 to 1 h.

# Andere voorbeeld-projecten uit 2020

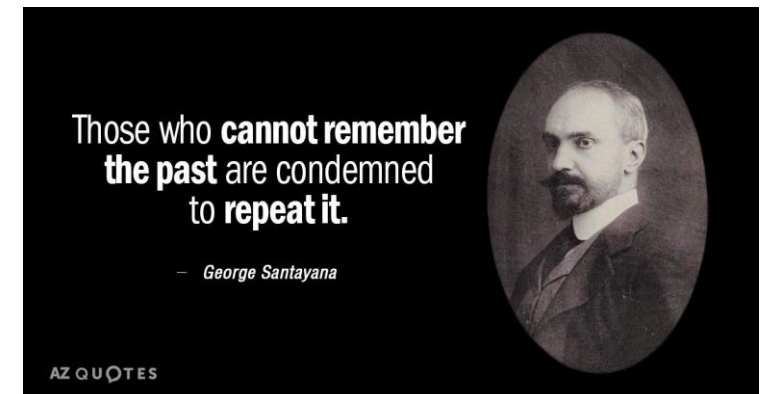


# Field lab experimenten



# Leerpunten

- Met name kleinere en middelgrote ruimtes met lage plafonds, en hoge bezettingsgraden kritisch...
- Ventilatiesystemen soms uit terwijl niemand dit door had....
- Theoretische en werkelijke prestaties van systemen lopen geregeld ver uiteen....
- Vraag-(CO<sub>2</sub>)gestuurde systemen niet optimaal tijdens een pandemie...
- Nieuwere gebouwen / installaties niet per se beter dan oudere...
- Te openen ramen maken gebouwen/installaties 'meer foolproof'
- 'Pandemie (boost) stand' ontbreekt helaas vaak ...



# Aspen Valley uitbraak

- 1e weekend dat cafes, nachtclubs weer open waren (juni 2021)
- 1 persoon infecteert ca. 25% van de 600 bezoekers
- eea ondanks rigoreuze entr e controle, verplichte QR code
- conclusie GGD: *“Belangrijke factoren die hebben bijgedragen zijn de oprukkende meer besmettelijke deltavariant, het gedrag van mensen in de horeca zoals luidkeels mee- zingen, hard praten om boven muziek uit te komen en onvoldoende ventilatie\* van de binnenruimte”*

\* nieuw entilatiesysteem had an sich voldoende capaciteit (VV 20) maar functioneerde dat weekend nog niet optimaal



*MIST project*  
*(globale uitleg en tipje van de sluiters, eerste resultaten)*



# Het MIST project

- MIST komt van Mitigation Strategies for airborne infection control
- Totaal 8 onderzoeksinstanties zijn betrokken met 38 (senior) researchers, 10+ PhD students, 14 industrial partners, 10 andersoortige organisaties (bv. sportbonden)
- NWO project, looptijd 5 jaar, gestart eind 2022
- Onderzoeksdoelen: *'to study the infectiousness of viruses, the spread of fluid droplets in the air, and the influence of ventilation and air cleaning technologies on transfer of viruses.'*
- Onderzoeksuitkomsten worden tzt (WP5) vertaald naar evidence-based praktische adviezen voor (verschillende groepen van) beslissingnemers



### Preventing Airborne Transmissions Of Viruses

Since the global impact of COVID-19, we are acutely aware of the risk of diseases dispersed through the air. Virologists, epidemiologists, fluid mechanics and engineers will join forces in the MIST programme to better understand and prevent airborne viral transmission. Under various conditions, the researchers will study the infectiousness of viruses, the spread of fluid droplets in the air, and the influence of ventilation and the purification of air on the transfer of viruses. They will subsequently translate this knowledge into practical recommendations about which measures can be deployed in the most efficient, cost-effective and sustainable manner in various environments ranging from people at home to hospitals, schools and trains.

22 MAY 2024

Second MIST Workshop –  
Issues in Practice



[READ MORE](#)

# Consortium meeting februari 2024, Amsterdam



# MIST werkpakketten

WP1 - Infectivity of airborne pathogens in droplets (coordination: UMCG)

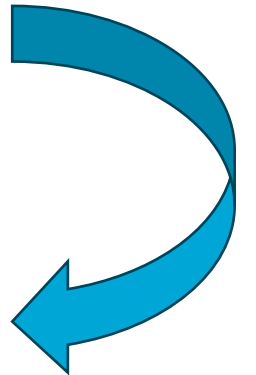
WP2 - Spreading of airborne droplets (coordination: University of Twente)

WP3 - Ventilation, development of ventilation & air sanitization concepts  
(coordination: TU Eindhoven)

WP4 - Use Cases (coordination: University of Amsterdam)

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**WP5** – Dissemination of Strategies for Infection Control (coordination: TU Delft)



# 1<sup>e</sup> resultaten WP5: inventarisatie voorbeeldmateriaal

Focus lag op infographics, compact whitepapers etc

Totaal 188 voorbeelden gevonden uit 16 landen

Selectie van 25 > bedoeld om voor te leggen aan stakeholders (workshops)

Gevonden deelaspecten:

Ventilation	CO <sub>2</sub> monitoring	Air cleaning technologies	HVAC system settings	Indoor Environmental Factors
Advice on how or how much to ventilate	Recommendations about CO <sub>2</sub> monitoring and recommended maximum CO <sub>2</sub> levels	Advice on use and effectivity of air-cleaners (not as a substitute for regular fresh air supply, but as an addition to it)	Recommendations on HVAC system settings related to operating hours, recirculation or pressure balances	Suggestions about ideal temperature or humidity setpoints.
				

# Voorbeelden van infographics

## VENTILATIE MAATREGELEN TER BEPERKING VAN OVERDRACHT LUCHTWEGINFECTIES IN VERPLEEGHUIZEN

Om de besmettingskans in verpleeghuizen zo klein mogelijk te houden is het van belang dat de ventilatie op orde is en kan waar dit nodig of wettelijk is, worden ingezet, op aanvullende ventilatie-maatregelen. In het algemeen geldt dat voldoende ventilatie goed is voor de kwaliteit van het binnenklimaat en helpt (als aanvulling op de standaard maatregelen) om de overdracht van luchtweginfecties te beperken. Een aantal belangrijke adviezen rondom ventilatie in verpleeghuizen zijn in dit overzicht voor de facility managers en onderhoudsbedrijven van verpleeghuizen op een rij gezet. [Voor info klik op het tekstplaatje.](#)

**MASTPLAN VENTILATIE**

**CHECK INSTALLATIE, INSTELLINGEN EN ONDERHOUD** **BEPERK CENTRALE RECIRCULATIE**

**STA RECIRCULATIE OP RIJTNIVEAU TOE MITS** **CONTROLEER VENTILATIE TOILETTEN**

**VOORKOM STEERKE LICHTSTROMEN TUSSEN PERSONEN**

**MONITOR LUCHTKWALITEIT**

**CONTROLEER VERSE LICHTTOEGANG** **CONTROLEER LICHTSTROMING TUSSEN DUNNEN**

**RAS VRAAGGESTUURDE SYSTEMEN AAN** **STIMULEER GEBRUIK TE OPENEN DANEN**

Laat stroomvoorziening door een deskundige op ruimteniveau controleren of de verse luchttoevoer per persoon ten minste voldoet aan de geldende Bouwbesluit-eisen (artikel 3.34). Houdbaarheidsminimum kwaliteitsniveau (zie bij oudere gebouwen) de Bouwbesluit nieuwbouw 2012 eisen als referentie van de 12 l/s totaal voor cliënten-kamers en 6,5 l/s totaal het opmerkelijke aantal aanwezige personen in gemeenschappelijke ruimtes. Controleer in dit verband of gebruik, gebouw en installatie nog voldoende aan het ontwerp en de uitgangspunten. Stel vast of er wijzigingen zijn en welke aanpassingen voor deze wijzigingen zijn gemaakt en of hiermee voldoende wordt geversteld. Indien nodig laat de houdbaarheid van luchttoevoer herbeoordelen. Laat door een deskundige ook controleren of de ruimte goed stormspand wordt (voorzienende ventilatie efficiëntie).

## Good ventilation protects you from COVID-19 infection

**Figure 1:** Illustration of how an infected person (passing infection) on the right leads to smaller exposure and spread in the breathing zone of another person (one on the left) in this case. Large dispersal indicates a room with poor ventilation. When the room is ventilated with mixing ventilation system, the number of virus-laden particles in the breathing zone is much lower than when the ventilation system is off. Left figure: unventilated system; right figure: ventilated system (off).

Effect of natural ventilation	Type of ventilation/window position	Approximate duration of ventilation to one air change at exchange
	Window and opposite door window fully open Cross-ventilation	1 to 5 minutes
	window fully open Durchzug	8 to 10 minutes
	window half open	30 to 15 minutes
	Window tilted and opposite door completely open Cross-ventilation	40 to 30 minutes

### Good advice Good habits

- Stay at home
- Wash hands frequently
- Avoid coughing and sneezing
- Avoid crowded and close quarters
- Avoid public transport
- Avoid public places
- Avoid public places like your office

### Tips voor het bestrijden van luchtweginfecties

- Vermijd contact met andere mensen
- Draag een mondkapje
- Was je handen regelmatig met water en zeep
- Vermijd de ruimte van andere mensen
- Vermijd de ruimte van andere mensen
- Vermijd de ruimte van andere mensen

**Proper ventilation in everyday school life**

**This is how it works quickly and efficiently!**

- Ventilation: facilities with the windows open every 20 minutes during the lesson.
- How long to ventilate? Time in four minutes or 10-20 minutes.
- All the windows open after each 4-minute lesson.
- Cross ventilation: If possible, open the opposite windows next to the same room.
- With crossflow and cross ventilation, the most temperature only drops by a few degrees, but quickly rises again after the windows are closed.

# 1<sup>e</sup> resultaten WP 5 stakeholder workshops



Beslissingnemers schijnen tegenwoordig vaak te denken ‘COVID is helemaal weg, dus waarom zou ik nog....?’

In de praktijk blijken opdrachtgevers, architecten, installatieadviseurs e.d. toch weer vooral naar kosten, energie prestaties en duurzaamheidsaspecten te kijken, minder naar gezondheid

Sommigen vragen zich af waarom er zoveel focus is op mobiele luchtreinigers en vragen: *Zijn die altijd, overal de oplossing? Hoe zit het met bv. ‘ceiling mounted’ filters?*

Verdere vragen betreffen o.a. het gebruik van natuurlijke ventilatie: *Moeten we alles met (meer?) mechanische ventilatie oplossen en luchtreinigers of hebben we toch ook nog iets aan te openen ramen?*

Allemaal aspecten waar we t.z.t. qua MIST output-communicatie wat mee moeten....

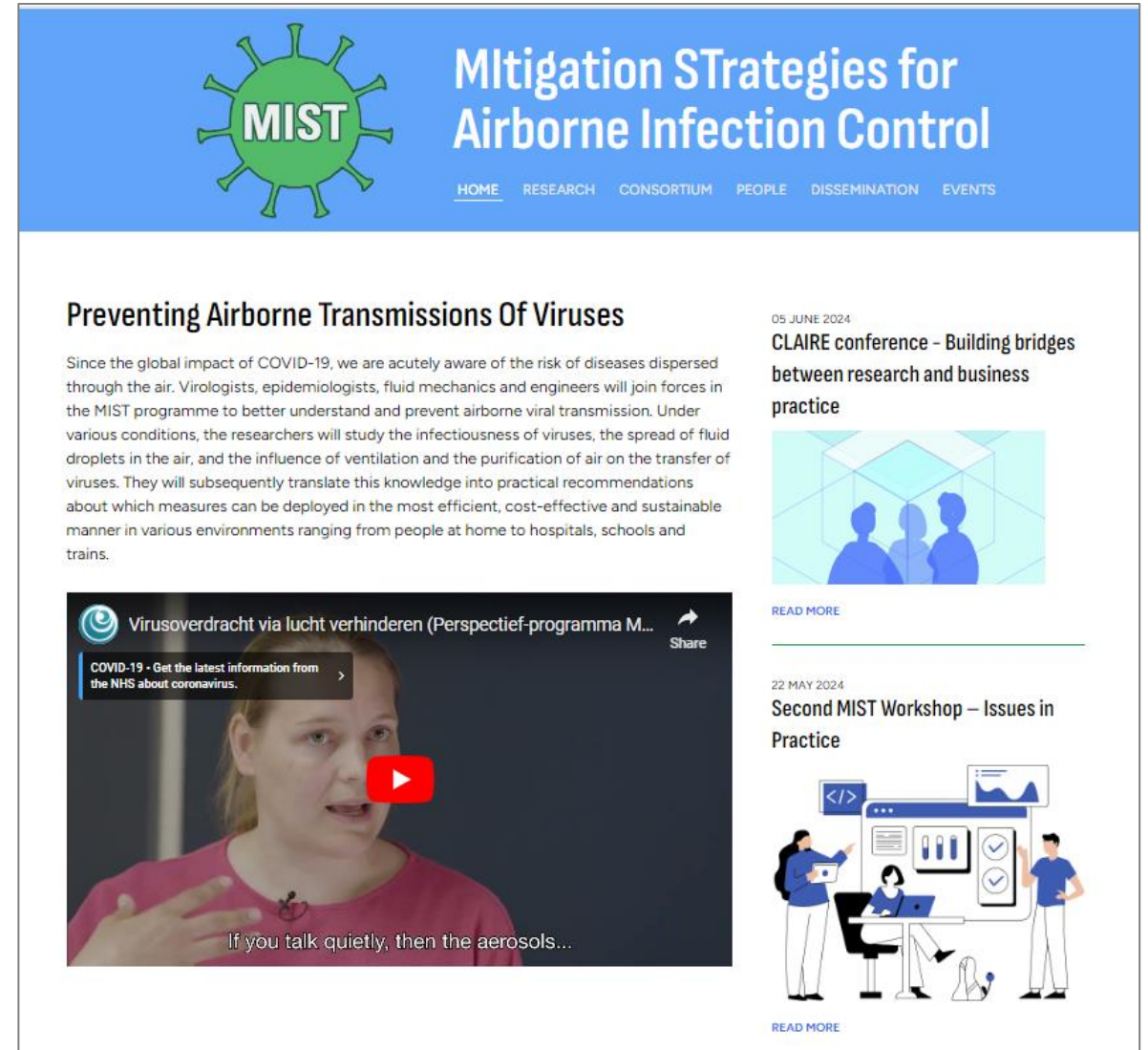
# Meer informatie

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The screenshot shows the MIST website homepage. At the top is a blue header with the MIST logo (a green virus-like shape with 'MIST' in the center) on the left and the title 'Mitigation Strategies for Airborne Infection Control' on the right. Below the title is a navigation menu with links for HOME, RESEARCH, CONSORTIUM, PEOPLE, DISSEMINATION, and EVENTS. The main content area features two articles. The first article is titled 'Preventing Airborne Transmissions Of Viruses' and includes a paragraph of text. The second article is titled 'CLAIRE conference - Building bridges between research and business practice' and includes a date '05 JUNE 2024'. Below the second article is a date '22 MAY 2024' and the title 'Second MIST Workshop – Issues in Practice'. A video player is embedded in the middle of the page, showing a woman speaking with the subtitle 'If you talk quietly, then the aerosols...'. The video player has a 'Share' button and a 'COVID-19 - Get the latest information from the NHS about coronavirus.' notification. The bottom right of the page features an illustration of people working at a computer and a dog, with a 'READ MORE' link below it.

## Mitigation Strategies for Airborne Infection Control

HOME RESEARCH CONSORTIUM PEOPLE DISSEMINATION EVENTS

### Preventing Airborne Transmissions Of Viruses

Since the global impact of COVID-19, we are acutely aware of the risk of diseases dispersed through the air. Virologists, epidemiologists, fluid mechanics and engineers will join forces in the MIST programme to better understand and prevent airborne viral transmission. Under various conditions, the researchers will study the infectiousness of viruses, the spread of fluid droplets in the air, and the influence of ventilation and the purification of air on the transfer of viruses. They will subsequently translate this knowledge into practical recommendations about which measures can be deployed in the most efficient, cost-effective and sustainable manner in various environments ranging from people at home to hospitals, schools and trains.

05 JUNE 2024  
**CLAIRE conference - Building bridges between research and business practice**

22 MAY 2024  
**Second MIST Workshop – Issues in Practice**

READ MORE

READ MORE

READ MORE

Share

COVID-19 - Get the latest information from the NHS about coronavirus.

If you talk quietly, then the aerosols...

# Take home messages

'Ventilation matters'

*Zou consequent deel uit moeten maken van infectiepreventie maatregel pakketten*

*Bestaande ventilatie infrastructuur vaak best OK maar door goed beheer en onderhoud is er vaak (veel) meer uit te halen*