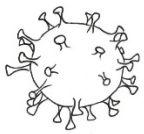
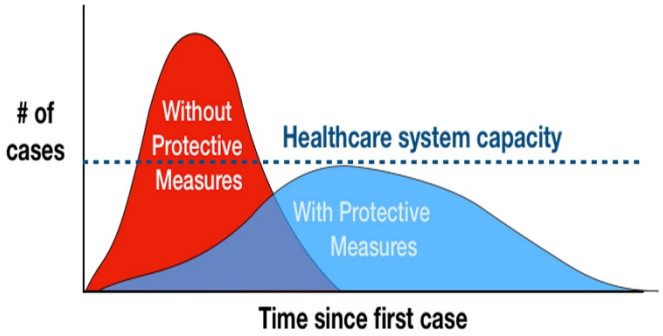
The Corona Virus !
But what about our elderly- & nursery homes ?

Introduction

The SARS and (bird/Mexican) flu pandemics during the last decade showed to the entire world that a medical airborne problem can have a significant social and economic impact. The coronavirus spreading now brings it all to a new, unexpected level.



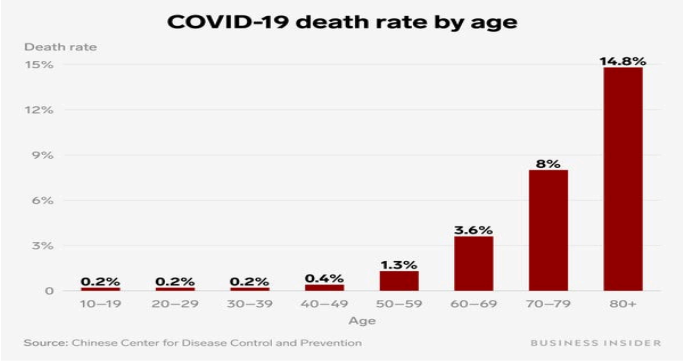
Authorities are mainly focussing to keep the cases below the meanwhile famous “healthcare system capacity” line by means of (semi) lock-downs and social distancing. First strategies are development also how they can re-open the economy as soon as possible, preventing a re-ignition of the spread again, in mind.



But what about our elderly & nursery homes? A disaster of unprecedented size is imminent in those institutes when we do not take dedicated measurements as soon as possible.

Elderly & Nursery homes

The virus showed that the elderly and persons with a medical file are at most risk. So, it would be logic that a main focus should also be on them.



The virus & its spreading

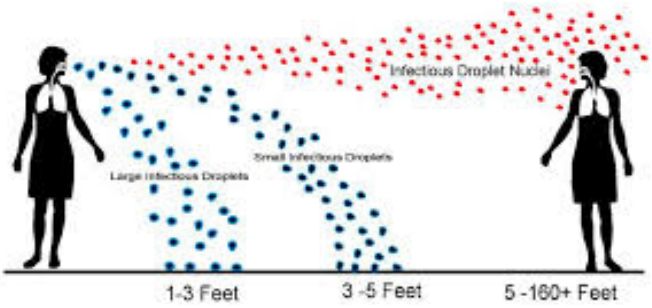
Research has demonstrated the primary ways in which the virus is able to spread:

1. Next to contact contamination, it can "FLY" (means airborne) so it can infect people over longer distances by using cold and dry air.
2. It works "UNDERCOVER". It spreads from people without symptoms so they move free among others (SARS 1 couldn't do that – only after symptoms it became infectious).
3. It is perfectly "FITTED" to dock on human cells by means of using (like flu, cold and HIV) the cells Furin Enzymes to enter the cell with its spikes (10x better fitting on ACE2 receptor than SARS 1).
4. It is rather "ROBUST" outside the body. It can survive hours (on paper) and maybe days on metal/plastic.
5. It keeps itself "HEALTHY". By means of "proofreading" the virus it is better enabled to prevent the reproduction of bad mutations.

Next to these micro abilities, also some macro facts can be derived from studies published: Natural spread, human spread and active spread

Natural spread

It is scientifically proven that the virus likes dry and cold air. In cold air (5-15°C) it stays healthy and with dry air, it can spread for longer distance.



The virus coughed by means of wet droplets would drop down very easy after 1,5m to the bottom because it is relatively heavy. But if the air is dry, the water molecules will evaporate and the droplets become smaller and lighter.

Human spread

One of the reasons why testing, testing and testing showed to be so effective in the battle against the virus, was attributed to discovering the “undercover” infected people and isolating them as soon as possible. Where SARS 1 became infectious after showing symptoms (and it showed in 99% symptoms), SARS 2 is for most people even asymptomatic, making it a silent spreader of disease.

The following 4 groups of people can be identified as victims of this “undercover” ability of the virus.

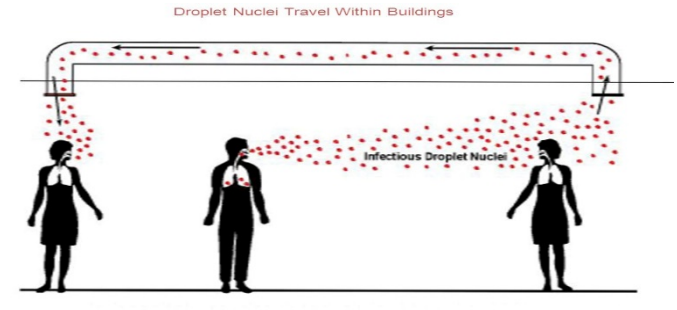
a) Pilgrims
b) Church visitors/singers
c) Tourists
d) Business travellers

do bring the virus unnoticed home and spread it there.

(graph showing ski tourists bringing the virus back home)

Active spread

Everyone knows how common it is to contract a cold or even the flu after a long flight. The reason is always the "air conditioning" in the airplane leading to viral spread. This is true to some extent due to the forced airstreams inside the airplane or inside the building transferring the virus through the HVAC system thus infecting other people.



Of course there is an interaction between these 3 primary routes of spreading. Natural spread occurs among crowded gatherings, and they bring it home unnoticed. The air conveyance system on his turn creates another virus source by spreading it through the whole building.

Discussion

Active spread is a very powerful phenomenon which medical scientist do underestimate. Look at the sand from our desert which we can find in our cities. It is also brought to us by "earth HVAC system".

Meanwhile, studies are in progress that will prove the significant effect of the HVAC system being a massive spread factor.

Practice will show an overlap of these 3 main characteristics, and generally all authorities acted appropriately by blocking one of the routes. But the route of HVAC spread is massively neglected by authorities and minimal or no advice is given.

We see a massive spread now in the elderly- & nursery homes, although we isolate patients. In the past, it has been proven that medical-not-airborne contaminants like MRSA can be found in a heat recovery wheel of an HVAC system. The virus is much smaller and the existing and standard HVAC filters do not provide adequate filter media.

General advice for elderly- and nursery homes

The management of elderly- and nursery homes already do take massive measurements to prevent:

- Getting the virus inside by keeping as much as possible people (like family) out of the buildings
- When it does got inside, limit the spread by means of isolation of patients

But is this general advice enough ?, or should there be more detailed measurements taken ?. Think about having all employees daily tested on fever, weekly on the virus or maybe more important; on anti-bodies of the virus to find the asymptomatic spreaders.

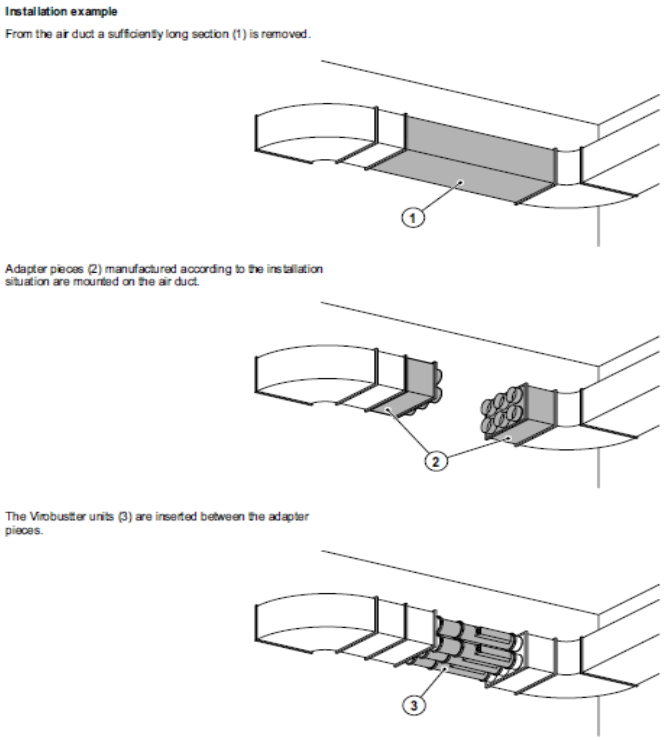
These measurements should be - next to classic hygiene discipline and family visit limitations, implemented as soon as possible.

Technical Advice

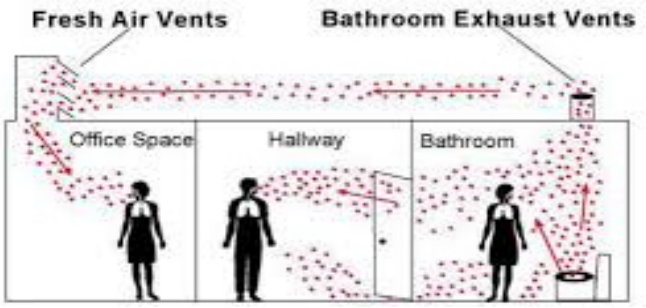
From technical points, also some significant measurements can be taken to prevent further spreading of the virus from an isolated patient or just an "innocent" bringing clothing to the reception by a family member.

We noted that the virus "likes" cold and dry air, and let it happen that most elderly- & nursery homes do have HVAC systems to maintain a comfortable climate in the building. Those HVAC installations provide in the coming summer cold & dry air with active air inlet flows and active air outlet exhausts. And on top of that, most systems even often recirculate the air also back into the building to save energy. So:

- Reduce the use of HVAC systems in buildings to prevent a) natural spread producing cold and dry air and b) active spread by means of forced air flows.
- If possible open more windows to dilute contaminants inside a room.
- If possible retrofit UV systems in the ducting preventing the spread of the virus by an HVAC system. UV is relative easy to retrofit because in comparison with filtration it has relative no pressure drop and it can handle viruses much better that filters (viruses are too small for filters)

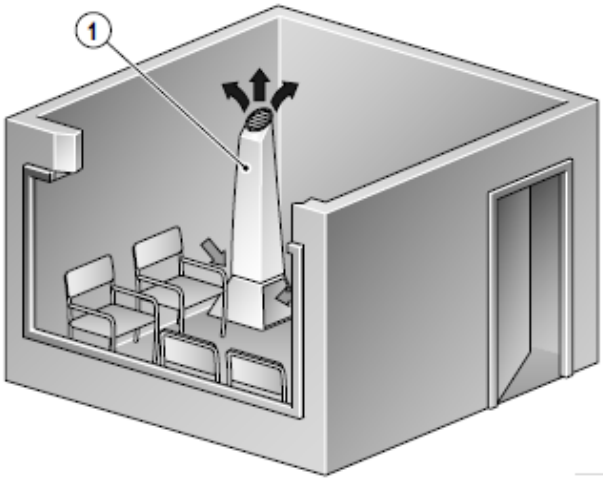


- Check the air exhaust system of bathrooms from patient rooms and offices, and look where they exit the building preventing a short circuit with air inlet systems.



- To dilute the possible virus aerosols at (infected) patients rooms or in waiting/office spaces, position stand-alone units.

Standing unit (waiting room)

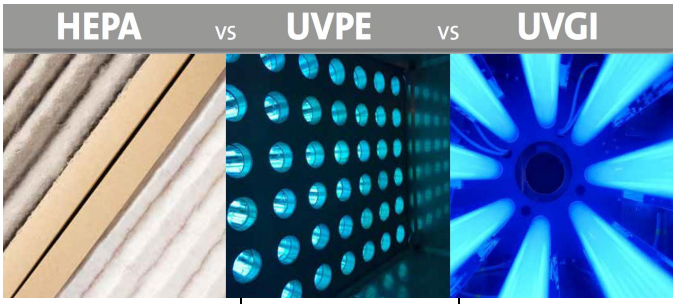


- Reduce the use of IT systems (laptops) or not important devices with a built-in ventilator which can take up a virus in infected room and give it back at a next (healthy) patient in the room.
- Minimize staff or patients having a beard, because a beard works like a broom picking up more viruses in the air.

Applicable technologies

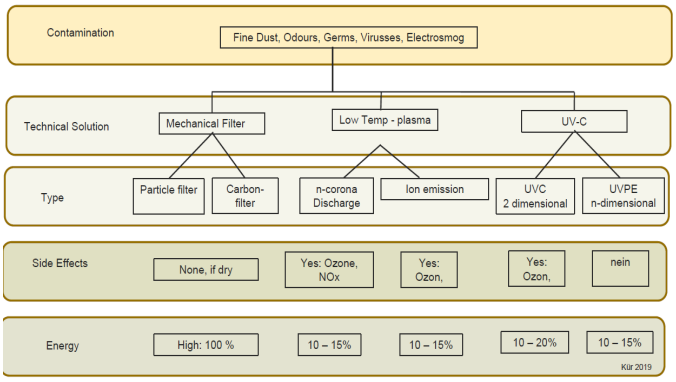
A large number of companies are "abusing" the situation to promote their technology. A lot of technologies are surely effective against the Coronavirus, but they will probably do more harm than benefit

- Ozone (or Plasma) will kill the virus but also harms lung tissue. Ozone accumulates above safe levels in (closed) spaces even when the device is low level ozone.
- Ionisation makes particles sticky and heavy. Ionisation creates minimal ozone that varies according to the technology.
- (HEPA) Filtration is a proven technology, but viruses are small enough to pass through. They only catch and do not kill.
- UV light (254nm) is also a proven and safe, solution against the virus



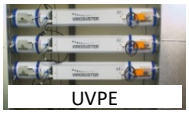
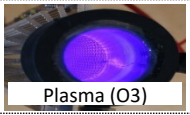
HEPA		UVPE		UVGI	
Virus:	No	Virus:	Yes	Virus:	Yes
Bacteria:	Yes	Bacteria:	Yes	Bacteria:	Yes
Fungi:	Yes	Fungi:	Yes	Fungi:	No

In summary:
Stay away from ozone, plasma, ionisation due to deleterious effects on human health.



Application matrix

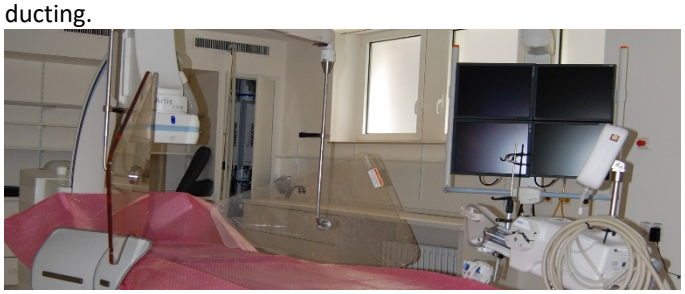
The choice of applicable technology should be based on the application and not what the technology could handle. Plasma Ozone can do a very good job in disinfection, but not for air supply.

Application	Position	Technology
 (Elec.) Cleanroom	• Air supply • Air recirculation (HEPA)	 Hepa Filtration
 (Med)OP Theathre	• Air supply • Air recirculation (HEPA / UVPE)	
 (Food) Industry	• Air supply • Air recirculation (UVPE)	 UVPE
 Educ./Offices	• Air supply • Air recirculation (UVPE)	
 Gastronomy	• Air exhaust (PLASMA)	 Plasma (O3)
 Domestic	• Air recirculation (IONISATION)	 Ionisation
 Surfaces	• Surface (UVGI)	 UVGI

Field examples

A few examples from practice, which already uses the next generation "thinking". Medical, industry and veterinary use of clean air.

A German university clinic requested a new heart-catheter operation room, The Steritubes were retrofitted in the ducting.



A Dutch clinic saw an increase of infections among new born vulnerable children. They retrofitted the UVPE Steritubes in the ducting of the right wing and did put all vulnerable new born over there.

An industrial potatoes plant implemented clean air protecting its cooling, transport and packaging processes. Two big HVAC installations executed with UVPE protect the whole line continuously, resulting in increased shelf life and product safety.

Even unique environments like the transport of small weeny pigs became an issue. UVPE was recognized by the RVC in London and the Danish Agriculture Ministry as leading solution against the PPRS-Virus.

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After his study at the University of Twente, Fahmi Yigit started in 2003 the development of the UVPE technology in close cooperation with international institutes.

He was triggered by the first SARS Pandemic and questioned how to give it a halt.

He is also a worldwide respected lecturer on air hygiene issues.

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