



Protecting what matters:
Patients, Staff, Trust.

*Effective Protection Against
Airborne Infections*

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Airborne Infections in Clinical Settings

An Underestimated Risk



Healthcare-Associated Infections:

- 4.3 million patients per year in the EU
- Total costs: €13–24 billion per year (WHO/ECDC)
- Respiratory HAIs: nearly 30% of all cases, the single largest category
- Additional hospital days: 25 million per year (WHO/ECDC)
- Estimated deaths: >90,000 per year (ECDC)

Challenges

- Nosocomial infections are difficult to prevent
- Infected patients occupy beds and staff resources
- Isolation measures are often not feasible (space, cost)
- Consequences: higher workload, additional infections, staff overload
- Flu and infection waves highlight these challenges every year



Airborne Infections in Clinical Settings

Challenge in Open Settings and with Sensitive Patients



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Intermediate Care Unit

- Multi- bed ward for patients that allow for a high level support and centralized continuous monitoring of patients.
- Patients are either coming from intensive care, or don't need intensive care but treatment needs exceeds the capacity of standard nursing units.



Quelle: Kur & Rehabilitation Althofen

Dialysis Setting

- Often severely compromised immune systems, multiple comorbidities, advanced age
- Multiple exposures to nosocomial infections per week,
- Infections are one of the leading causes of death in dialysis patients (~9% of all dialysis-related deaths)

Why does Bedside HEPA Filtration not Work

Challenge in Open Settings and with Sensitive Patients

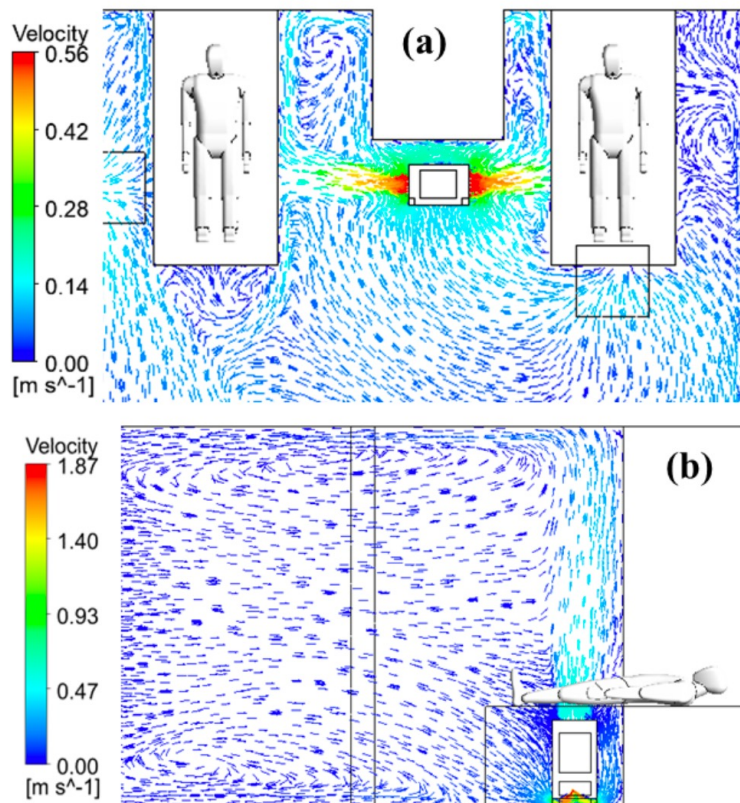
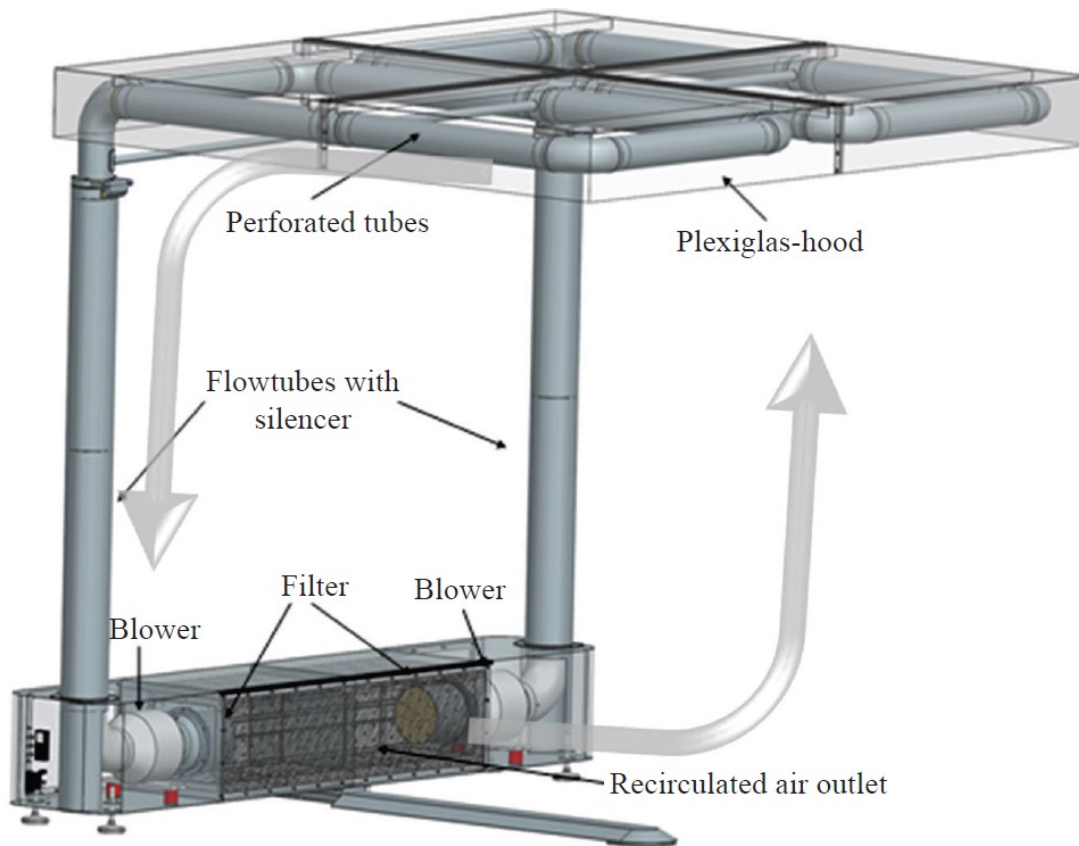


Fig. 9. Airflow distribution flow fields from the portable air purifier (a view).

- **Computational study by Lip: 10-bed ward station**
 - Effectivity below 50%, multiple Air Purifiers (HEPA) bedside in optimized position
 - Turbulences distribute virus-containing aerosols
 - Cause of the turbulences are:
 - Overall airflow in the ward station
 - Local turbulences created by the Air Purifier
 - *Source: Lip H.W. et al, The myth of air purifier in mitigating the transmission risk of SARS-CoV-2 Virus, <https://doi.org/10.4209/aaqr.210213>*
- **Conclusions**
 - Pathogens have to be captured close to the source
 - Turbulent air currents are to be avoided

How the Technology Works

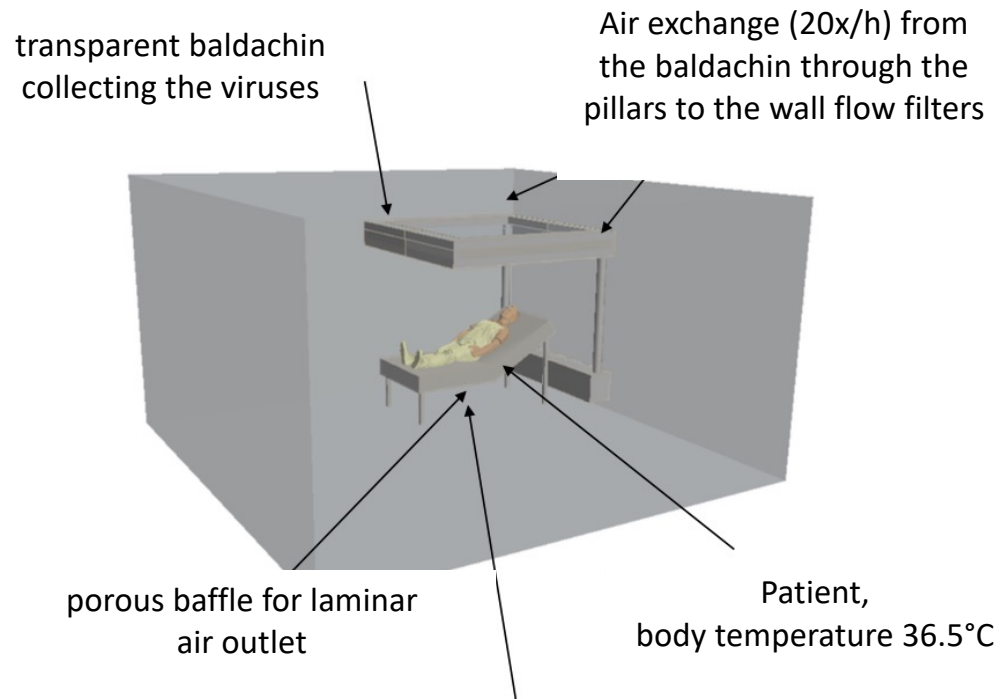
Clean Air - Right at the Patient Bed.



- Self-standing construct, minimal interference with clinical instrumentation and workflow
- Protection of patient and staff, without restriction to patient's and staff's mobility
- Laminar vertical airflow from floor to ceiling that contains patients emissions independent of his position
- Minimal sensitivity to disturbances
- Continuous air recirculation and filtration at > 20 cycles per hour
- Airflow < 2 cm/s, well below the human perception threshold of 15–20 cm/s, so patients feel no draft
- Ceramic wall-flow filters
 - 99.95% efficiency for salt aerosols > 30 nm
 - Heat-sterilizable and virtually unlimited in reusability (HEPA filters require regular replacement)
 - long service life

Simulation

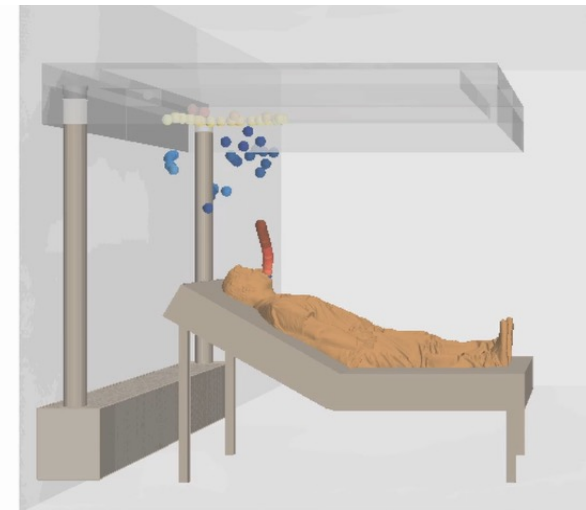
Coughing Patient in an Open, 4 Bed-room Setting



Question:

How many viruses escape from the bed into the room to the other patients?

- Pulsatile breathing
- 5000 Viruses per breath
- 3 high-dose coughs (15'000 viruses per cough)
- The patient is half upright (30°)

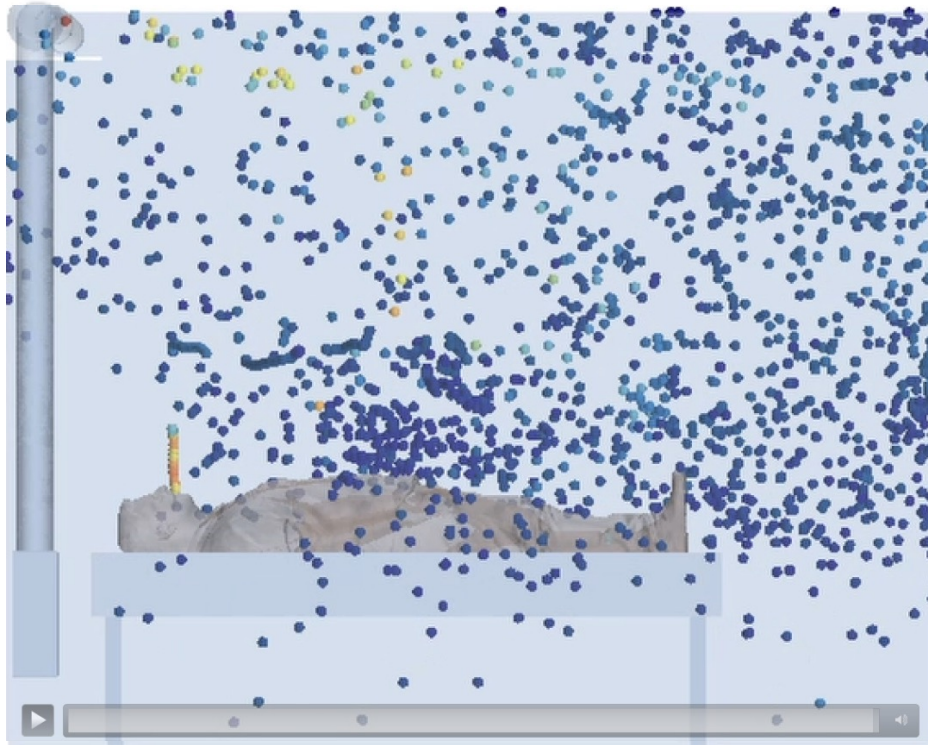


Simulation

Aerosol Distribution Over 10 Minutes



Unprotected Room



The aerosols spread throughout the entire room, potentially infecting other patients and staff.

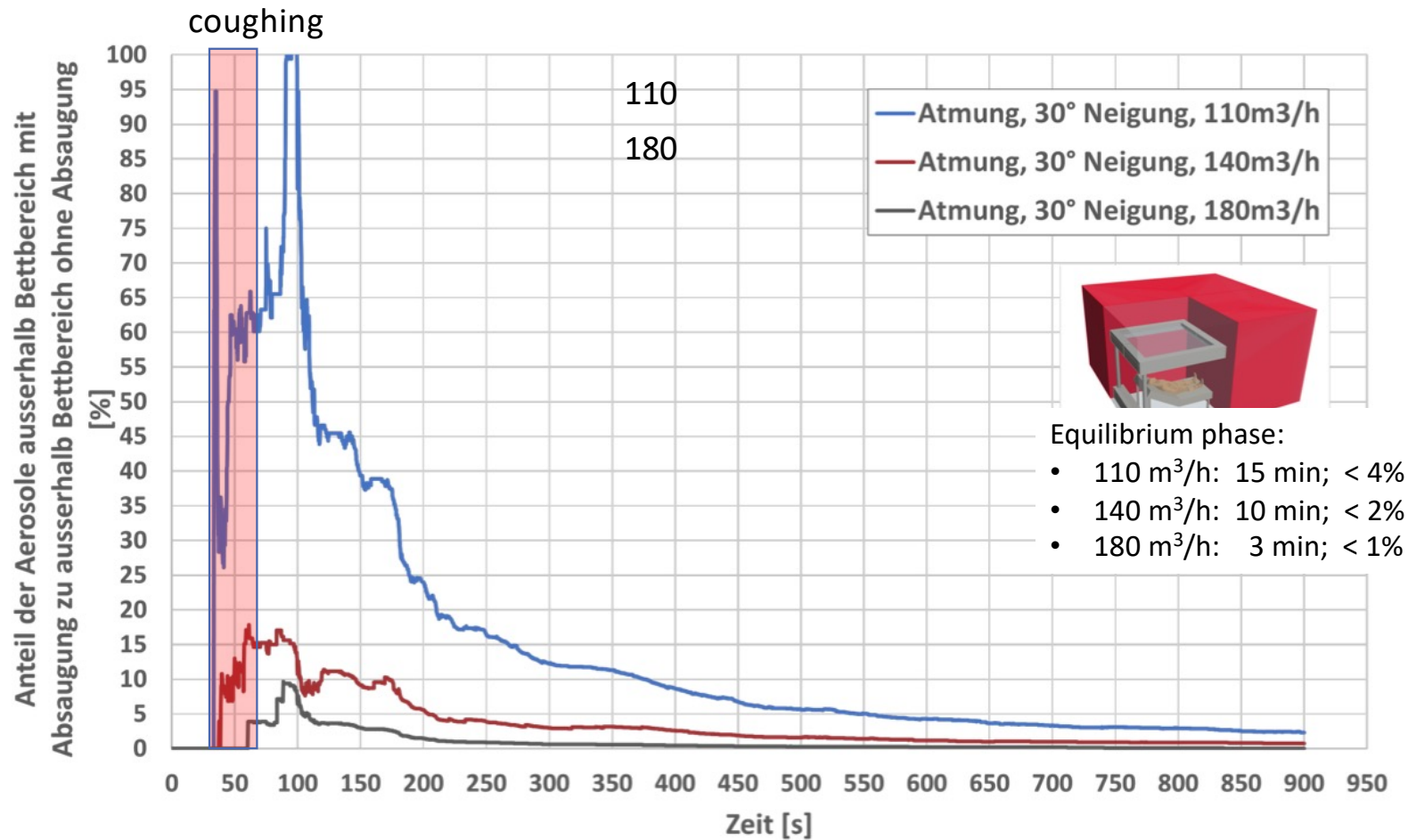
Room Protected by Baldachin



Nearly all aerosols are immediately captured, drawn in, and efficiently filtered out by the Baldachin.

Simulation

Importance of Flow Rate to Control Escape Ratio



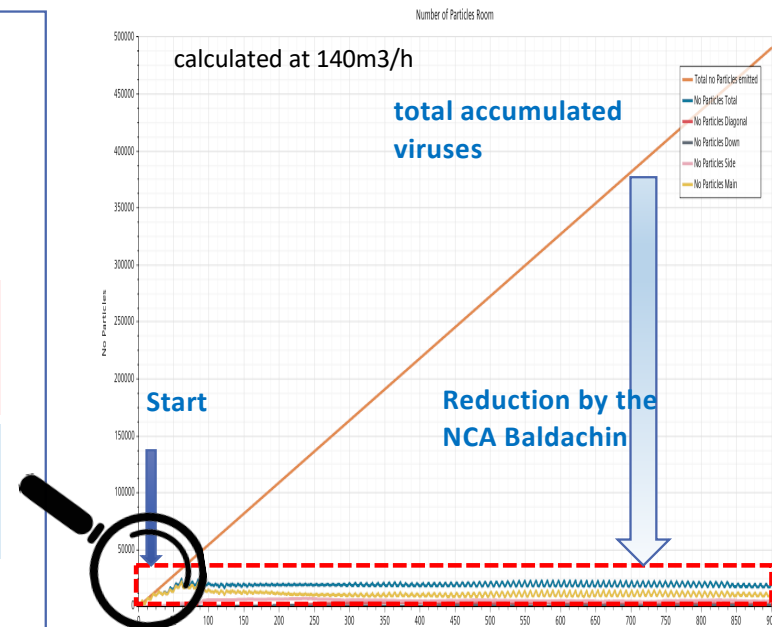
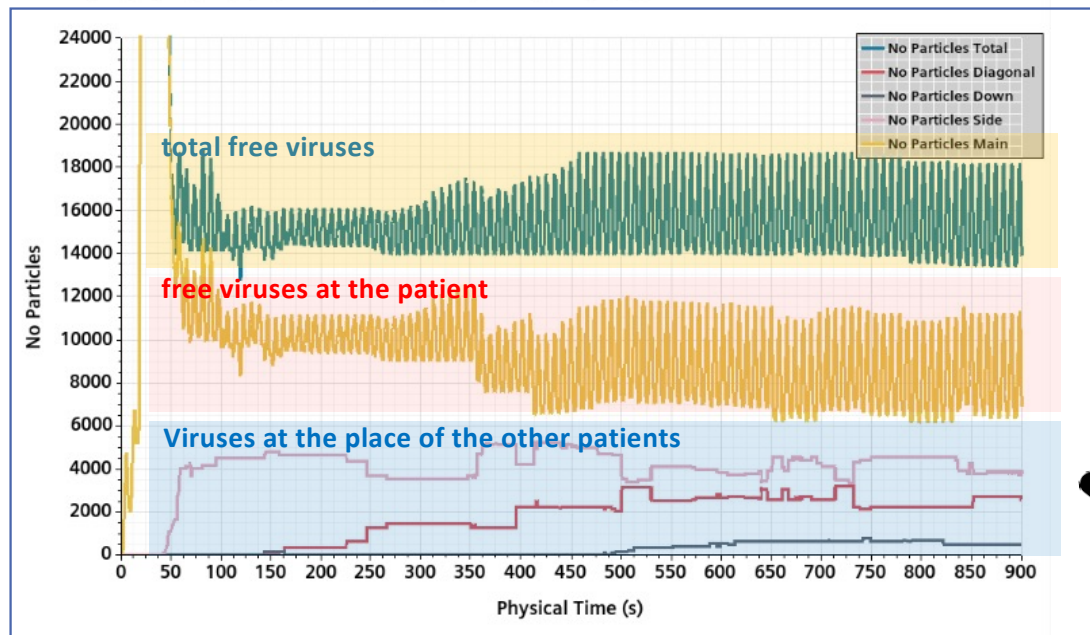
Startup phase:

Patient emits from the very beginning –

Worst case for a disturbance

Simulation

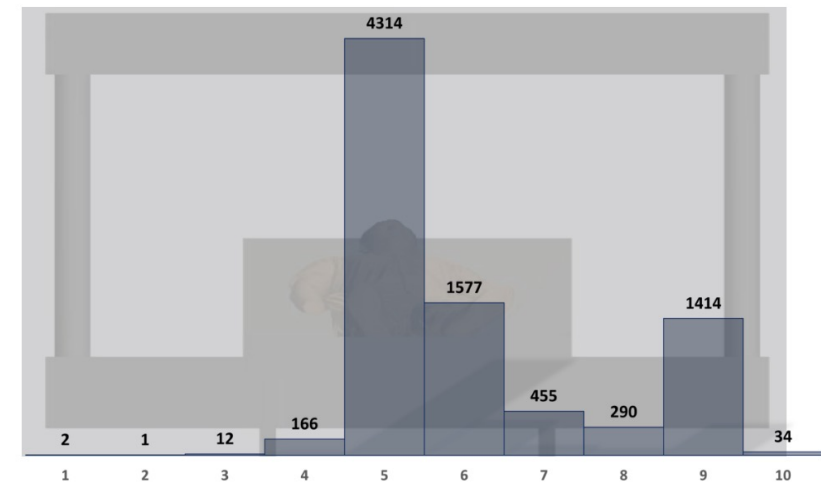
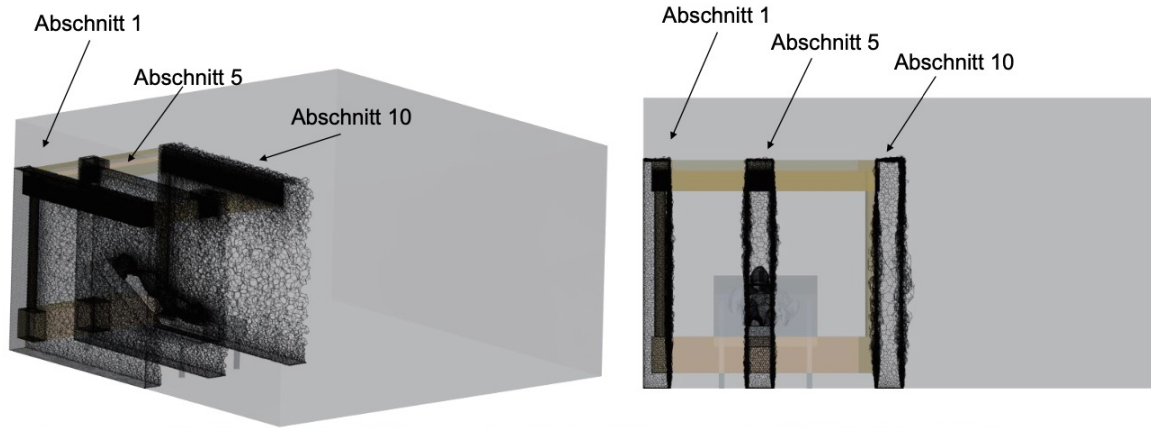
Visualization of Virus Distribution and Clearance Effectivity



- 0.5 mio viruses are emitted over 15 mins and would stay in the room if not for the NCA Baldachin:
 - **Inside the bed area:** remaining virus load corresponds to 3 breaths, >97% are filtered out
 - **Outside the bed area:** virus load corresponding to a single breath escapes
- **Conclusion: < 1% Escape ratio:**
to illustrate: if in the entire patient ward, just the virus load of a single breath is present, in a 4-patient ward (100m²), there would be less than one virus per minute from this patient to breathe!

Simulation

Lateral virus distribution inside the bed area (180m³/h)



Segmentation of the model – cumulating over height and depth

- Concentration over the patient's head
- Viruses beside the bed area are primarily accumulating underneath the Baldachin

The Baldachin Closes the Gap in Infection Protection

The Bridge Between Efficacy and Affordability



	Air Purifier	Medical Masks	Cohort Isolation	Baldachin	Bed Closure	Negative Pressure Room
Effectiveness	<50%	42–56%	Low–Medium	>87–95%	High	Very High
Mobility & Flexibility	High	High	Low–Medium	High	Low	None
Operating Costs	Low	Low	N/A	Low	N/A	Medium
Staff Effort	Low	Medium	Medium	Low	Medium	Low–Medium
Investment or Opportunity Costs	Low	Low–Medium	Low–Medium	Medium	Very High	Extremely High

The NanoCleanAir Baldachin

Clean Air - Right at the Patient Bed.



Highly efficient purification of breathing air

- Studies show: virus filtration >99.999%*
- Various simulations and experiments demonstrate a filtration/protection effect of 87–95%, depending on the environment, pathogen type, and the use of additional protective measures (e.g. curtains)
- Protection for patients and staff
- Excellent acceptance

Reduced costs and isolation effort

- No additional shifts for infected patients
- Reduced need for isolation and protective equipment
- Fewer staff sick days
- Reduced maintenance costs, as ceramic nanofilters are many times more durable than HEPA filters

Study at Inselspital Bern: Among hospitalized COVID-19 patients (SARS-CoV-2/Omicron: R_0 ~9–10, making it the most infectious currently relevant disease after measles), not a single nosocomial transmission was recorded under Baldachin use.

*Measured using MS2 bacteriophages (approx. 60 nm)

The NanoCleanAir Team

Leadership Team, Scientific and Strategic Partners



**Jörg Mayer; Dr. Dipl. Ing. ETH
Legal & IP | VRP**

30+ years of experience in development and approval, patenting, and licensing of platform technologies. Extensive MedTech and startup leadership background. Serial Inventor.



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Growth-focused executive with strong background in supply chain, market scaling and turnaround projects. Co-built multiple start-ups.



**Siro Gottardi
Chief Marketing Officer**

Marketing, sales and partnerships leader with strong Life Sciences experience. Built and scaled customers and strategic partnerships across Europe and North America.



**Andreas C. R. Mayer; Dipl. Ing.
Dr. med. h.c.
Chief Technical Officer**

Pioneer in exhaust emission and filtration technologies. Led the introduction of particulate filters in Switzerland and numerous international retrofit programs. Serial Inventor



**Patrik Grütter
Chief Production Officer**

Leads production and industrialization of air purification solutions. Deep hands-on expertise in particulate filtration and applied engineering..



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Scientific Advisory Board

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Partners

Swiss Institute for Translational
and Entrepreneurial Medicine

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Patents Pending

Swiss Engineering Excellence



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