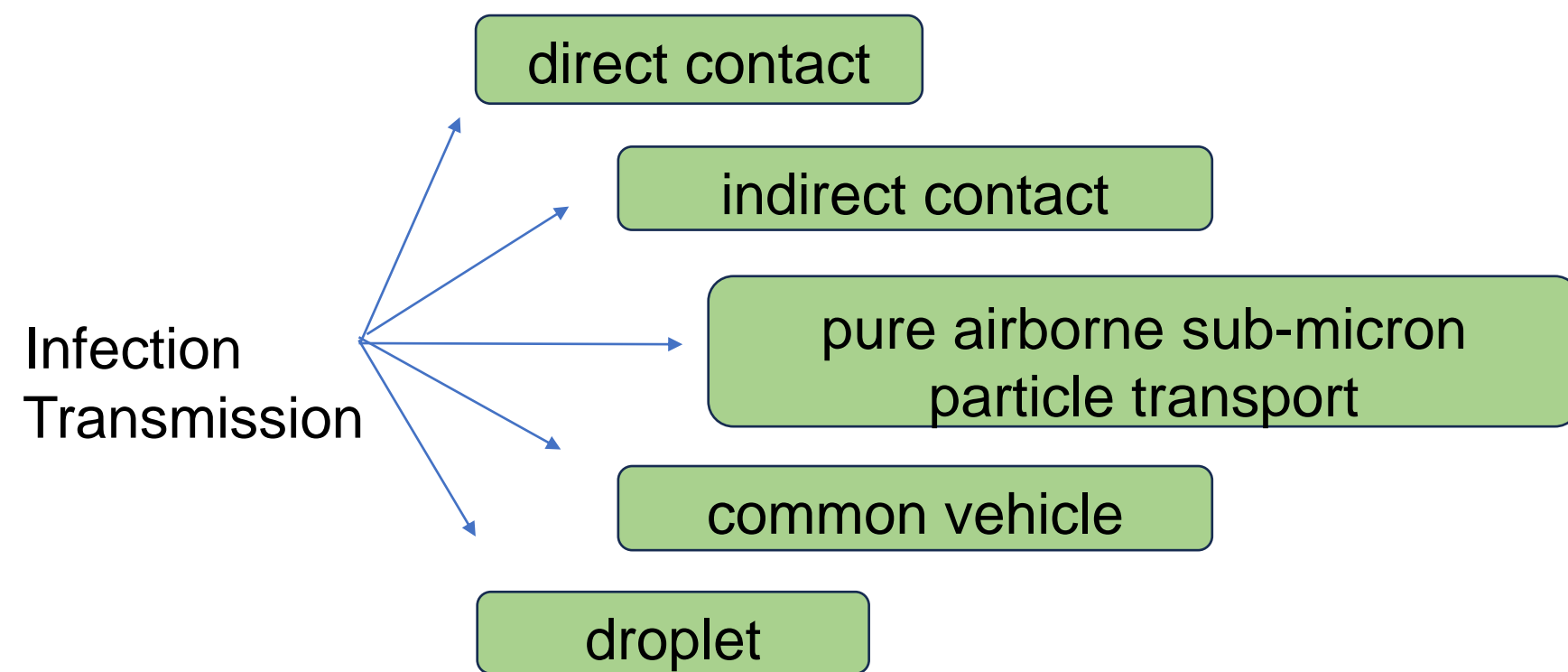


Optimising the performance of air cleaning technology for mitigation of infection in hospital environments.

Background and Motivation

- People are exposed to significant amounts of particles that contain microbial material, also known as bioaerosols [1]
- We cannot eliminate the production of bioaerosols but we can certainly implement mitigation strategies to reduce the effects caused by it.
- People with low immune systems form the major fraction of people affected by inhalation of bioaerosols. Therefore, the risk of infection is at its highest in a hospital environment [2].
- There are several routes for infection transmission in a hospital [3].



- One of the most reliable and feasible ways to reduce exposure is the introduction of air-cleaning technology [2].
- Air Sentry, the industrial partner of this project, manufactures air cleaning devices that have been installed in the NHS and the private healthcare sector since 2000.



Methodology

- A series of experiments and modelling will be used to fulfil the objectives of this project.
- The project's novelty lies in the collection of spatial and temporal data under realistic conditions of a hospital ward.
- The experiments will be conducted in the bioaerosol chamber in a controlled environment at the University of Leeds.
- The experimental setup would be similar to [3] as seen in Figure 2 [3] and the methodology will resemble that described in [4].
- For modelling, computational fluid dynamics (CFD) would be used to understand the airflow of the room.
- The TBS will help understand atmospheric chemistry mainly focusing on chemical oxidation.

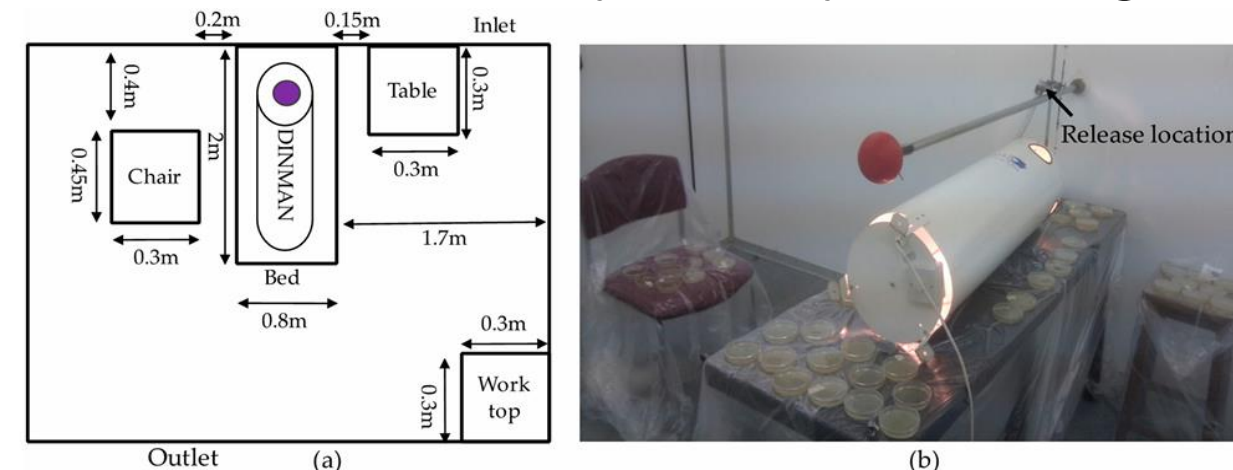


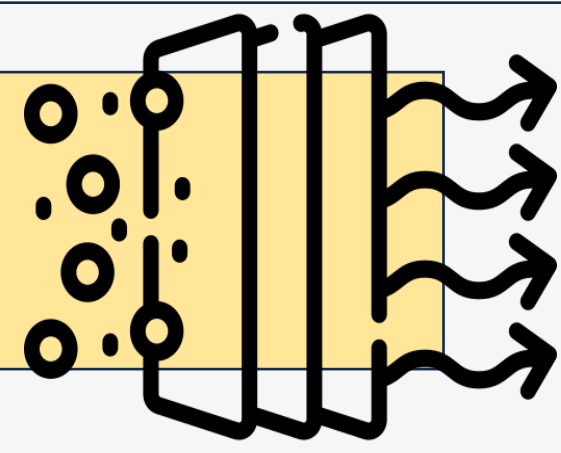
Figure 2. (a) Experimental layout in the chamber for hospital room; (b) Photo of furniture, DIN maset-up and release location.

Responsible Innovation and Policy

- Air cleaners could soon be placed in all public places and installed in offices, like the ventilation system.
- It is our responsibility to put forward the pros and cons of using these devices.
- Clean air will have a positive impact on the healthcare, education, residential, and commercial sectors.
- Innovation and development in this area possess the potential to impact a large section of society by improving indoor air quality, promoting health and safety, and enhancing overall quality of life.
- We can expect that policies related to accepted bioaerosol concentrations, certain regulations for manufacturers, sufficient ventilation in hospitals, and others could be implemented.

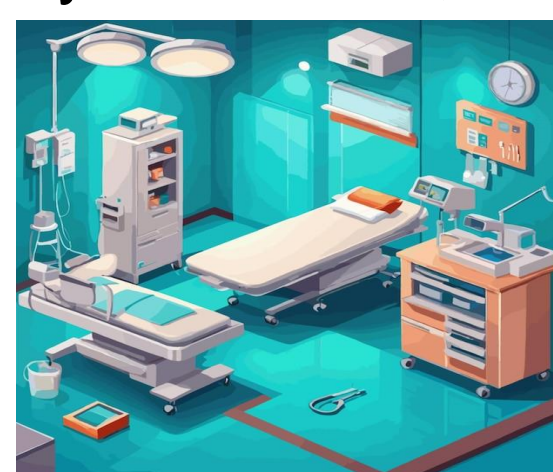


Will air-cleaning technology become the one-stop solution for achieving cleaner and risk-free air soon?



Objectives

- The project intends to study and optimise the use of air-cleaning devices within hospitals. The aims are as follows:
 - To understand the interaction between the design of the air cleaners and the room flow.
 - Assess mitigation strategies for surface contamination. Depending on the outcomes of the 2nd and 3rd year results, one or both objectives may be achieved,
 - Simultaneous removal of gaseous and particle contaminants from the air.
 - Incorporating smart action within the device.



Challenges

- As this project focuses on a sensitive area like a hospital, creating a realistic environment is difficult.
- The absence of standardized protocols for testing and reporting air cleaners makes comparing them difficult.
- Finding a common ground between the academic and industrial agenda is important to maintain a balance between the two sectors.



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