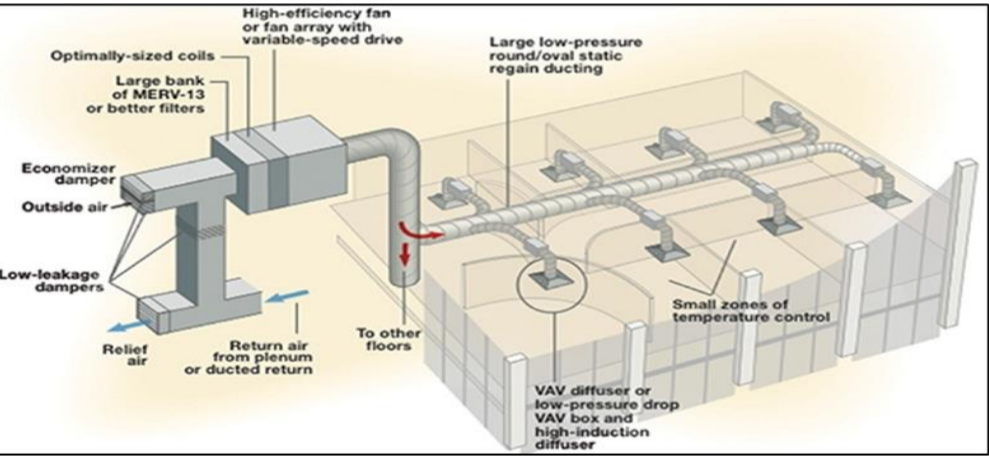


## Aim of the project

With hospitals being the primary providers of medical and surgical care globally, they should ideally be constructed and upheld to the highest standards. One of the most important mechanical systems in these facilities are HVAC systems. The aim of this dissertation was to study the current status and effectiveness of HVAC systems that are present in hospitals and suggest future improvements based on the research carried out.



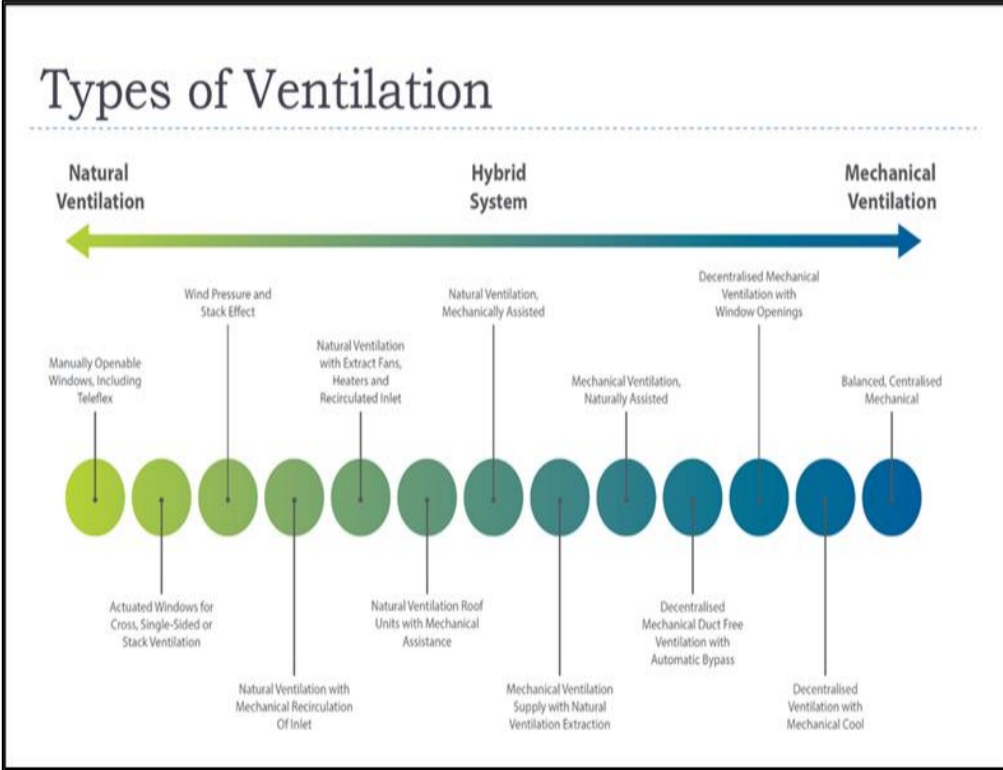
High Efficiency Ventilation system (Hiboox)

## Objectives

- To research the status of how effective current HVAC systems are in hospitals.
- Find out what is the reason for poor HVAC performance in certain hospitals and what are the factors causing the poor performance.
- To find the best solution possible to reduce the risk of airborne diseases and maintain working condition for healthcare workers.
- Compare these changes with the different scenarios studied and analyse the improvements that have been found towards the HVAC Systems in Hospitals.

## Background

Mechanical HVAC systems in hospitals operate by regulating the air quality and temperature levels to benefit the patients and healthcare workers that are present in the environment, these HVAC systems are used to prevent airborne diseases and play a major role in controlling the level of harmful bioaerosols in the air. The need to control the surrounding climate, temperature and humidity is crucial for any working conditions within a facility. Controlling these factors in most workplaces ensure suitable and healthy work conditions for the workers and occupants that are present.



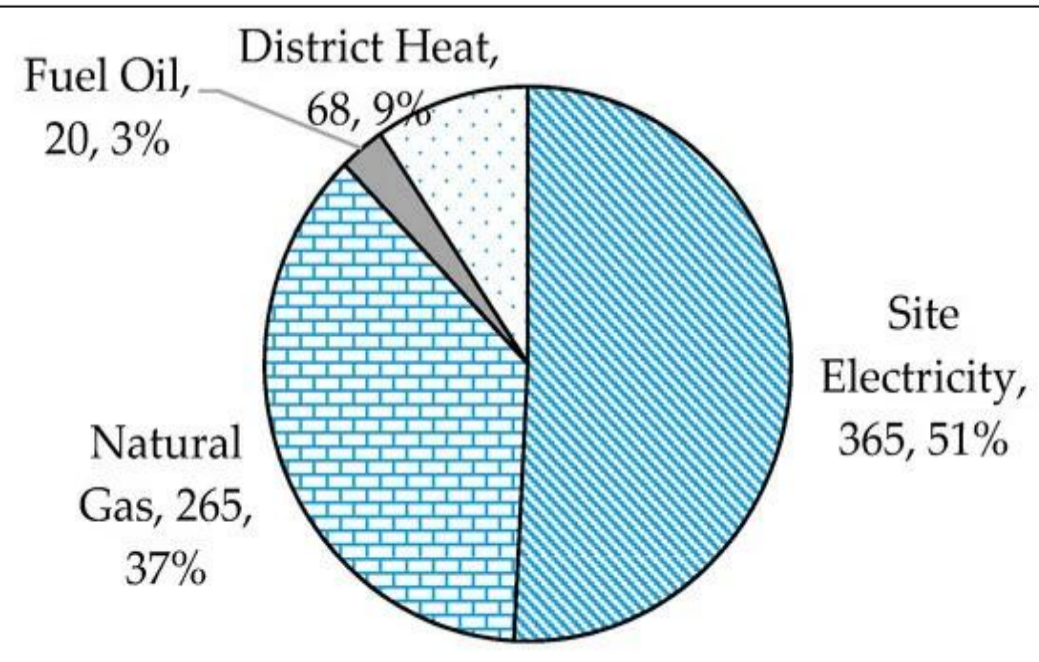
Range of ventilation systems present (ResearchGate)

## Methodology

The main research that was carried out for this topic was by means of case studies and a survey. Altogether a total of five case studies were carried out followed by a survey that was handed into Swinford district hospital

## Problems found

- One of the major problems found in most hospitals was the lack of filter bypass and maintenance in the HVAC systems.
- The heating system cannot be controlled by the nurses in the hospital. This can only be controlled by the maintenance staff who are not based in the hospital. In order to control the temperature a phone call must be made.
- The cleaning and maintenance of these HVAC systems should be carried out on regular occurrences.
- HVAC systems can cause slight discomfort for some.
- Overheating was seen as a big problem in hospitals.
- The energy consumption for HVAC systems in hospitals can reach high figures due to the high levels of heating and cooling. A case study researched showed a figure of 51% in the amount of electricity consumed due to HVAC systems.



Pie chart on HVAC energy consumption (Blue Mountain)

## Results

- HEPA filters to be installed in AC units and exhaust ducts.
- Allowing different temperature thermostats in different zones of the hospitals that can be controlled by the nurses
- Regular maintenance with maintenance workers on site.
- Air curtains were seen as an effective solution with an effectiveness of 60-85%.



Example of an air curtain that is used in hospitals (Burner)

## Conclusion

- The current status and effectiveness of HVAC systems in hospitals was researched by means of a literature review, case studies and a survey.
- The cause for poor performance from these systems was achieved and the factors affecting this were considered.
- Solutions were found from recommendations achieved from the case studies and the survey that was carried out.
- The recommendations and suggested improvements were then analysed and compared with the different studies where the problems that were present were given solutions

## References

Hiboox - <https://www.hiboox.org/optimizing-energy-efficiency/>  
 ResearchGate - <https://www.researchgate.net/>  
 Blue mountain - <https://bluemountainair.net/homeowners/>  
 Burner - <https://burner.com/>