

Ann Noble Research Award - Dissertation Outline

Student: **Rahul Manchanda**

Programme: **MSc Healthcare Facilities, UCL**

Title: **Evaluating Vertical and Horizontal Hospital Typologies: Spatial Efficiency, Patient Flow and Operational Performance**

Academic Rationale

Healthcare architecture is undergoing a critical transformation as rapid urbanisation, land scarcity, and rising healthcare demand push hospitals toward vertical expansion. While vertical hospitals optimise land use, they fundamentally reshape how care environments are experienced, navigated and operated, introducing stacked departments, lift dependency and fragmented circulation. In contrast, horizontal campuses have historically enabled intuitive wayfinding, efficient movement, and strong clinical adjacencies, supporting operational performance and patient wellbeing. Despite their growing adoption, there remains limited architectural evidence comparing these typologies across spatial efficiency, workflow, and user experience. This study positions hospitals as socio-spatial systems, examining how building form shapes movement, behaviour, stress, and care delivery.

Research Questions

- How do vertical and horizontal hospitals differ in spatial efficiency and circulation performance?
- How does verticality affect travel distance, time, and clinical workflows?
- What are the implications for emergency response and departmental adjacencies?
- How does building configuration influence wayfinding, cognitive load, and user experience?
- When should vertical or horizontal typologies be adopted in future healthcare systems?

Methodology

Mixed-method comparative approach:

- **Literature Review:** Guidelines (HBN/HTM), academic research, healthcare planning standards
- **Case Studies:** Comparative analysis of UK-based and international hospital projects
- **Spatial Analysis:** Integration, depth, connectivity, movement flow, travel distance/time, vertical transport dependency
- **Sociological Layer:** Wayfinding complexity, cognitive load, user experience mapping
- **Synthesis:** Comparative matrix + **Hospital Spatial Efficiency Index (HSEI)**

Use of Award Funds

The award will enable a shift from theoretical study to empirically grounded research:

- Advanced spatial modelling tools (simulation software)
- Access to detailed hospital plans and datasets
- UK-based site visits for on-site observation
- Expert interviews with architects and healthcare professionals
- High-quality analytical diagrams and visualisations

As hospitals move vertically in response to urban pressures, this research aims to provide a critical, evidence-based framework to inform future-ready, high-performance healthcare design decisions.