

Identifying Features of Healthcare Facility Design as a means to Contain the Spread of Epidemic Infectious Diseases



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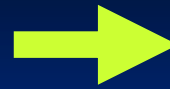
Architectural Design
(Tangible)

&

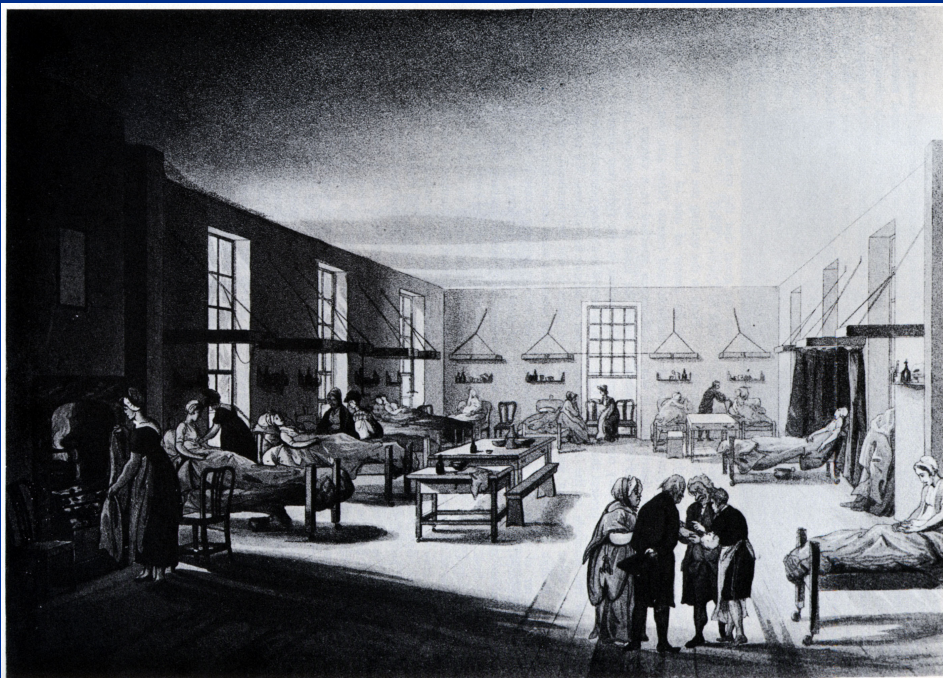
Infection Control
(Seemingly Non-Tangible)



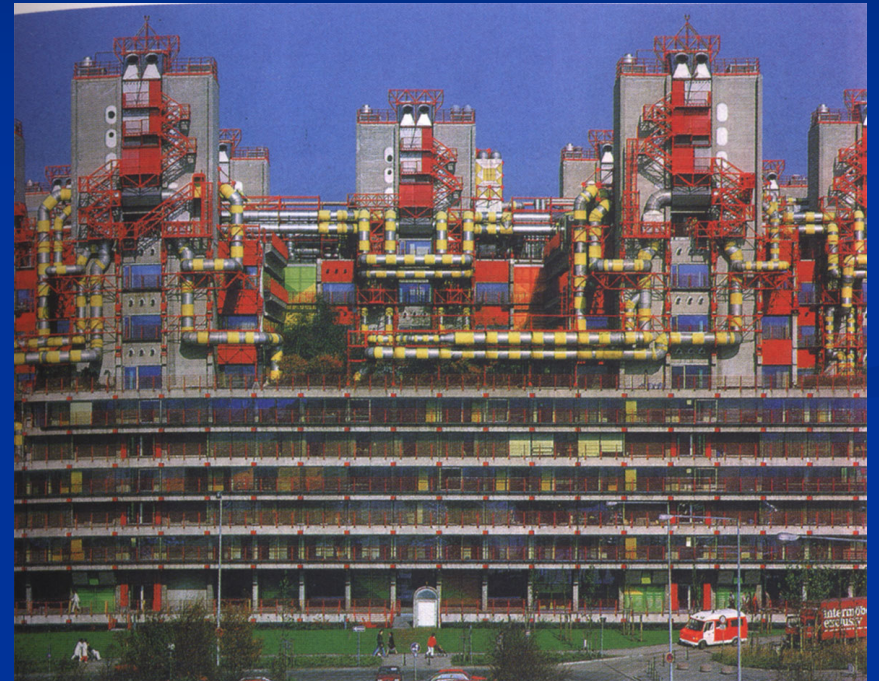
Sick House



Healthcare Industry



**Middlesex Hospital,
London. 1808 A.D.**



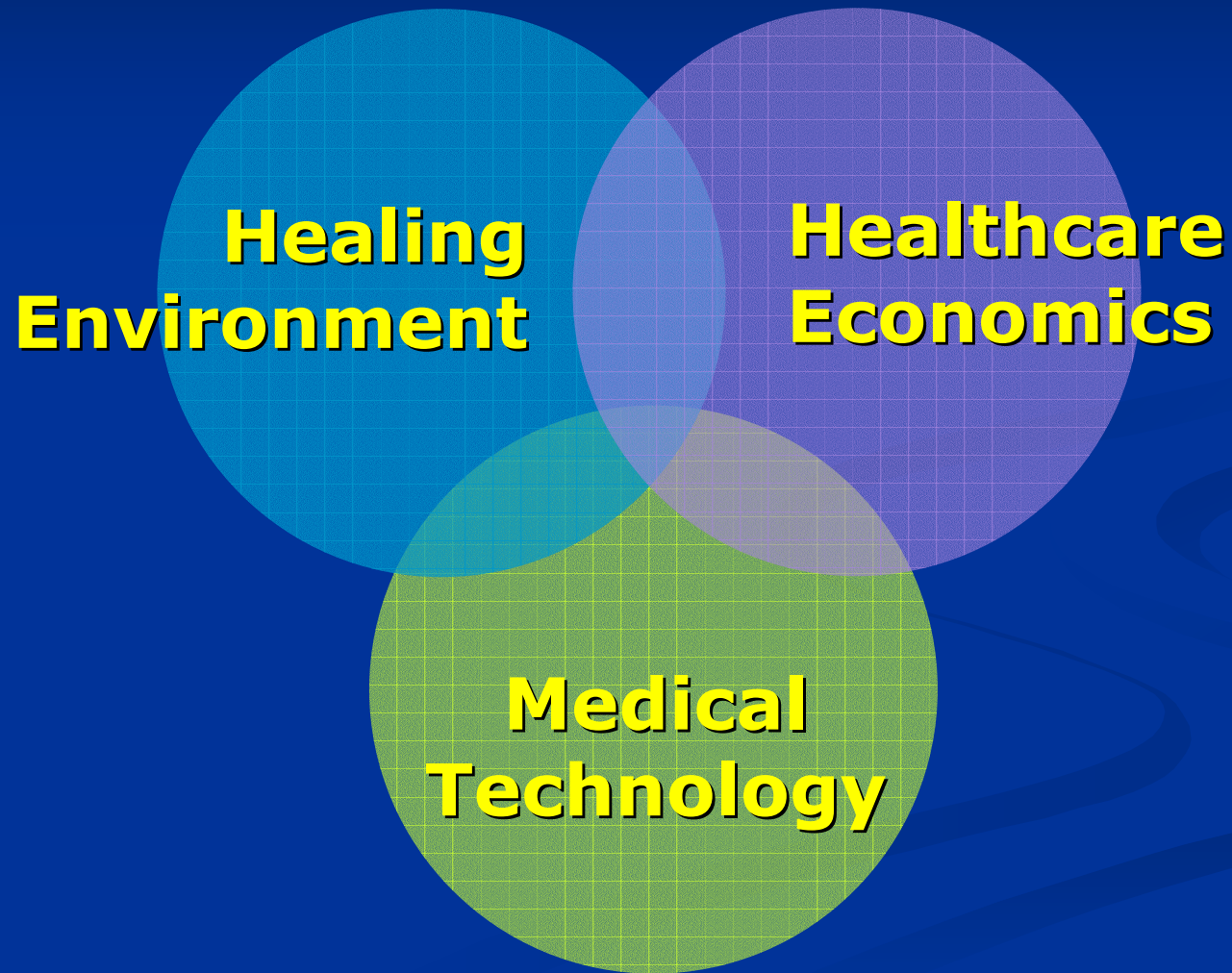
**Tech. Univ. of Aachen,
Medical Center, Germany,
1984**

A Place for the Sick
Vs.
A Place for Healing

Future Keywords:

Virtual Medicine
Agelessness
Healing-in-place
Bionic Architecture

Healthcare Industry



Why is Control Needed ?

1. Patient Fatality

**Nosocomial Infection affect 5-10% of all patient
2 million per year in US Hospitals**

**Hospital-acquired Infections are implicated in
over 88,000 deaths in the US each year**

[Source: Weinstein, CDC, 1998]

Why is Control Needed ?

2. Increased Health Cost

**Nosocomial Infection Costs \$4.5 billion
each year in the US**

[Source: Weinstein, CDC, 1998]

**Decreased the nosocomial pneumonia rate 29%
in one large tertiary care facility,
resulting in cost savings of \$200,000/year**

[Source: Infection Prevention &
Management Associates, Inc.;
Houston, Texas]

Keywords:

- **Facility Design**
- **Epidemic**
- **Infectious Diseases**
- **Nosocomial Infection**

Endemic : if it has a stable pattern of occurrence in a given population.

Epidemic : are defined as the occurrence of an infectious disease greatly in excess of expectation.

Pandemic : is an epidemic occurring over a wide area and usually affecting a large proportion of the population.

Nosocomial Infection:

“An infection acquired in hospital by a patient who was admitted for a reason other than that infection. An infection occurring in a patient in a hospital or other healthcare facility in whom the infection was not present or incubating at the time of admission.”

Nosocomial infections – known also as hospital-acquired infections, hospital-associated infections, and hospital infections.

US Nosocomial Data

Year	Admissions (x10 ⁶)	Patient days ^a (x10 ⁶)	Length of stay (days)	Nosocomial infection (x10 ⁶)	Nosocomial infections (/1000patient days)
1975	38	299	7.9	2.1	7.2
1995	36	190	5.3	1.9	9.8

^aPatient days = total inpatient days

Nosocomial Infections :

Air Borne

Water Borne

Touch Borne

Medical Device Based

Nosocomial Top Chart

MRSA

Urinary Tract Infection

Nosocomial Pneumonia

TB

SARS

▪

▪

▪

Etc.

Health Factors [Limitations]:

- **Patient Health**
- **Susceptibility to Infection**
 - **Age of Subject**
 - **Infection Type**

METHOD: PLANNING & DESIGN

'ZONING'

'STRATIFICATION'

A. Low Risk Areas (*administration*)

B. Moderate Risk Areas (*regular patient units*)

C. High Risk Areas (*isolation unit, ICU*)

D. Very High Risk Areas (*operating rooms*)

Influencing Parameters of Design

- **Traffic Flow and Patient Transport**
- **Adequate Spatial Separation of Patients**
- **Adequate nos. of Isolation Rooms**
- **Appropriate Access to Hand-washing**
- **Materials that can be Adequately Cleaned**
- **Appropriate Ventilation**
- **Appropriate Potable Water System**
- **Zoning of Air System**

The Biggest Constraint

'Data Collection'

Types of Required Data

- **Nosocomial Infection Surveillance Data**
- **Setting up of Nosocomial Infection Surveillance Benchmark**
- **Collaboration between Infection Control & Clinical Microbiology**
- **Feedback of Data**
- **Performance & Response Data**
- **Dissemination of Intra-Hospital Infection Data among Health Care Professionals**
- **Synthesis of Individual Success Stories**

Remarks:

Four Major Steps in Achieving more Caring and Safer Healthcare Facilities

- 1. Ensuring access to Nosocomial Infection Data by Concerned/Interested groups/parties.**
- 2. Setting up Nosocomial Infection Control Institutions.**
- 3. Creating design interventions, as required, by analyzing evidence based data collection.**
- 4. Collaboration between Designers and Infection Control Professionals.**

Thank you