Evidence Based Design for the Post-Antibiotic Era: Experiences from a New Building for Infectious Diseases in Malmö, Sweden

Peter Lanbeck, MD, PhD
Scope of today´s lecture

• Perspective from infectious diseases and infection control - implications for hospital planning and building – in general and details
• Interaction with users
• How did we do it – what was the evidence
Planning started in 2005

• The old facility
  – Built in 1908 rebuilt several times
  – On the ground with entrance from outside
  – Inner and outer anterooms
  – Few singlerooms
  – Worn out, small rooms, bad working conditions
  – Ventilation old and not adequate
Infectious Diseases organisation in Sweden

- Facilities emerged from "epidemic" hospitals
- Separated from internal medicine
- Facilities used to be located outside of or in outskirts of hospital area
- Facilities on all regional hospitals (25)
- Internationally large number of beds
Proportion of Methicillin Resistant *Staphylococcus aureus* (MRSA) Isolates in Participating Countries in 2014

Percentage resistance:
- < 1%
- 1 to < 5%
- 5 to < 10%
- 10 to < 25%
- 25 to < 50%
- ≥ 50%
- No data reported or less than 10 isolates
- Not included

(C) ECDC/Dundes/TESSy
Future in Infectious Diseases - looking back!

- A sample of new and emerging infections during the last 30 years:
  - HIV/AIDS
  - Hepatitis C
  - Lyme disease
  - SARS
  - Norovirus
  - Resistant bacteria: MRSA, VRE, ESBL
  - Resistant tuberculosis
Future of Infectious Diseases

- Bacterial resistance
- Influenzae-Pandemic flu-Birdflu
- New viral infections
- Bioterrorism
- Climate changes – globalisation – refugees
- ?
Factors that promote resistance

- Antibiotics
- Crowding
- Hygiene
- Bacterial factors
- Selection
- Propagation
Main principles

• Far away - yet nearby
• Flexibility
• Defined links to hospital main facilities
Far away - yet nearby

• Far away:
  – Direct access to patient-room from outside
  – Separate ventilation from rest of hospital
  – Separate sewage

• Nearby:
  – Emergency unit,
  – ICU and
  – Radiology
  – Hospital main buildings
Flexibility

- Seasonal variations
- Outbreaks
- Emerging infections
- "Everyday care" as well as advanced isolation
Interaction between the Emergency unit and dpt of Infectious diseases
Admitting patients – pre-emptive separation

- Examination in rooms in the emergency room or in out-patient clinic – entrance from outside
- From examination room to elevator – outdoors
- From elevator to in-patient room on balcony
- Into patient room directly from outside
Infectious diseases

Communicable diseases with need for single-rooms

Diseases with need for advanced isolation
The patient-room

- All large single-rooms that can be used as small double-rooms
- Inner and outer ante-rooms
- Access from the balcony
Ventilation

• All 50 rooms good ventilation
• 17 more advanced
• 5-10 air exchanges/h
• Easy to handle
• Hepafilters
• No risk for spread between rooms
• No air leakage
Elevators with access to balcony
The patient room
Ante-rooms
Balconies
Evidence-Based Design Applied

• Daylight
• View
• Privacy
• Single rooms
• Advanced ventilation system
• Facility planning to support hand hygiene
• Patient lifts in all rooms
• Support of family presence
Building organisation

• Architect: CF Möller bureau in Aarhus, Denmark in cooperation with Samark (now LINK) Sweden

• Fruitful dialogue between architect and user

• Constructor PEAB Sweden

• Building management Region Skåne
Evaluation

• Main principles:
  – Flexibility
    • Has been used for evacuation
    • Works good as single and double room
    • Can be used for highly contagious diseases (Ebola, MERS)
  – Far away yet nearby
    • Can be used for highly contagious diseases (Ebola, MERS)
    • Easy to isolate all kinds of contagious diseases
    • Technical solutions work
  – Links
    • Works – no patient transport in main hospital areas
Evaluation

• No spread of resistance

• Difficulties in evaluation of working conditions
  – New hospital organisation
  – Economic cuts and staff reduction
  – Not used as only single rooms
  – Other use – other departments in the facility
  – Difficult to recruit nurses – in general
CONSTRUCTION FACTS

Area 24,000 m²
(19,000 m² new construction and
5,000 m² reconstruction)
Diameter 65 m
Height 30 m
8 floors including basement

Construction start Jan/Feb 2008
Completion 2011

General Construction
PEAB AB
Important people in the process

• CF Möller
  – Klavs Hyttel
  – Jörn Held

• Samark
  – Paula Block

• Building management of Region Skåne
  – Klas-Göran Björk
  – Håkan Ahlqvist

• Hospital project manager
  – Ingela Andersson-Lyberg

• Inspirator and dialogue partner
  – Roger Ulrich