

Architecture and Healthcare, A German Perspective

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Crieff Hydro, Scotland*

AGENDA

BASIC

Built environment and IPC

- *History*
- *Challenges*

PROJECT KARMIN

Patient Room and IPC

- *Objectives*
- *Methods*

LEARNED LESSON

10 FINAL CONCLUSIONS

RESEARCH TEAM HEALTH CARE BUILDING AND IPC



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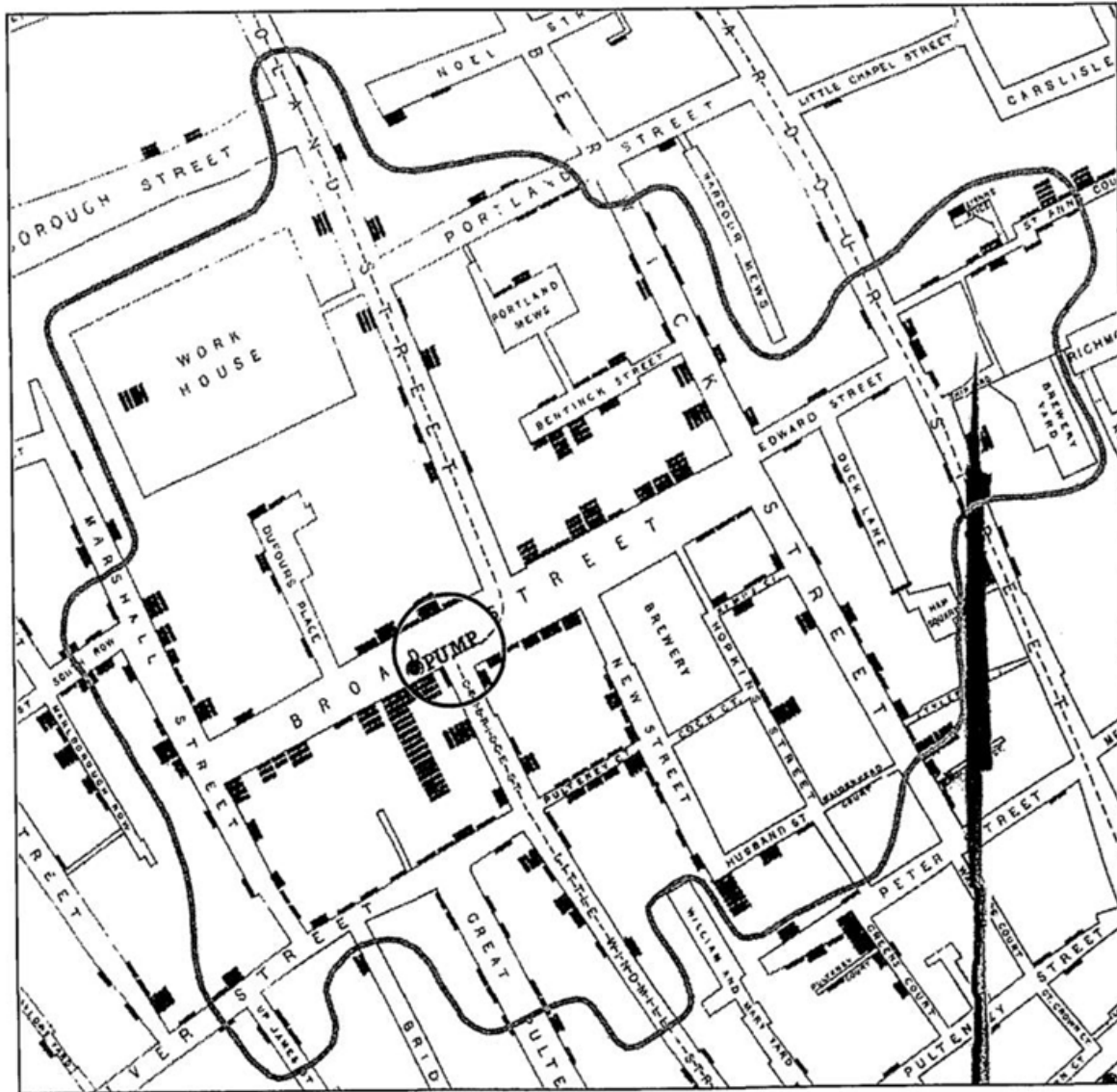


Steven Hahnemann

What influence does the built environment have on IPC?

RESEARCH AREAS

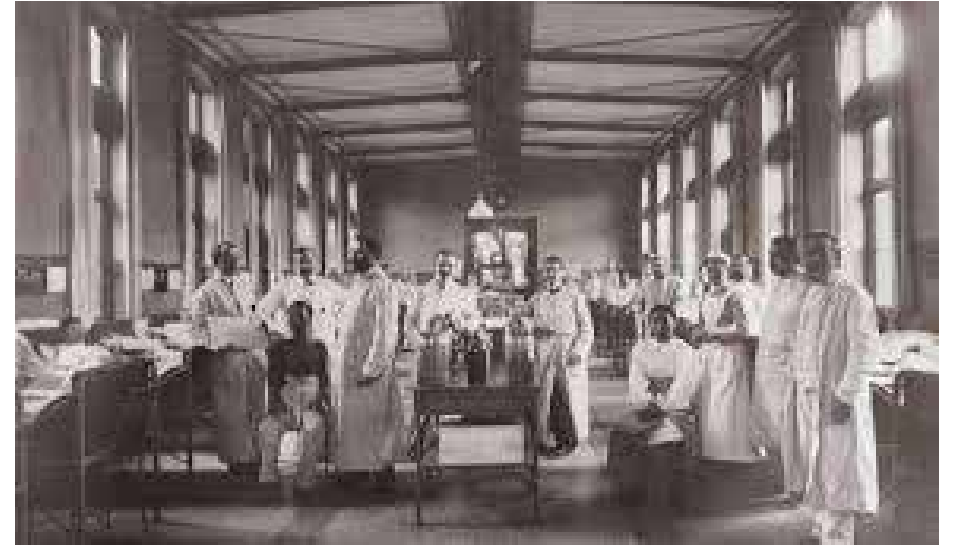
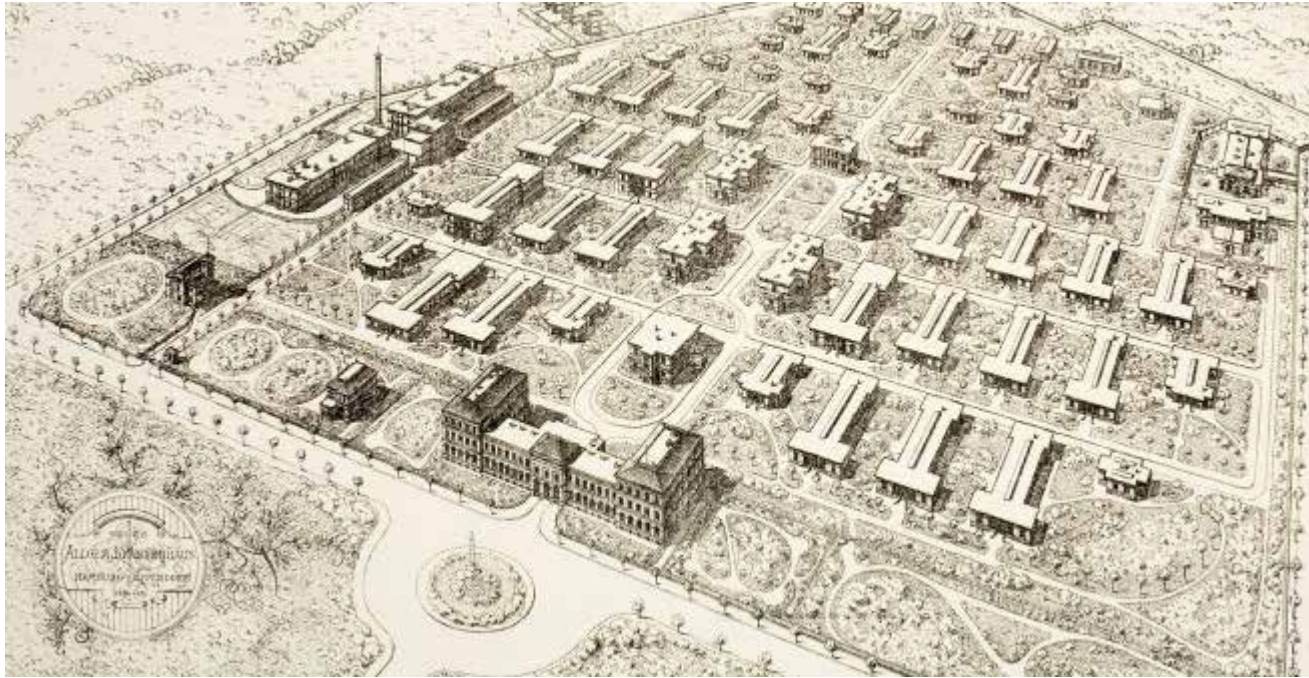




Infectious disease epidemiology deals with the temporal and geographical spread of infectious diseases.

Illustration: Extract from London map: Cholera related deaths in central London September 1854 (Koczweski and Foster 2012)

HISTORY OF IPC AND HOSPITAL DESIGN: 1885



Supplying the hospital beds with air and light and keeping the air in the rooms clean were top priorities for the pavilion structure.

Illustration: Municipal hospital in Hamburg-Eppendorf, floor plan of a hospital pavilion 1885-1888 (Murken 1995).

Tuberculosis at the beginning of the 20th century. In the corridor construction, in the spirit of open-air therapy, the wards opened to the south and were equipped with spacious balconies.

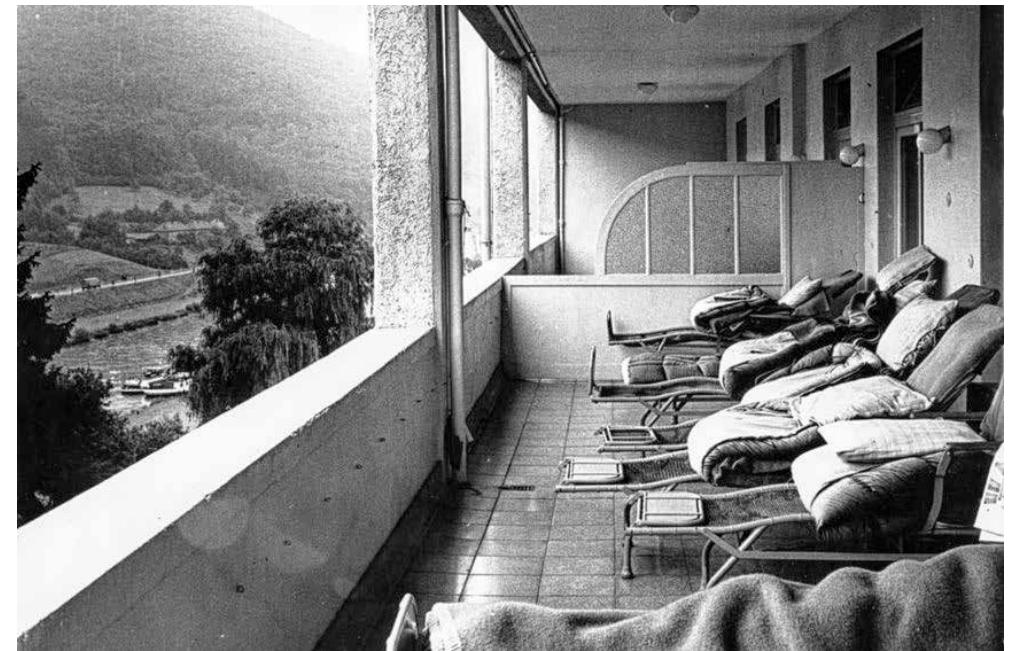


Illustration: Municipal hospital in Düsseldorf, 1907, site plan and view (Murken 1995)

HISTORY OF IPC AND HOSPITAL DESIGN: 1970



The medical transformation from a humanistic holistic care to a high-tech system found its special expression in the university hospitals, found its particular expression.



Illustration: Hospital of the University of Aachen, -1985,



The hospital complex is organised like a city, with a hierarchy of quarters, streets, squares and courtyards. Architecture based on the systematic application of knowledge and evidence-based design



Illustration: Hospital of the University of Aarhus, -2010, C.F. Möller Architects

CHALLENGES TODAY

INCREASES OF MULTI-RESISTANT BACTERIA AND NEW AGENTS



INCREASE IN NOSOCOMIAL INFECTIONS AND MULTI-RESISTANT GERMS



tagesschau

Sendung verpasst? 



🏠 ▶ Ausland ▶ Amerika ▶ Antibiotika-Auswertung für 2019: 1,2 Millionen Tote durch resistente Keime



<https://www.tagesschau.de>,
Date 20.01.2022

Antibiotika-Auswertung für 2019

1,2 Millionen Tote durch resistente Keime

Stand: 20.01.2022 07:47 Uhr

Seit Jahren warnen Experten vor der Gefahr von Antibiotika-resistenten Bakterien. Nun zeigt eine Studie: Mehr als eine Million Todesfälle weltweit ging 2019 laut Schätzungen direkt auf das Konto solcher Keime.

CHALLENGES TODAY

THE BURDEN OF HEALTH CARE-ASSOCIATED INFECTIONS (HCAI)

Data from high-income settings

Drugs consumption



Excessive use of medicines
(costs and drugs resistance)

Hospitals stays



16 million extra-days
of hospital stay

Mortality rates



37 000 deaths/year EU
99 000 deaths/year
USA

Financial losses



€ 7 billion year in EU
US\$ 6.5 billion year in
USA

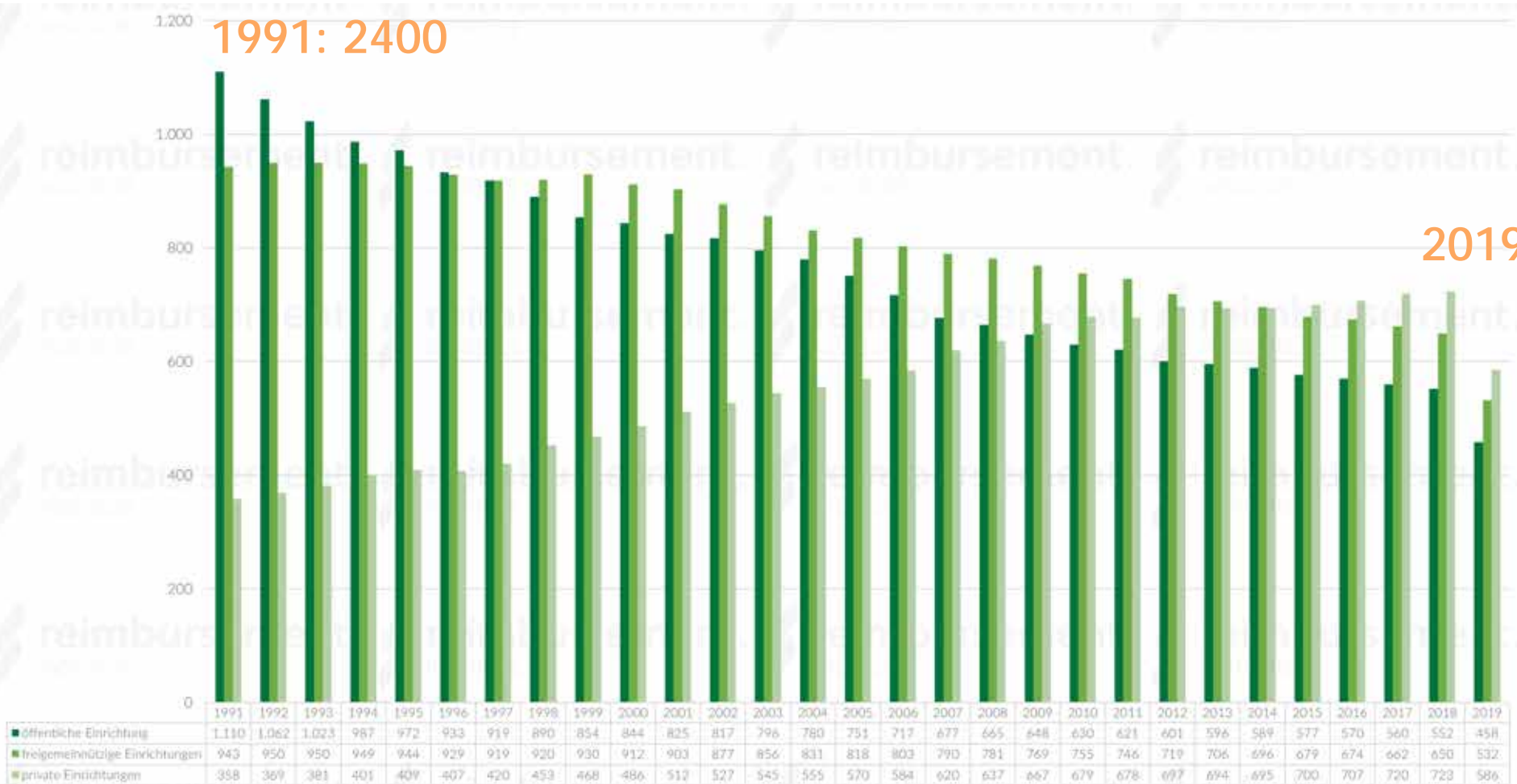
CHALLENGES TODAY

SHORTAGE OF CARE AND POOR JOB QUALITY



CHALLENGES TODAY

REDUCTION IN THE NUMBER OF HOSPITALS IN GERMANY



KARMIN

UNTERSUCHUNGEN ZUM EINFLUSS DER ARCHITEKTUR UND DES DESIGNS AUF DAS AUFTRETEN VON NOSOKOMIALEN INFEKTIONEN UND MULTIRESISTENTEN ERREGERN UND ZUR BESIEDLUNG EINES NEUEN KRANKENHAUSES MIT MIKROORGANISMEN

Aufgrund der unterschiedlichen Übertragungswege von Infektionen haben Patienten und Mitarbeiter auf Pflegestationen spezifische Anforderungen an ein hygienereobustes Umfeld. Diese können zum Beispiel in der Bereitstellung von ausreichender Bewegungsfläche für die erforderlichen Pflegeprozesse oder in der Sicherstellung eines bestmöglichen Überblicks der Station zur Beobachtung und Kontrolle liegen.

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KARMIN



Vorhabenlaufzeit
10.2016-
09.2019

Das neu sanierte Bettenhochhaus der Charité in Berlin soll als Musterbeispiel dienen für Untersuchungen zur

The aim is to plan and build a prototype of a two-bed room for normal care.

This prototype should show if a two-bed room is infection-proof for patient accommodation.

ROOM STRUCTURE IN OTHER COUNTRIES

- Canada:** The ward of the 21st century has mainly single rooms (>80%).
- USA:** Single rooms become the standard
- UK:** 50 % single room share required in new buildings
- DK:** New buildings only with single room standard
- NO:** St. Olav Hospital with exclusively single rooms. Single rooms as a sample
- NL:** Erasmus Medical Center Rotterdam with single rooms only as a model

Van Steelandt et al. *Anthropology & Medicine* 2015; 22: 149-161

Bobrow/Thomas. John Wiley & Sons 2000; 131-93

Department of Health 2013 Health Building Note 04-01 adult in-patient facilities

Buschbeck et al. *Bauwelt* 2012; 103: 270412

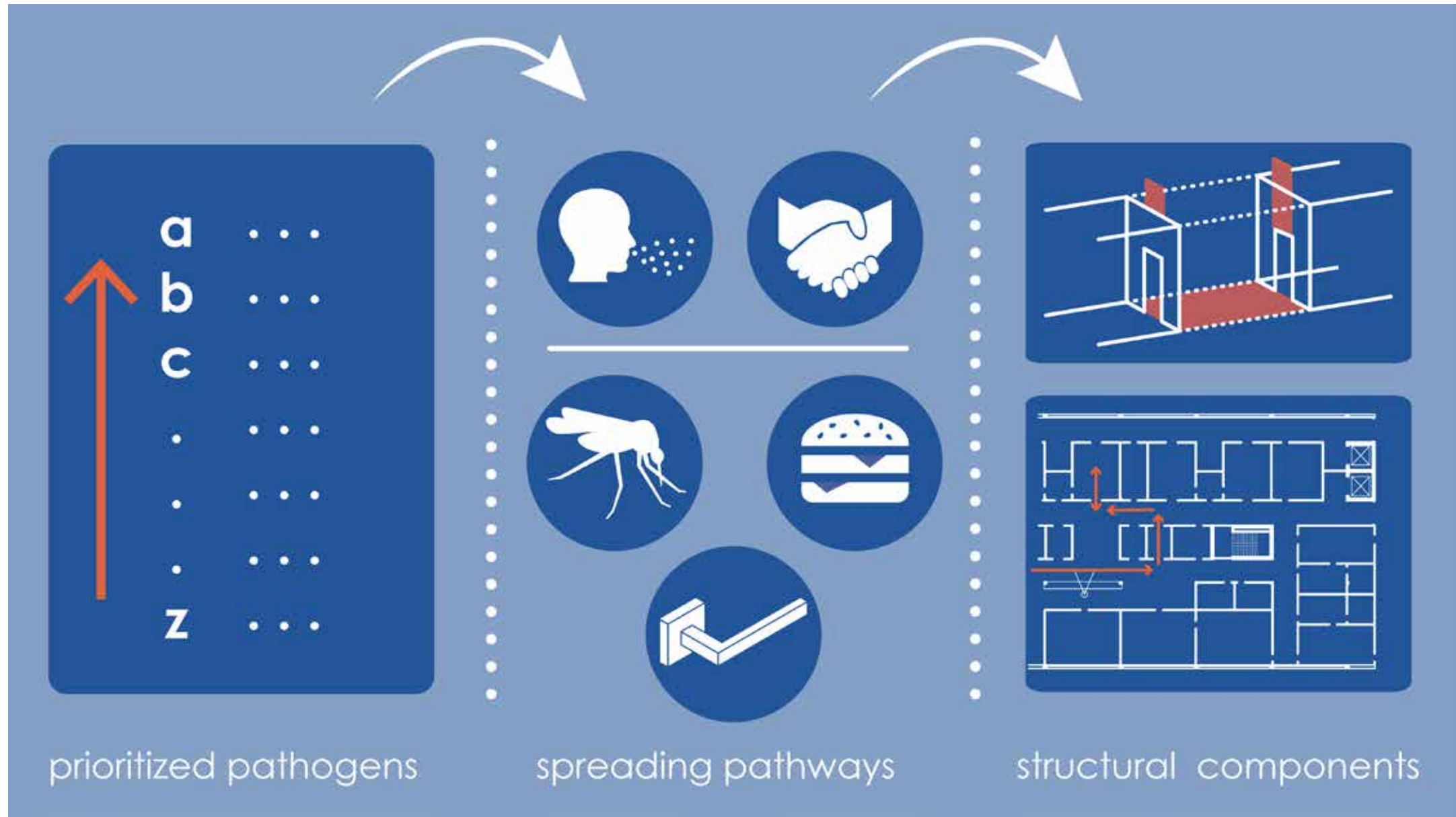
Bakken B *Health Estate* 2012; 66: 28-32

Van de Glind et al. *Health Policy* 2007; 84:153-61

QUOTE OF SINGLE ROOMS IN GERMAN HOSPITALS

Stationsart	n	Zimmer	Betten	Patienten-zimmer-anzahl im Median	Betten-anzahl im Median	Anteil Betten im Einbettzimmer (%)
Intensivstation	534	4134	6817	7	12	27,1 %
Normalstation	621	9921	22189	15	34	6,4 %

COMPONENTS OF INFECTION PREVENTION



Established methods of building to reduce infection

Structural components

Material and surfaces

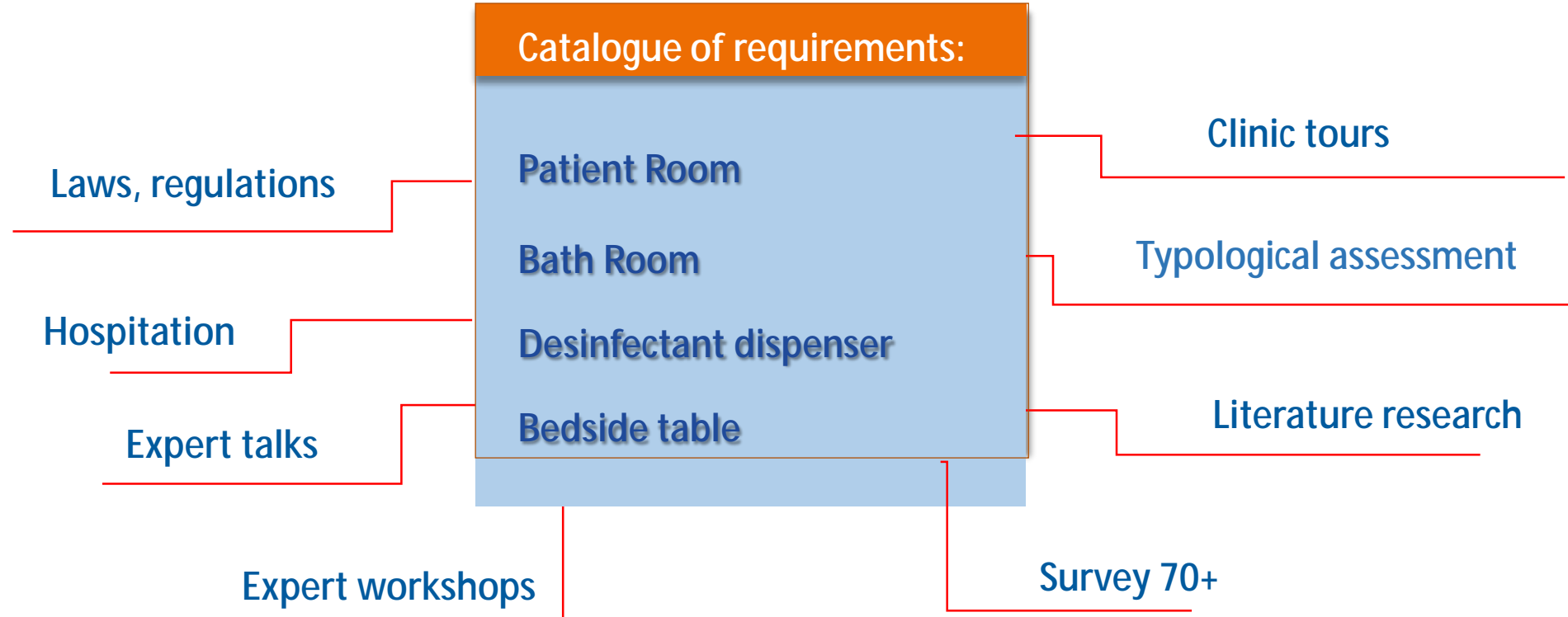
Building technology components

*Building functional-process
components*

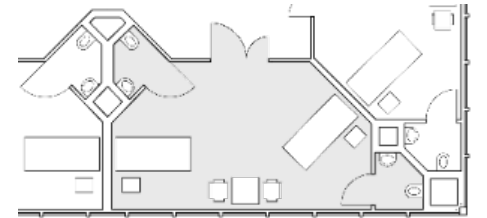
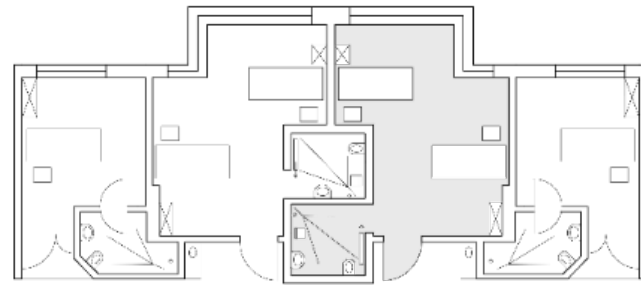
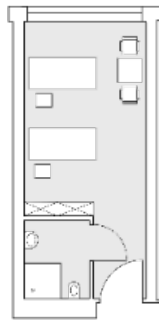
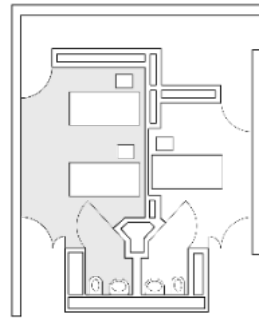
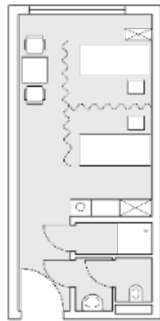
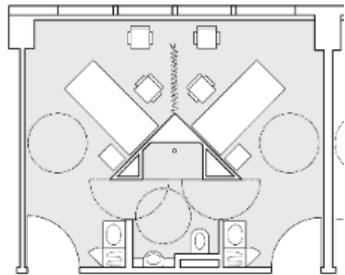
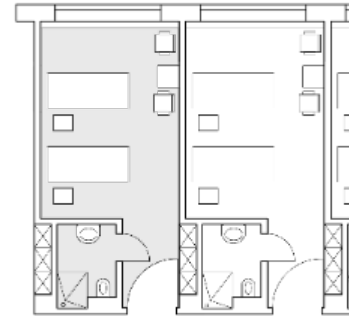
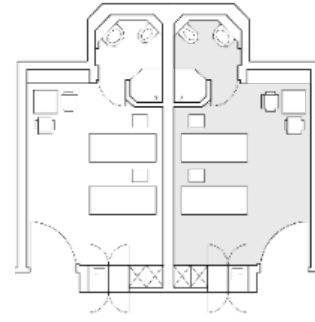
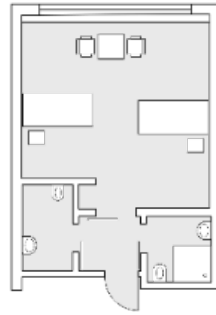
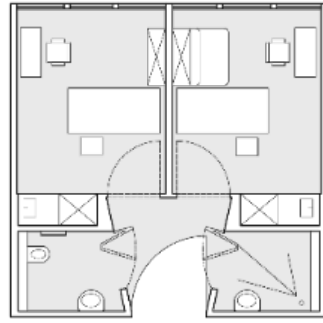
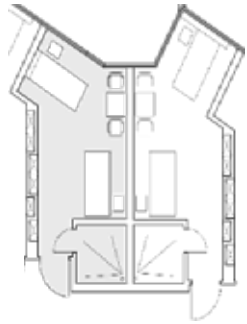
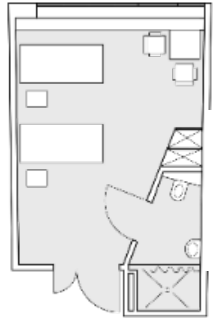
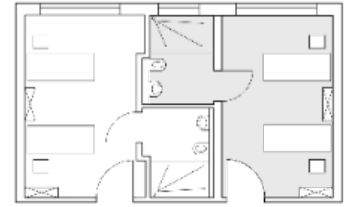
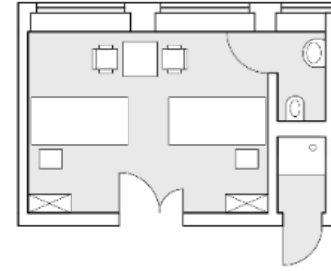
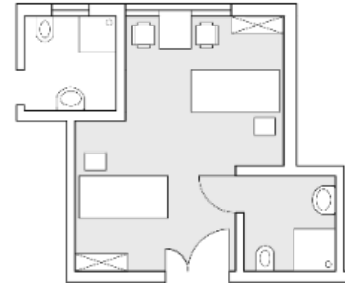
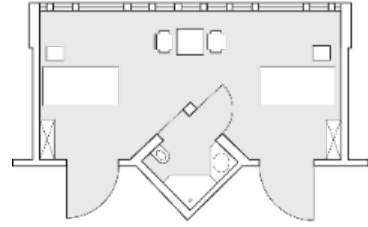
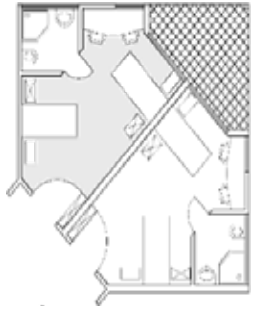
Unbundling / directional routing

Land allocation and barriers

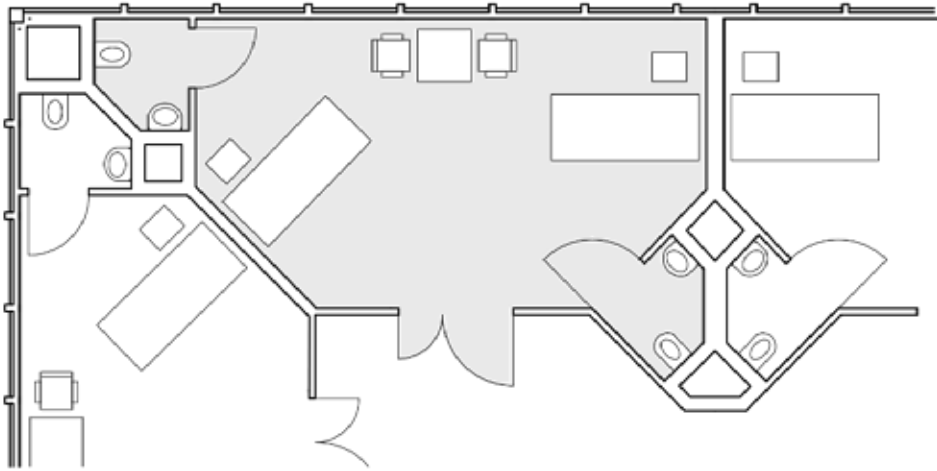
Separation and isolation



TYOLOGICAL ASSESMENT



EXAMPLE



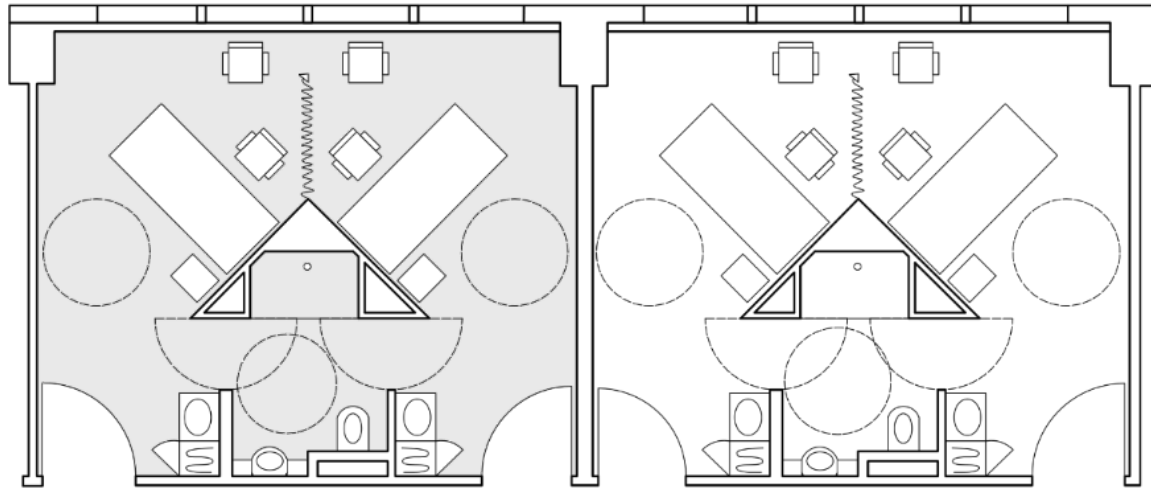
Nürnberg Süd Klinikum II

Neubau Fertigstellung 1994

Zweibettzimmer-Variation



EXAMPLE



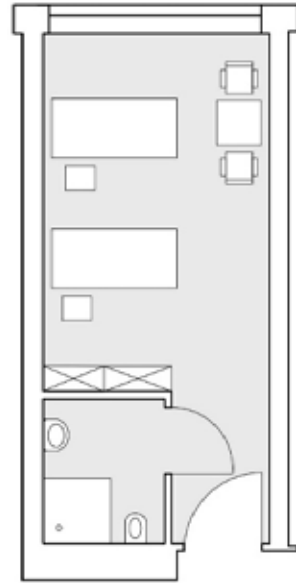
Mississauga CA Trillium Health

Umbau/Modernisierung 2017

Zweibettzimmer



EXAMPLE



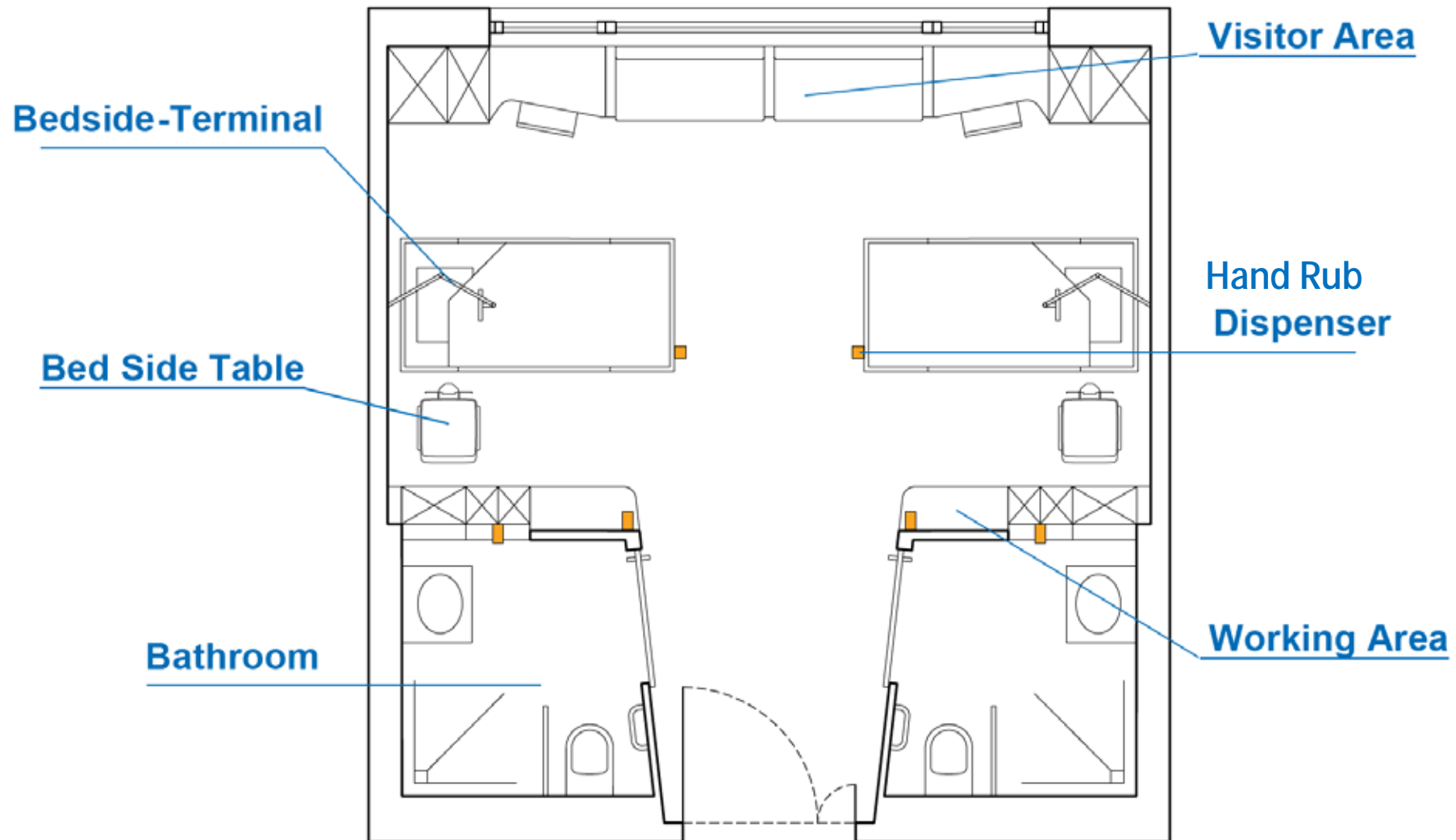
Dinslaken St.Vinzenz

Umbau Wahlleistungenstation 2013
Zweibettzimmer

PROTOTYPE SETUP



GRUNDRISS PATIENTENZIMMER

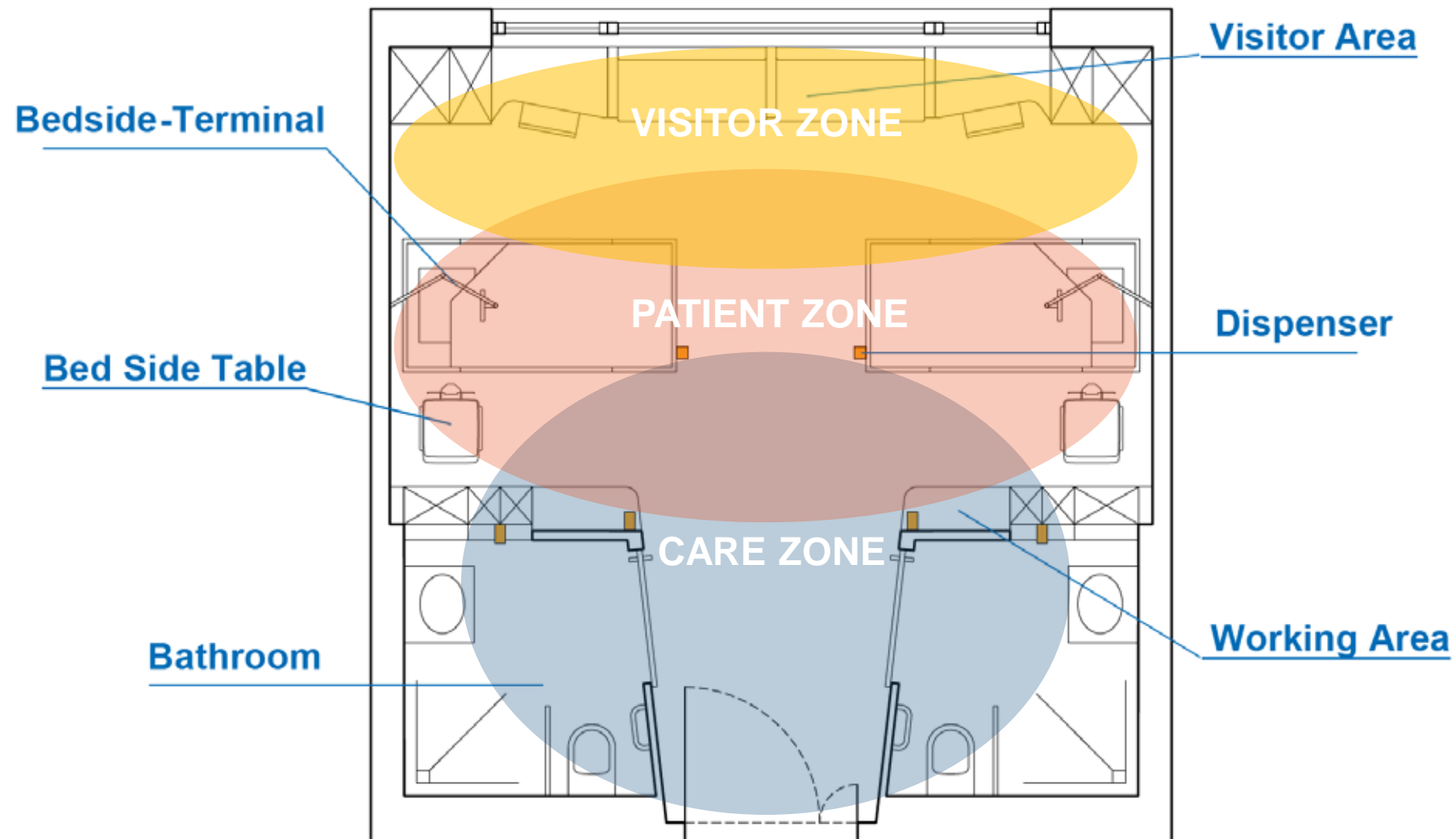


10 CONCLUSIONS

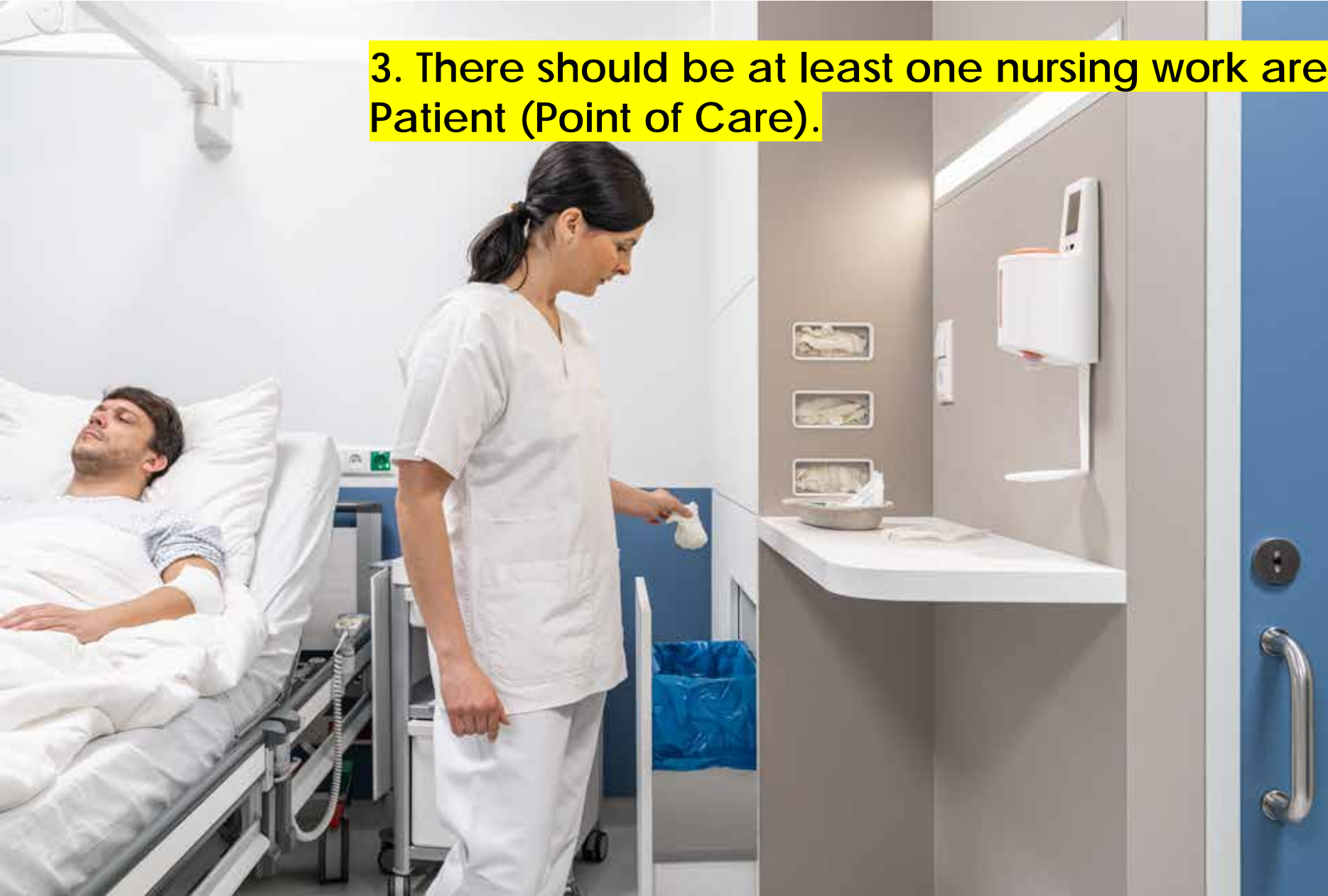
1. The position of the patient beds in a two-bed room should be planned equally and the patients should be positioned as far as possible positioned as far apart from each other as possible.



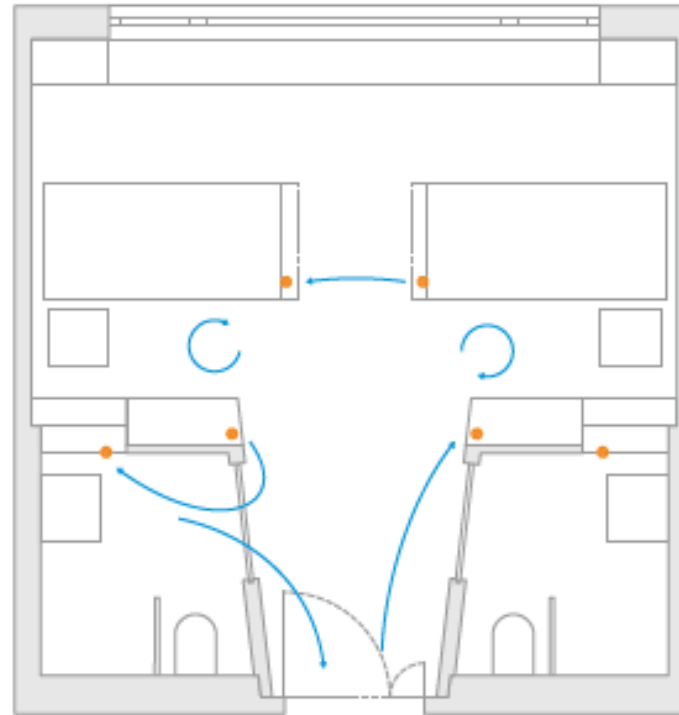
2. A clear zoning of the room into working, visitor and patient areas patient area makes sense.



3. There should be at least one nursing work area close to the Patient (Point of Care).



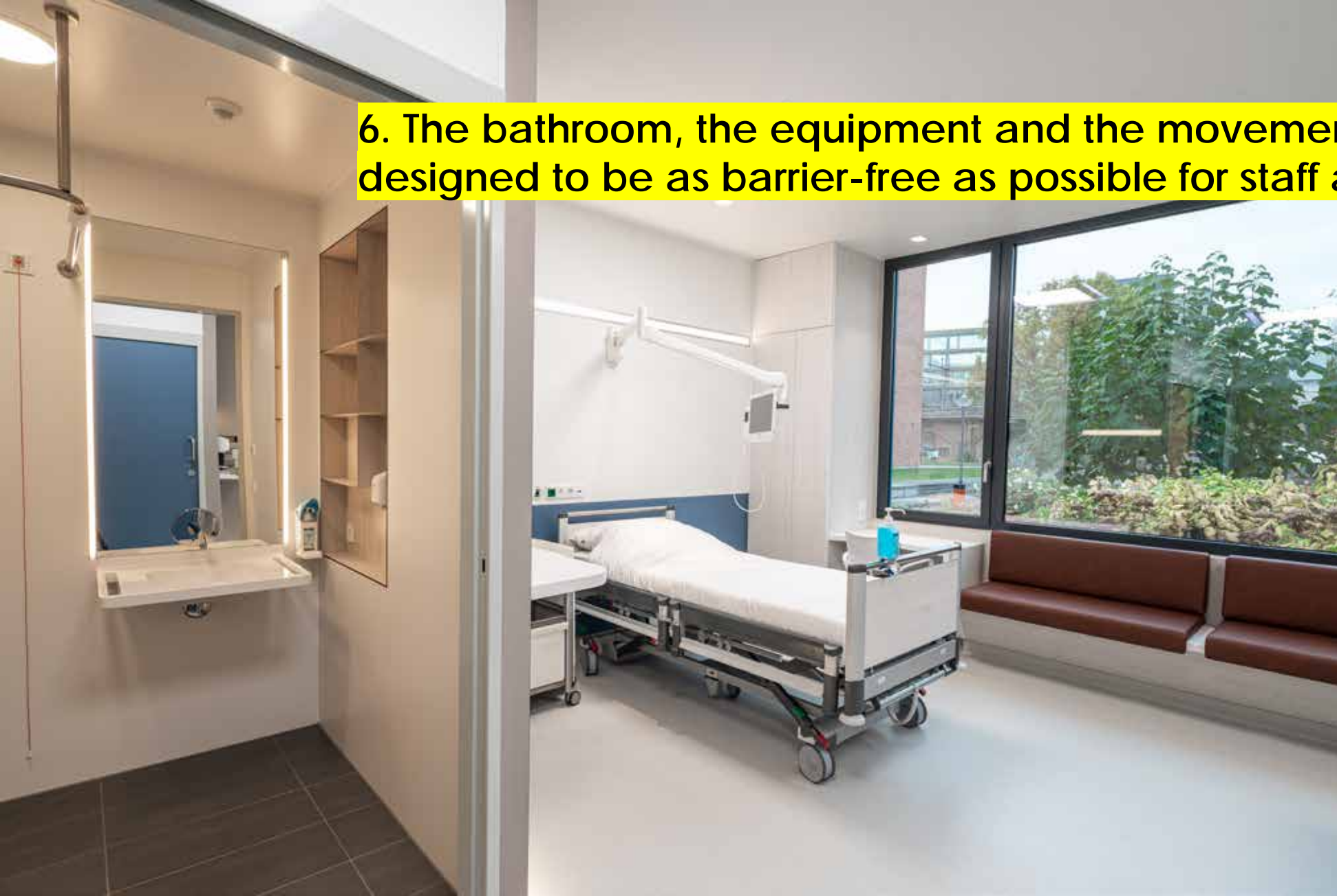
4. Desinfectant dispensers should be placed along the work route, clearly visible and accessible.



5. Two-bed rooms should be equipped with two bathrooms to prevent contact prevent contact infections.



6. The bathroom, the equipment and the movement areas should be designed to be as barrier-free as possible for staff and patients.



10 CONCLUSIONS

7. The equipment/furniture should be planned, as far as possible, be with few joints.



10 CONCLUSIONS


8. Radial surface instead of edges, monochrome surfaces in the care work area, the reduction of objects that come into contact with the floor and reduced material changes should support cleaning.



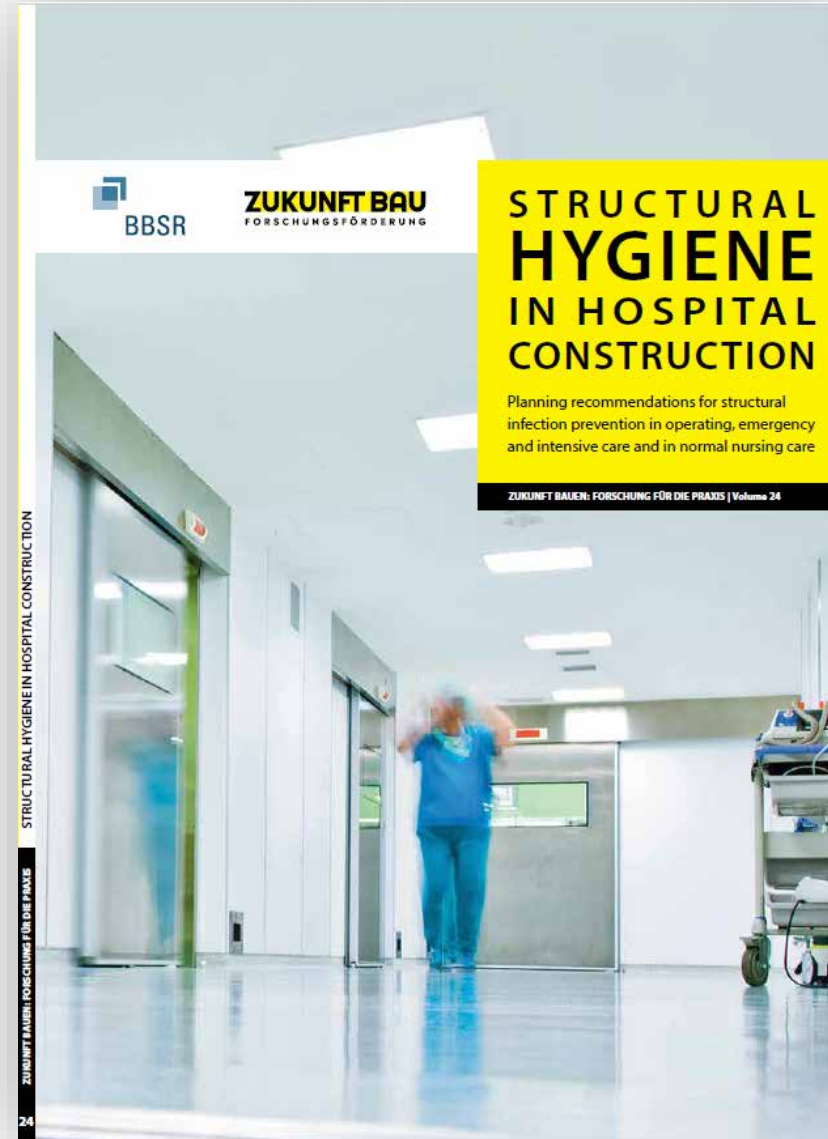
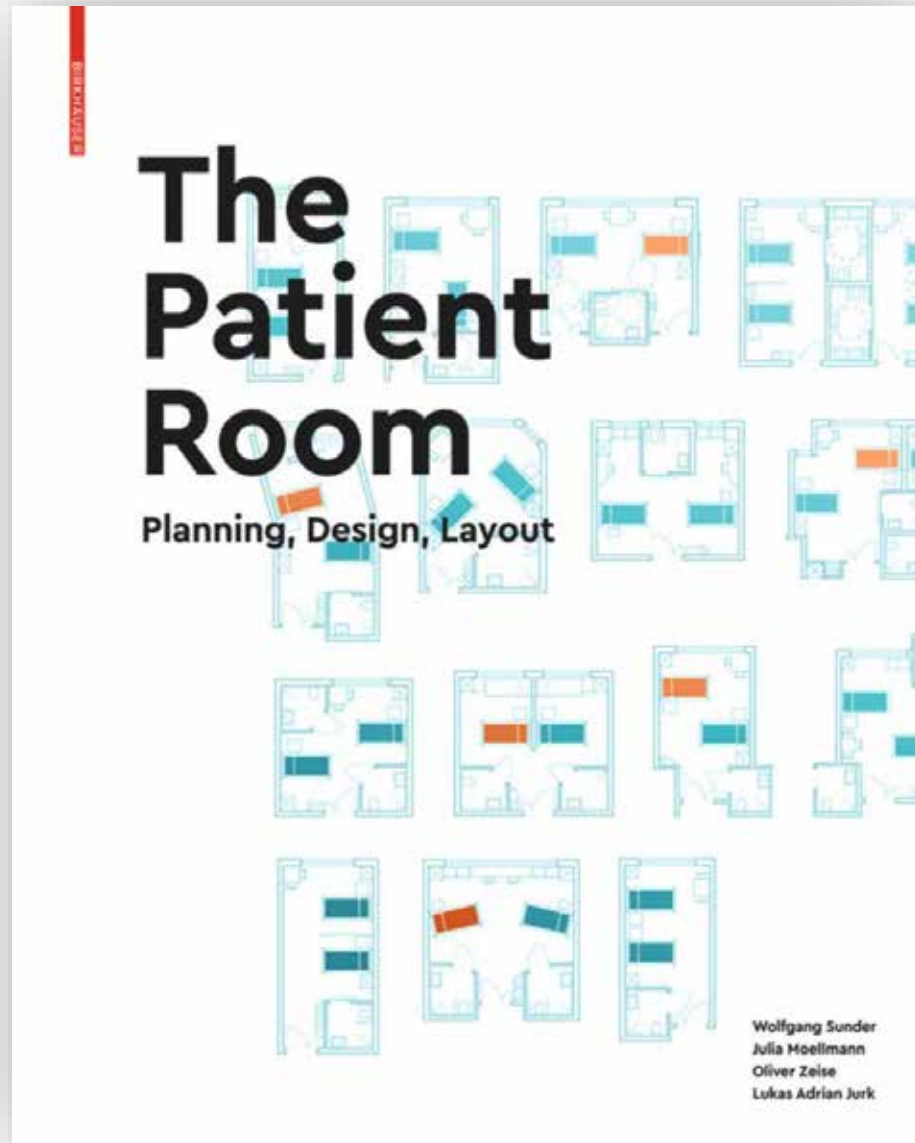
10 CONCLUSIONS

9. A user-group-related lighting of the patient's room supports hygienic activities.





10. The issue of construction-related infections should be integrated as early as possible in the planning process.



VIELEN DANK!



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