

GREEN HOSPITALS

CONCEPT MANUAL FOR IMPROVING INFRASTRUCTURE

SECTION 1

Best Practice: Basic Planning Principles

Further sections available - go to [EPOS' Green Hospitals](#) page to view all:
Section 1: Best Practice—Basic Planning Principles
Section 2: Best Practice—Building and Building Services Maintenance
Section 3: Best Practice—Water Supply and Wastewater for Health Facilities
Section 4: Best Practice—Healthcare Waste Services
Section 5: Best Practice—Environmental Cleaning Services

www.epos.de



www.etlog-health.com



www.giz.de



Developed as part of the 'Greening Hospitals Integrated Infrastructure Competence Project' in Tajikistan, co-funded by EPOS, ETLog and GIZ • December 2013 - October 2015

For further information contact:

EPOS Health Management • eposhq@epos.de • +49 (0)6172-930-370



This Concept Manual has been prepared in five sections within the framework of the 'Greening Hospitals — Integrated Infrastructure Competence Project' in Tajikistan, by the development partnership of EPOS Health Management and ETLog Health GmbH, as part of the part of the develoPPP.de programme that Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH is implementing on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ).

The five sections are as follows:

- SECTION 1 — Best Practice: Basic Planning Principles
- SECTION 2 — Best Practice: Building & Building Services Maintenance
- SECTION 3 — Best Practice: Water Supply and Wastewater for Healthcare Facilities
- SECTION 4 — Best Practice: Healthcare Waste Services
- SECTION 5 — Best Practice: Environmental Cleaning Services



Table of Contents

Introduction—Importance of Planning	4
Sustainability in Health Facility and Hospital Planning	6
• Sustainability Rating Tools for Healthcare Buildings	7
• Good Practice Principles Supporting Sustainability	9
Detailed Planning Issues	16
• Detailed Planning Considerations	17
• Good Practice Layout, Fixtures & Fittings for Critical Rooms .	18
Further Reading	29

List of Figures

Fig. 1 Bubble Diagram—Clinical Adjacencies/EPOS	11
Fig. 2 Diagram—Circulation Routes	12
Fig. 3 Patient Centred Environments/ Photo EPOS	14
Fig. 4 Worktop and Shelf Configuration.....	15
Fig. 5 Mobile Hoist	15
Fig. 6 Example 1: Dirty Utility Room Layout/ EPOS	20
Fig. 7 Example 2: Dirty Utility Room Layout/ EPOS	21
Fig. 8 Ceramic Slop Hopper/ www.twyfordbathrooms.com	22
Fig. 9 Stainless Steel Slop Hopper/ www.franke.com	22
Fig. 10 Stainless Steel Sluice/ www.stanbridge.co.uk	22
Fig. 11 Stainless Steel Slop Hopper/ www.stainlessdesign.co.uk	22
Fig. 12 Stainless Steel Sluice/ www.stanbridge.co.uk	22

List of Figures (contd.)

Fig. 13 Ceramic Slop Hopper/ www.twyfordbathrooms.com	22
Fig. 14 Example 1: Cleaners Rooms Layout/ EPOS.....	23
Fig. 15 Example 2: Cleaners Room Layout/ EPOS	24
Fig. 16 Ceramic Cleaners Sink/ www.armitage-shanks.co.uk	25
Fig. 17 Stainless Steel Cleaners Sink/ Photo EPOS	25
Fig. 18 Stainless Steel Cleaners Sink/ www.franke.com	25
Fig. 19 Cleaning Equipment Storage/ Photos EPOS	25
Fig. 20 Cleaners Trolley/ Photo EPOS.....	25
Fig. 21 Example: Patient Shower and WC Layout/ EPOS	26
Fig. 22 Example: Assisted Patient Bathroom Layout/ EPOS.....	27
Fig. 23 Assisted Patient Bathroom/ www.kylesmartassociates.co.uk	28
Fig. 24 Patient Shower-WC, Liverpool Heart and Chest Hospital, UK	28
Fig. 25 Patient Shower-WC, Derriford Hospital, Plymouth, UK.....	28
Fig. 26 Disabled WC/ www.victorianplumbing.co.uk	28
Fig. 27 Assisted Patient Bathroom, Bradford Royal Infirm., UK/ModuleCo28	
Fig. 28 Clinical Was Hand Basin/ www.armitage-shanks.co.uk	29
Fig. 29 Alcohol Rub Dispenser/ Photo EPOS	29
Fig. 30 Alcohol Rub Dispenser/ www.bristolmaid.com	30
Fig. 31 Alcohol Rub Dispenser/ www.ecolab.com	30
Fig. 32 Alcohol Rub Dispenser	30
Fig. 33 Clinical Wash Hand Basin with Dispensers/ www.venesta.co.uk	30
Fig. 34 Clinical Wash Hand Basin with Dispensers, University Hospital of Wales, UK.....	30

Introduction—Importance of Planning

When considering a 'Green Hospital', there are many issues which need to be addressed in design, construction and operation, whether considering new construction or rehabilitation. Some of these issues include: energy and water efficiency, use of renewable energy, reduction of carbon footprint, environmental impact of waste disposal, procurement policy and so on.

In many countries it is not possible to consider all these issues in the same depth and detail, due to serious financial constraints and in the light of the often seriously poor condition of much health facility infrastructure. However, despite these challenges it is important to be aware of various aspects which contribute towards the overall sustainability of health facility infrastructure, so that when the opportunities to invest in improvements or new infrastructure arises, the factors supporting sustainability are taken into account.

There are many factors which address environmental sustainability, which will also contribute to the economic sustainability of healthcare infrastructure. A key issue for health facilities is remaining fit for purpose, that is in a condition, which allows appropriate health service delivery and provision. Some of the important aspects to consider at the planning stage of investments, be it for improvements to existing infrastructure or new construction, are addressed in this section.

Sustainability in Health Facility and Hospital Planning

Sustainability Rating Tools for Healthcare Buildings

There are a range of internationally used and recognised green building rating tools available offering a framework for designing , building and managing in a sustainable manner. The tools are designed for both new build and refurbishment projects.

Some of the most widely known are:

- BREEAM www.breeam.org
- LEED www.usgbc.org/leed
- GREEN STAR www.gbca.org.au/green-star
- DGNB www.dgnb.de

Even healthcare specific models have been developed:

- BREEAM Healthcare www.breeam.org/health
- Green Healthcare Guide www.gghc.org

To achieve ratings as ‘Green Hospitals’ a range of issues are considered in both construction and operation. From the Green Healthcare Guide the following elements are evaluated:

Construction

Integrated Design
Sustainable Sites
Water Efficiency
Energy + Atmosphere
Materials + Resources
Environmental Quality
Innovation + Design Process

Operation

Integrated Operation + Education
Sustainable Sites Management
Transportation
Facilities Management
Chemical Management
Waste Management
Environmental Services
Food Service
Environmentally Preferable Purchasing
Innovation in Operation

The World Health Organization is also contributing with a draft discussion document:

Healthy Hospitals Healthy Planet Healthy People Addressing climate change in health care settings

www.who.int/globalchange/publications/healthcare_settings/en/

In context of developing and transition countries the application of such tools is often not feasible, because of limitations on budget, access to technology and expertise, as well as healthcare settings dealing with existing dysfunctional infrastructure and services, remote locations, often with interrupted access to energy and resources and so on.

Even if a health facilities' green credentials cannot be measured with these sophisticated tools, there are other aspects that can be considered, which will contribute to the overall sustainability of that facility – contextual environmental condition, economic viability, appropriate building technology, remaining fit for purpose.

Applying good practice principles in hospital planning will also contribute to sustainability.

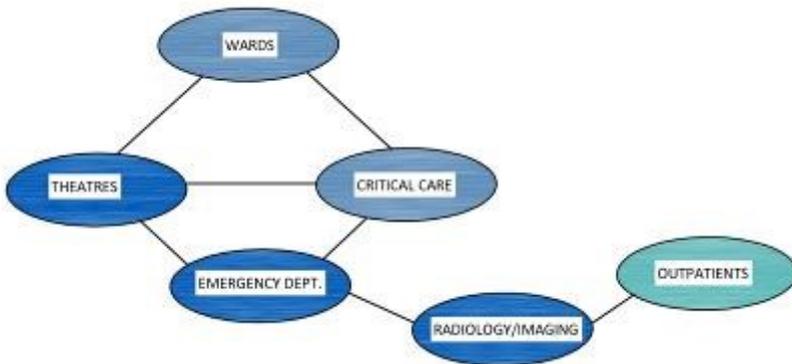
Good Practice Principles Supporting Sustainability

Functionality

A hospital is not just a building, but a facility with complex functions, which need to be organized so that all services can be provided safely and efficiently.

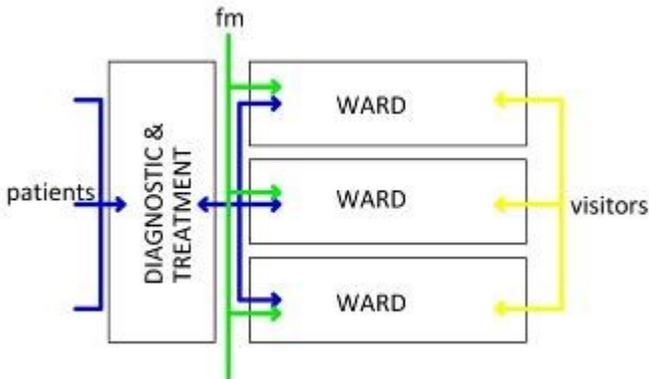
- Zoning – grouping services that have important relationships. Regardless of care model, optimizing clinical adjacencies allows increased efficiency and effectiveness of service delivery.

Fig. 1: Bubble Diagram—Clinical Adjacencies/ EPOS



- Circulation – create shortest possible routes to optimize patient care and service delivery; separate movement of patient, staff, visitors and materials to maintain patient privacy and dignity, allow staff to move easily to deliver services, reduce risk of cross-infection; protect patients from disturbance and cross-infection risk.

Fig. 2: Diagram— Circulation Routes/ EPOS



- Sanitary Facilities – safe, accessible and fit for purpose, considering hygiene and infection control issues, patient safety, ability to assist patients with limited mobility or manoeuvre wheelchairs.

Efficiency + Cost Effectiveness

A hospital needs to be planned to be economical to run and maintain

- Locate support services for sharing between departments/wards.
- Group departments with similar system/building service requirements.
- Organize departments in relation to 24h or 12h operational to allow energy savings in heating and lighting.
- Standardize elements that are repeated to benefit operational procedure, limiting risk of human error such as: clinical wash hand basin, bed-head services.
- Allow for natural ventilation, if appropriate, to support patient comfort, reduce energy costs.

Flexibility, Adaptability and Expandability

A hospital needs the capacity to adapt to changes in demographic and patterns of use, as well as technology and clinical practice.

- Use generic rooms – designed to accommodate a range of activities, not only a single function, to provide future flexibility. Clinical and support rooms, which are frequently duplicated in a facility, such as Consult/ Exam Rooms, Treatment Rooms, Dirty and Clean Utility Rooms, Cleaners Rooms, should be generic, as this will maximize flexibility of use.
- Standardize room sizes, using dimensions that can be more easily adapted to another use. For example:
 - * 8 sqm room may be used as a Staff Base, Store, Clean or Dirty Utility
 - * 12 sqm room may used for Examination Room, Office or larger Staff Base
 - * 16 sqm room may used for Consult/Exam Room, Single Patient Bedroom or Meeting Room.
- Consider future expansion opportunities in the layout on site, location of ‘soft space’ (offices/stores) adjacent to ‘hard space’ (clinical), to allow for future expansion or change of use.
- Allow flexible boundaries between departments to allow flexing of space.
- Ensure constructive elements and structural design allow flexibility or change with limited disruption.

Patient Centred Care/Healing Environment

A hospital needs to improve patient outcomes.

- Evidence based research has shown a clear relationship between the built environment in healthcare buildings and patient outcomes, factors that support the well being of patients are: daylight/natural light; views out; familiar and culturally relevant materials; use of colour; green space; intuitive way finding around facility.
- But also consider patient safety: location and layout of sanitary facilities, to reduce risk of falls; infection control and hygiene, to reduce risk of HAI and build confidence in using facility.

Fig. 3: Patient Centred Environments/ Photo EPOS



Occupational Health

Staff retention is a critical issue in many hospitals. Considering the physical work environment for staff at the planning stage, may contribute to improving staff retention levels.

- Consider the provision of staff rest rooms, preferably with natural light.
- Consider the provision of staff changing areas.
- Consider the provision of moving and handling equipment (such as fixed

or mobile hoists) or sufficient space to allow manual handling with the appropriate number of staff.

- Consider worktop and shelf heights to limit unnecessary bending and risky practices.
- Consider provision of daylight/natural light in rooms where staff are working for longer periods.

Fig. 4: Worktop and Shelf Configuration

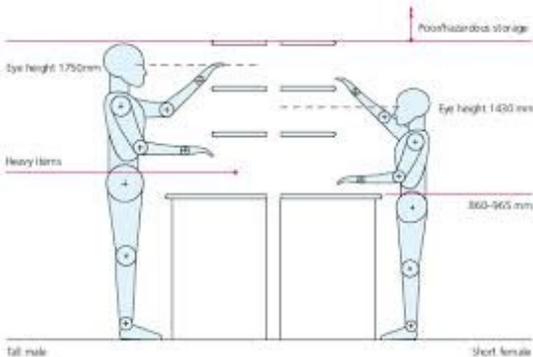


Fig. 5: Mobile Hoist



Cleanliness and Sanitation

A hospital must maintain a level of cleanliness and sanitation that allows safe delivery of health services and interventions.

- In some countries there is a need to instil confidence and encourage the use of health facilities, maintaining good hygiene practices supports this.
- Important factors in relation to reducing HAI and risk of cross contamination:
 - * appropriate quantity and quality of water;
 - * appropriate air changes and air quality;

- * location and sufficient number of clinical wash hand basins and hand sanitizer stations;
- * consider layout and location of sanitary facilities;
- * Specify easy to clean finishing materials and ensure detailing to avoid dust traps and hard to clean corners.

Accessibility

A hospital must be accessible to all members of its catchment population.

- In terms of patient, staff, visitor and supplies access to facility, it should be located to ensure good access to transport routes.
 - * Arrangements can be made with public and private transport providers to ensure regular connections exist from the hospital or health facility to main public transport hubs.
- In terms of patients, visitors (and staff) with limited or restricted mobility, considering how these people can access the facilities, receive same quality of treatment and care.
 - * The provision of ramps, appropriate sizing of selected treatment and consulting rooms, inpatient rooms and patient bathrooms will support access for all.

Detailed Planning Issues

Detailed Planning Considerations

As overall hospital planning contributes to achieving sustainability, detailed design plays an important role in supporting safe and efficient clinical practices.

Detailed Design in a hospital setting considers various aspects in relation to clinical function and process flow, such as:

- Critical dimensions – corridors widths, room dimensions, size of doorways;
- Layout and Specification of sanitary fittings – accessibility, durability, ease of cleaning, appropriateness for function;
- Door swing, door vision panels;
- Location of fittings – fixing height, distance from other fittings;
- Finishes – floor, wall and ceiling - for hygiene, patient safety.

There are many critical rooms and keys areas in a hospital, but in relation to waste management and infection control the following rooms/areas are particularly critical:

- Dirty Utility Room
- Cleaners Room
- Patient Sanitary Facilities
- Hand Washing Facilities

Good Practice Layout, Fixtures & Fittings for Critical Rooms

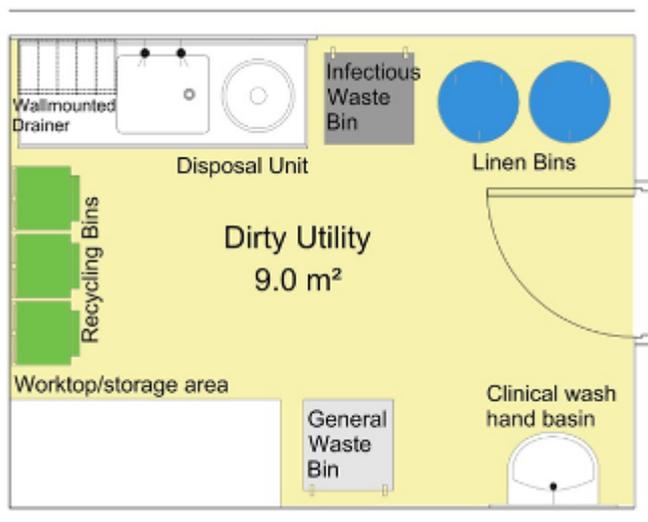
Dirty Utility

A Dirty Utility is used for:

- The temporary storage of dirty linen, infected and non-infected waste prior to removal to disposal hold.;
- Emptying of bedpans, urinal bottles etc.;
- Clinical hand washing;
- Storing disposable items;
- Cleaning of equipment, bedpans etc.

Preferably one Dirty Utility Room should be allocated per department and may range in size from 6 m² to 12 m², depending on the size of the department and the equipment required.

Fig. 6: Example 1: Dirty Utility Room Layout/EPOS



To ensure functionality a width of 2.4 m is recommended.

The preferred location for a Dirty Utility is central to the department, so that distances for transporting soiled linen and waste are optimised from all parts of the department. Access should be staff only.

Preferred fittings and facilities:

- Disposal Unit, slop hopper or sluice and sink (preferably in stainless steel);
- Worktop, storage cupboards and shelving;
- Waste bins - for infectious and general waste, linen and sharps bins;
- Clinical wash hand basin.

Fig. 7: Example 2: Dirty Utility Room Layout/EPOS

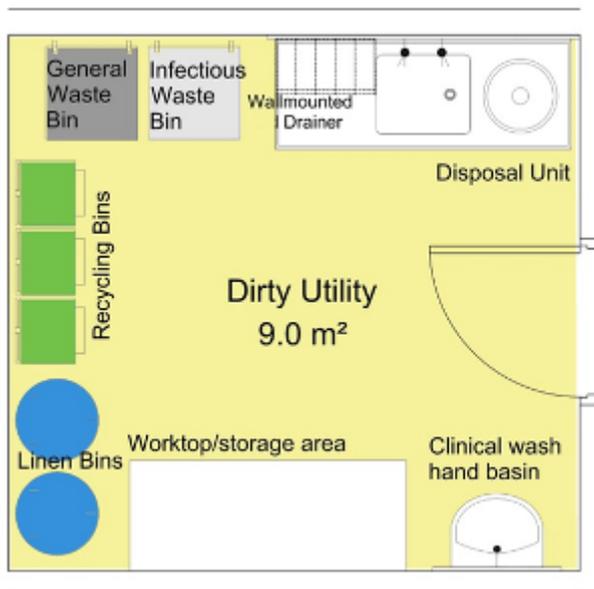


Fig. 8: Ceramic Slop Hopper/
www.twyfordbathrooms.com



Fig. 11: Stainless Steel Slop Hopper/
www.stainlessdesign.co.uk



Fig. 9: Stainless Steel Slop Hopper/ www.franke.com



Fig. 12: Stainless Steel Sluice/ www.stanbridge.co.uk



Fig. 10: Stainless Steel Sluice/ www.stanbridge.co.uk



Fig. 13: Ceramic Slop Hopper/
www.twyfordbathrooms.com



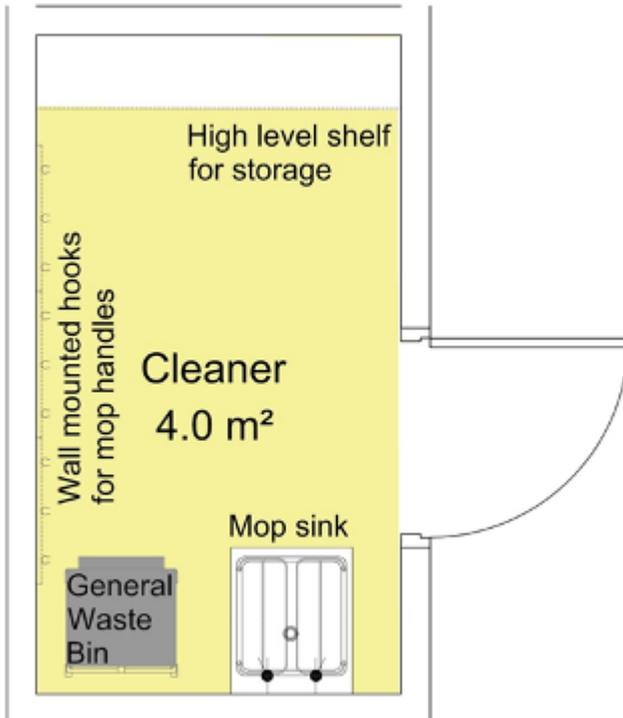
Cleaners Room

A Cleaners Room is used for:

- Storing cleaning materials and equipment for daily use;
- Filling/emptying mop bucket;
- Keeping cleaning equipment in dedicated location to reduce risk of cross-infection.

There should preferably be one Cleaners Room for each department, although in some cases a Cleaners Room may be shared. It may range from 4m² to 8m², depending on the size of the department and equipment required. For ease of access an outward opening door is preferred, opening to 180°.

Fig. 14: Example 1: Cleaners Room Layout/EPOS



If a complete room cannot be provided, an alcove or recessed area may also be sufficient, ensuring that cleaning equipment may be stored off the floor on hooks or shelves.

The preferred location for a Cleaners Room is at the edge of the department, near the entrance. In the case of department having more than one entrance, the Cleaners Room should be located where there is the least amount of public/visitor traffic.

Preferred fittings and facilities:

- Mop sink
- High level hooks for mops and brushes
- High level shelf
- Waste bin for general waste
- Lockable storage for cleaning materials
- Storage area for cleaners trolley, vacuum cleaner, floor polisher etc.

Fig. 15: Example 2: Cleaners Room Layout/EPOS

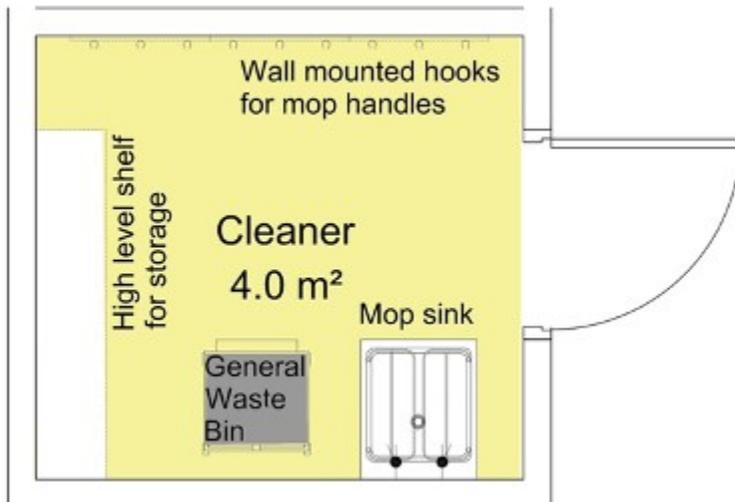


Fig. 16: Ceramic Cleaners Sink /
www.armitage-shanks.co.uk



Fig. 17: Stainless Steel Cleaners Sink /Photo EPOS



Fig. 18: Stainless Steel Cleaners Sink /
www.franke.com



Fig. 19: Cleaning Equipment Storage /Photos EPOS



Fig. 20: Cleaners Trolley /Photo EPOS



Patient Sanitary Facilities

Types of patient sanitary facilities range from assisted bathrooms to allow staff to bathe a patient with the use of a hoist or with enough space to allow manual handling, individual patient shower/WCs, allowing a patient with limited mobility to bathe independently and separate cubicle WCs and showers.

Patient Wash/WC

- Personal washing of patient
- Provides basin, shower and WC in single space
- Provides space to assist a patient if necessary
- Outward opening door for ease of access in the case of patient fall
- Floor level shower area
- Easy clean wall and floor finishes
- Preferred dimensions: 2.5m minimum length from behind WC.

Fig. 21: Example: Patient Shower and WC Layout/EPOS



Assisted Bathroom

- Fully assisted washing of patient, allowing transfer from trolley or wheelchair or hoist;
- Wheelchair and sanitary chair access to toilet and wash-hand basin;
- Level access shower area, allowing use of sanitary chair;
- Grab rails located next to toilet and wash-hand basin provided for additional support;
- Bath should preferably be positioned to allow access from both sides;
- Preferred size: 16m².

Fig. 22: Example: Assisted Patient Bathroom Layout /EPOS

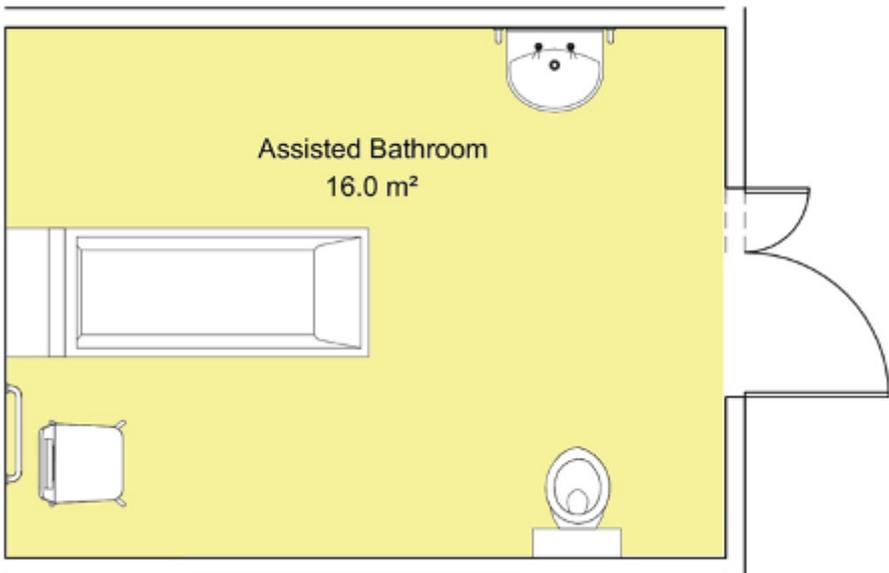


Fig. 23: Assisted Bathroom/ Kyle Smart Associates
www.kylesmartassociates.co.uk



Fig. 25: Patient Shower-WC/ Derriford Hospital,
 Plymouth, UK



Fig. 26: Disabled WC/ www.victorianplumbing.co.uk



Fig. 24: Patient Shower-WC/ Liverpool Heart and
 Chest Hospital, UK



Fig. 27: Assisted Patient Bathroom/ Module Co/
 Bradford Royal Infirmary, UK



Hand Cleaning Facilities

Hand hygiene is a crucial component of maintaining correct infection control standards. Ensuring appropriate hand hygiene is maintained by patients, staff and visitors can be achieved by well-located clinical wash-hand basins and alcohol rub dispensers, along side comprehensive patient, staff and visitor education and awareness raising.

- Clinical wash hand basins are wall mounted, with wall mounted taps, preferably located in every clinical room, as well as at prominent locations in corridors at department entrances;
- Alcohol rub/gel dispensers located in many location and easily accessible;
- Presentation and location of clinical wash hand basins and alcohol rub/ gel dispensers critical to encouraging hand hygiene amongst staff, patients and visitors
- Use of locally appropriate banners, posters and signs to raise awareness and remind patients, staff and visitors to use available facilities.

Fig. 28: Clinical Wash Hand Basin / www.armitage-shanks.co.uk



Fig. 29: Alcohol Rub Dispenser / Photo EPOS



Fig. 30: Alcohol Rub Dispenser / www.bristolmaid.com



Fig. 33: Clinical Wash Hand Basin with Dispensers / www.venesta.co.uk



Fig. 31: Alcohol Rub Dispenser / www.ecolab.com



Fig. 34: Clinical Wash Hand Basin with Dispensers / University Hospital of Wales, UK



Fig. 32: Alcohol Rub Dispenser



Further Reading

Options for further reading are indicated below:

- Health Building Note 00-01/March 2014
General design guidance for healthcare buildings, Department of Health, UK:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/316247/HBN_00-01-2.pdf
- Health Building Note 00-02/2013
Core Elements — Sanitary Spaces, Department of Health, UK:
http://www.dhsspsni.gov.uk/hbn_00_02.pdf
- Health Building Note 00-03/2013
Core Elements— Clinical and Clinical Support Spaces, Department of Health, UK:
http://www.dhsspsni.gov.uk/hbn_00_03.pdf
- Health Building Note 00-04/2013
Core Elements— Circulation and communication spaces, Department of Health, UK:
http://www.dhsspsni.gov.uk/hbn_00_04.pdf
- Health Building Note 00-09/2013
Infection control in the built environment, Department of Health, UK:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/170705/HBN_00-09_infection_control.pdf
- Health Technical Memorandum 07-07/2013
Environment and Sustainability—Sustainable health and social care buildings, Department of Health, UK:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/147950/HTM_07-07_Final.pdf