Functional Healthcare Design for Mobilisation and Ergonomics
– Based on Patient Mobility

Kristina Hallström a, Elly Waaijer b, Tom Guthknecht c

aArjoHuntleigh, SWEDEN; bWaaijerconsult, NL;
cLHtwo, Lausanne Health and Hospitality Group, SWITZERLAND

The goals of the project were to establish guidelines to architects and planners based on patient mobility with the aim of defining the minimum space requirement to ensure functional space in a healthcare facility. And to communicate how to ensure sufficient space for the caregivers to work according to safe patient handling protocols; using ergonomic aids and working techniques. The International Assessment Instrument used to assess patient/resident mobility was Mobility Gallery™, a validated 5-category classification system (Knibbe et al 2012). Based on the assessment of mobility levels, the equipment for safe patient handling use was defined (CEN/ISO TR 12296). All transfers and care activities were measured in practical settings and translated into functional areas, shown in a bird’s eye view perspective, including patient, equipment and caregiver/s. The areas focused on were: by the bed, in the toilet area, in the bath/shower, for both general and bariatric patients/residents.

Practitioner Summary: The results are published as a communication tool; including advice, plan drawings showing functional areas illustrated in bird’s eye view images. These describe the smallest working areas required for the staff to be able to use proper aids in an ergonomic manner.

Keywords Safe Patient Handling, health care ergonomics, architect guidelines, health care design, working area, mobility gallery, mobility assessment, ISO/TR12296

Background

Healthcare workers experience musculoskeletal disorders at a rate exceeding that of workers in professions with notoriously heavy workloads, such as construction, mining, and manufacturing. According to a German study, 73.3% of the nursing staff reported that they suffered moderate or severe back pain and studies from other countries show similar twelve-month prevalence rates (59.8% - 73.5%) (Freitag 2013). One cause of the problem is that there often is not enough space in healthcare facilities to work with larger equipment like patient lifters, shower chairs or other ergonomic devices necessary in a preventive program. This leads to an undesirable extra physical load for caregivers, determined by the patient’s state (size, mobility level, and medical condition), and the methods and aids used. Apart from the individual suffering they cause, physical injuries among healthcare workers are also costly. They negatively impact productivity and the retention and recruitment of employees to the industry. (Cohen et al 2010)

Guidelines for Architects and Planners

Wanting to address this issue, ArjoHuntleigh initiated a project in the 1990s to establish guidelines for architects and planners based on patient mobility. The aim was to define the minimum space required to create a functional workspace in a healthcare facility and to communicate the information to architects and planners and staff involved in the planning of nursing homes. In order to implement a safe patient handling culture, different levels of patient/resident mobility need to be discussed already when planning the care environment. Sufficient space, proper aids, and correct working techniques were defined as decisive factors for the patient’s mobility and key to the entire
care process. The Guidebook for Architects and Planners, with a focus on the design of nursing homes, was first published in 1995.

Planning approaches for mobility support

In 2013 and 2014 a new external international reference group of experts in healthcare design and ergonomics became involved in the revision of the Guidebook. Working across different functions, the project included ergonomists, architects and specialists on safe patient handling, as well as experts from ArjoHuntleigh, which manufactures and develops products for patient handling and patient care. All transfers and care activities were measured in practical settings and translated into functional areas, based on different patient/resident mobility levels. The update addresses general care in both long-term care and hospital settings, with a special section on bariatric care. Based on the latest research, new space requirements and practical design tips have been included.

The Guidebook presents different models that can be used to more easily select the right working technique, the total number of caregivers, and the proper equipment to be able to offer safe patient handling. The base is an assessment instrument for establishing patient/resident mobility, the so-called Mobility Gallery™, a validated five-category classification system (Knibbe et al 2012). Based on this, the equipment for safe patient handling can be defined (CEN/ISO TR 12296, Hignett et al 2014).

Five Levels of Mobility: The Mobility Gallery

---

Figure 1. Mobility Gallery.

Depicting the characteristics of five typical patients and their levels of functional mobility, the Mobility Gallery, which is also available in a bariatric version, is currently used in several countries as the basic instrument to implement guidelines for safe patient handling. The strength of the Mobility Gallery is that the levels, or classifications, are based on people you could actually meet in various care settings. The visualisation of the characters makes it easier to discuss choices in care and rehabilitation in a realistic way, based on standardised solutions.
It is important to emphasise that, within each level, there may be small differences in the need for assistive equipment. That is why it is always important to carry out an individual assessment prior to any activity. Stimulating mobility and, eventually, respecting passivity, is crucial from a quality-of-care perspective. However, we must also protect the caregivers and provide them with the professional working environment that they deserve. The five mobility levels can guide caregivers to the correct aids needed to mobilise the patient in an optimal way for both parties.

It is important to select equipment that continuously encourages patients to use all their residual physical function and to stretch their ability. Maintaining a greater degree of independency and mobility is not only beneficial for the patients, but reduces the risk of dynamic overload for the caregivers. Since the level of mobility is key to safe patient handling, it is vital to plan for the future. As the mobility of patients and residents staying in elderly care typically decreases, the number of aids and necessary space increases accordingly. This should be taken into consideration already at the planning stage. To reduce the risk of dynamic overload for the caregiver, manual lifting in all but exceptional situations should be eliminated. For non-weight-bearing patients, appropriate lifting equipment and friction-reducing devices should be used to assist with transfers on to the bed/trolley and for repositioning. To avoid the risk of static overload, height-adjustable equipment is preferred wherever possible. Caregivers should be encouraged to take a seated position on the same level as the patient, and adopt sound working postures in their daily work.

Applying concepts

The Guidebook focuses on different areas, which include the space around the bed, the toilet area, and the bath/shower area. Both general and bariatric patients/residents have been taken into consideration. Each area is introduced with a chart, providing an overview of working solutions and the mobility levels they are intended for.

<table>
<thead>
<tr>
<th>Mobility Level</th>
<th>Bed</th>
<th>Repositioning in bed</th>
<th>Lateral transfers</th>
<th>General transfers</th>
<th>Bathing transfers</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALBERT</td>
<td>High-low bed</td>
<td></td>
<td></td>
<td>Walking stick</td>
<td>Lift hygiene chair</td>
</tr>
<tr>
<td>BARBARA</td>
<td>High-low bed</td>
<td></td>
<td></td>
<td>Walking frame</td>
<td>Stand aid</td>
</tr>
<tr>
<td>GAIL</td>
<td>High-low bed</td>
<td>Sliding sheet, Transfer sheet</td>
<td></td>
<td>Standing and raising aid</td>
<td>Lift hygiene chair</td>
</tr>
<tr>
<td>DORIS</td>
<td>High-low bed</td>
<td>Sliding sheet, Transfer sheet</td>
<td></td>
<td>Raiser, mobile bar</td>
<td>Daling bar</td>
</tr>
<tr>
<td>DAMA</td>
<td>High-low bed</td>
<td>Sliding sheet, Transfer sheet</td>
<td></td>
<td>Assistive device, Shower frame,</td>
<td>Raiser mobile bar</td>
</tr>
</tbody>
</table>

Figure 2. Working solutions by the bed, based on the patient/resident mobility level.
To identify the minimum space requirements, all situations were tested in a real-world setting. Two trained caregivers performed all the transfers and the situations were analysed by two experts. The dimensional plan drawings are shown as bird’s eye view photographs with the aim to describe, not the ideal room, but the smallest working space required for the staff to be able to use proper aids in a correct manner. To people not used to read drawings, the photographs allow for a greater understanding of the recommendations given. In order to provide a standard reference point, a uniform template has been used, where the working areas are based on right-angled spaces, even though clinical procedures naturally have a more irregular pattern. This also draws attention to the need of being able to reverse the working areas, for two main reasons. Firstly, it can be difficult to collect a patient/resident from an ‘ideal’ side because the preferred side may be dictated by the patient's/resident's disability. Secondly, some staff may prefer to work from a particular side, depending on whether the person is left- or right-handed, for example.

**Architect guidelines**

*Turquoise area shows the minimum working area required for the caregiver to be able to use the mechanical aids in an ergonomic way from one side.*

*Light turquoise area shows required extension of working area to facilitate activities from either side to provide adequate access for the patient, mechanical aid and assisting caregiver.*

Figure 3. Space requirement bariatric care by the bed. Doris and Emma, general transfer, passive lifter.
In a care facility both patients/residents and equipment will be transported between different rooms. When planning the corridor space it is important to allow for two wheelchairs (or a wheelchair and a mobile walking device) to easily pass each other without having to move any furniture, or one of the parties having to back up. If it is expected that two beds will frequently pass each other in the corridors, the passage space should be further widened. It is generally recommended that the size of corridors and elevators be based on bed dimensions, as this assures that sufficient space is provided for all mobile aids.

To support patient/resident independence and mobilisation control panels should be centrally located on the sidewall of the elevator. The buttons should be horizontally positioned at a proper height to facilitate use by patients/residents in wheelchairs. Except for the doorway, the elevator should have rounded handrails on every side. At every stop, the elevator should be exactly level with the corridor floor and a mirror should be placed opposite the door so people in wheelchairs can see when the door is opened. The elevator information should preferably be audible and the buttons easy to read. A foldable seat for people with limited standing possibilities is recommended.

Turning and free passage during the transport of patients/residents with mobile equipment must be able to take place without having to move any furniture. To facilitate turning manoeuvres, room for the caregiver is required on both sides. The Guidebook presents plan drawings showing mobile equipment moving from a wider area and then turning through a door or around a corner, as these are the most common turning manoeuvres in any care facility. Door jambs, knobs, protruding handles etc. must be taken into consideration.
As already stated, the availability of proper aids and equipment is of great importance. They should be easy to park and stored close to the rooms where they are needed. Caregivers may be tempted to manually lift patients/residents if aids are perceived as being too far away, or take too much time to access. Corridors should not be used as storage space, unless alcoves have been designed such that equipment is safely parked out of the way. Preferably, aids should be stored adjacent to wall-mounted battery chargers and sufficient room made available to store a variety of slings.

These are only a few of the considerations that make designing a care facility an exciting challenge. We cannot emphasise enough that sufficient space, proper aids, and correct working techniques are the three cornerstones for a safe and pleasant environment that support both patient/resident mobility and caregiver safety.

Briefly touching upon the planning of ergonomics in the design of healthcare facilities, this article has aimed to show the importance of thorough planning in every detail. The project has resulted in a new revision of the Guidebook for architects and planners. Together with web-based assessment tools, CAD drawings, and space requirement drawings, it may help in the design of healthcare facilities, based on patient/resident mobility levels and sound ergonomically principals.

References


Knibbe J.J., Knibbe N.E., Waaijer E.M., Assessments of patients with a 5-category or a 3-category practical classification system: validity and practicality, Work 41 5655-5656, 2012