



Case Report

Is There Room for Improvement? Stroke Rehabilitation Environments May Not Reflect Home Environments in Terms of Chair, Toilet, and Bed Heights



Katharine Scrivener, PhD ^a, Louise Ada, PhD ^b,
Michael Pellegrini, PhD ^{c,d}, Rebecca Nicks, PhD ^e,
Sharon Kramer, PhD ^{c,d}, Lauren J. Christie ^{f,g,h},
Laura J. Jolliffe, PhD ^{i,j}, Catherine Dean, PhD ^a,
Natasha A. Lannin, PhD ^{c,d}

^a Department of Health Sciences, Macquarie University, Sydney, New South Wales, Australia

^b Physiotherapy Department, University of Sydney, Camperdown, New South Wales, Australia

^c Department of Neuroscience, School of Translational Medicine, Monash University, Melbourne, Victoria, Australia

^d Alfred Health, Melbourne, Victoria, Australia

^e Occupational Therapy, Allied Health, Eastern Health, Box Hill, Victoria, Australia

^f Allied Health Research Unit, St Vincent's Health Network Sydney, Darlinghurst, New South Wales, Australia

^g School of Allied Health, Faculty of Health Sciences, Australian Catholic University, North Sydney, New South Wales, Australia

^h Nursing Research Institute, St Vincent's Health Network Sydney, St Vincent's Hospital Melbourne and Australian Catholic University, Darlinghurst, New South Wales, Australia

ⁱ Department of Occupational Therapy, Peninsula Health, Frankston, Victoria, Australia

^j Department of Occupational Therapy, School of Primary and Allied Health Care, Monash University, Melbourne, Victoria, Australia

KEYWORDS

Hospital environment;
Occupational therapy;
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Abstract The present study aims to describe the chair, bed, and toilet heights in rehabilitation hospitals and home environments to challenge rehabilitation clinicians to better prepare stroke survivors for discharge home. This study uses analysis of secondary outcomes from a multicentre, phase II randomized controlled trial (HOME Rehab trial) and additional observation of hospital environment. Data were collected from six rehabilitation hospitals and the homes of two

List of abbreviations: SD, standard deviation; CI, confidence interval; cm, centimeter.

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hundred first-time stroke survivors who were aged >45 years. Chair, bed and toilet heights were measured; we measured 936 chairs and beds in hospital (17%) and home (83%) environments. Mean chair height at home was 47 cm (SD 6), which was 2 cm (95% CI, 0-4) lower than in the hospital ward and 5 cm (95% CI, 3-7) lower than in the hospital gym. Mean toilet height at home was 42 cm (SD 3), which was 3 cm (95% CI, 2-4) lower than in the hospital. Study findings suggest a disparity in heights between hospitals and home. Although clinicians may be aware of this disparity, they need to ensure that chair and bed heights within the hospital environment are progressively made lower to better prepare stroke survivors for discharge home.

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Physical rehabilitation after stroke aims to prepare stroke survivors for discharge home. Safe discharge home from rehabilitation includes being able to sit, transfer, and walk.¹ Therefore, physiotherapy in rehabilitation is based on the practice of these essential everyday activities to improve the performance of these activities in preparation for discharge home.^{2,3} A common everyday activity practiced in rehabilitation is standing up from a chair. Over the previous decades, research has described the biomechanics of standing up from a chair.³ One of the important findings is that, as the chair height is increased, lower limb joint moments are decreased, ie, it requires less muscular effort to stand from a higher chair.⁴⁻⁷ This knowledge assists rehabilitation therapists in tailoring the difficulty of standing up to the stroke survivor's ability by modifying the chair's height.

Rehabilitation hospitals are modified in design and built specifically for people with physical disability. The design of rehabilitation hospital environments usually considers safety, eg, minimizing fall risk, but does not necessarily consider the potential of the environment to influence functional outcomes.⁸ Hospital clinicians suggest that the current environmental design does not match stroke survivors' goals and home challenges.⁹

This study aimed to describe the chair, bed, and toilet heights in the home environment to inform rehabilitation clinicians and consider how they can better prepare stroke survivors for discharge home. Therefore, the research questions were (1) what are the heights of chairs, beds, and toilets in hospital and home environments? and (2) what is the difference in chair, bed, and toilet heights between rehabilitation hospitals and home environments?

Methods

Design

Secondary observational analysis of the hospitals and individuals post-stroke participating in a discharge planning trial, the HOME Rehab trial.¹⁰ The HOME Rehab trial is a multicentre, phase III randomized trial conducted in Australia. The trial compared an enhanced occupational therapy discharge planning intervention to usual care discharge planning. Within this trial, environmental measures were taken at stroke participants' homes and in the hospital sites' wards and gyms.

Ethics approval

This study was approved by the Alfred Health Human Research Ethics Committee (HREC/17/Alfred/236 [NMA]),

and site-specific ethics approval was obtained at all participating sites. All participants gave written informed consent before data collection.

Participants, therapists, centers

Six metropolitan hospitals that had rehabilitation wards, which were sites in the HOME Rehab trial, were included in the hospital ward and gym environmental analyses. The hospitals were located across 3 states of Australia. The rehabilitation wards had a stroke throughput of >20 patients each year.

The home environmental analysis included the first 200 stroke participants in the HOME Rehab trial. The stroke participants had all experienced their first stroke. They were aged >45 years, admitted to rehabilitation, expected to return to a community (private) dwelling after discharge, and had no significant prestroke disability (prestoke modified Rankin Scale score, 0-2).

Measures

A comprehensive environmental evaluation was completed in rehabilitation hospital wards, gyms, and homes. In the hospital evaluation, a trained therapist measured the heights of chairs, plinths, toilets, and beds using a standardized procedure. In the home evaluation, dining chair, lounge, toilet, and bed heights were measured by a trained family member, who also took a photograph of the procedure that a trained therapist checked. In both environments, the same procedure was used, and it involved using a tape measure from the floor to the top of the chair or bed to the nearest millimeter. All chairs and beds were measured at the height they were found on entry to the room without adjustment. All chairs and toilets were measured when vacant, and beds and plinths (therapy mat tables) were measured with a person sitting on them to account for mattress compression when occupied.

Additionally, in the rehabilitation environment evaluation, beds or plinths (therapy mat tables) were measured under further conditions; after measuring at the height found, they were adjusted to the lowest possible and highest possible height. Five individual chairs or beds were measured in the ward and therapy gym areas for each type.

Table 1 Mean \pm SD height (centimeters) of chairs, beds, and toilets in each environment and mean difference (95% CI) between environments.

	Environments			Mean Difference Between Environments	
	Home	Hospital Ward	Hospital Gym	Home Minus Hospital Ward (95% CI)	Home Minus Hospital Gym (95% CI)
Chair	n=188	n=30	n=35	-2 (-4 to 0)	-5 (-7 to -3)
Mean \pm SD height (cm)	47 \pm 6	49 \pm 3	52 \pm 4		
Lounge	n=196	N/A	N/A	N/A	N/A
Mean \pm SD height (cm)	43 \pm 5				
Toilet	n=199	n=30	N/A	-3 (-4 to -2)	N/A
Mean \pm SD height (cm)	42 \pm 3	45 \pm 2			
Bed/plinth	n=198	n=30	n=30	-1 (-5 to 3)	1 (-3 to 5)
Mean \pm SD height (cm)	59 \pm 9	60 \pm 10	58 \pm 9		

Data analysis

Descriptive statistics (mean \pm SD) were used to describe the average height of each type of chair or bed in the hospital ward, hospital gym, and home. The difference in heights was calculated as mean difference and 95% CI.

Results

Height data were included from 65 chairs, 60 beds/plinths (therapy mat tables), and 30 toilets across 6 hospitals rehabilitation wards and gyms. Height data from 200 stroke participant homes were available. The height of chairs, beds, and toilets in the home and rehabilitation hospital environments are detailed in [table 1](#).

Height of chairs and beds in the home environment

In terms of height, the mean \pm SD chair height was 47 \pm 6 cm, lounge (recliner) height was 43 \pm 5 cm, toilet height was 42 \pm 3 cm, and bed height was 59 \pm 9 cm ([table 1](#)).

Height of chairs and beds in hospital ward and gym environments

In the ward, beds were adjustable to a minimum height of 42 \pm 12 cm and a maximum height of 88 \pm 9 cm. In the gym, plinths (therapy mat tables) were adjustable to a minimum height of 46 \pm 2 cm and a maximum height of 89 \pm 7 cm. The mean toilet height was 45 \pm 2 cm.

Difference in heights between hospital and home environments

Bed height and variability were similar across environments. Toilet height was 3 cm (95% CI, 2-4) lower in the home than in the hospital. Chair height was 2 cm (95% CI, 0-4) lower in the home than in the hospital ward and 5 cm (95% CI, 3-7) lower in the home than in the hospital gym. See [table 1](#) and [figure 1](#).

Discussion

The current study identified that the heights of beds were similar between environments; however, chairs were lower in the home than those in hospital environments (mean 2 cm lower). This result is not surprising because hospitals are purpose-built spaces for people with physical disability and, therefore, designed to make everyday activities more manageable for these people.⁷ In addition, chairs in the gyms were even higher, perhaps because very disabled people are practicing this everyday activity within the gym, so using a higher height to make standing up more manageable with a focus on improving technique.³

Notably, there was more variability in heights in the home environment than in the hospital, eg, the SD of chair heights in homes was more than double the SD in hospital wards. This suggests that stroke survivors need to be equipped to be able to stand up from some very low chairs and beds that will be present in the home environment. Moreover, when accessing the community or using a car, the height may be even lower than found in the home.

Strengths and limitations

The current study has both strengths and limitations. Limitations include different height measurers in the hospital and home environments. However, all measurers followed a standard procedure. A significant strength of the study is the large sample size of stroke survivor homes and the inclusion of 6 hospitals across 3 states of Australia. This large sample helps to assure certainty in the results presented in this study. Further, these are the hospital environments the stroke survivors accessed before discharge home.

Conclusions

The findings of the current study suggest clinicians should pay particular attention to the height of chairs and beds within the hospital environment. Chair and bed height should be matched to the stroke survivor and lowered as their ability improves over time.

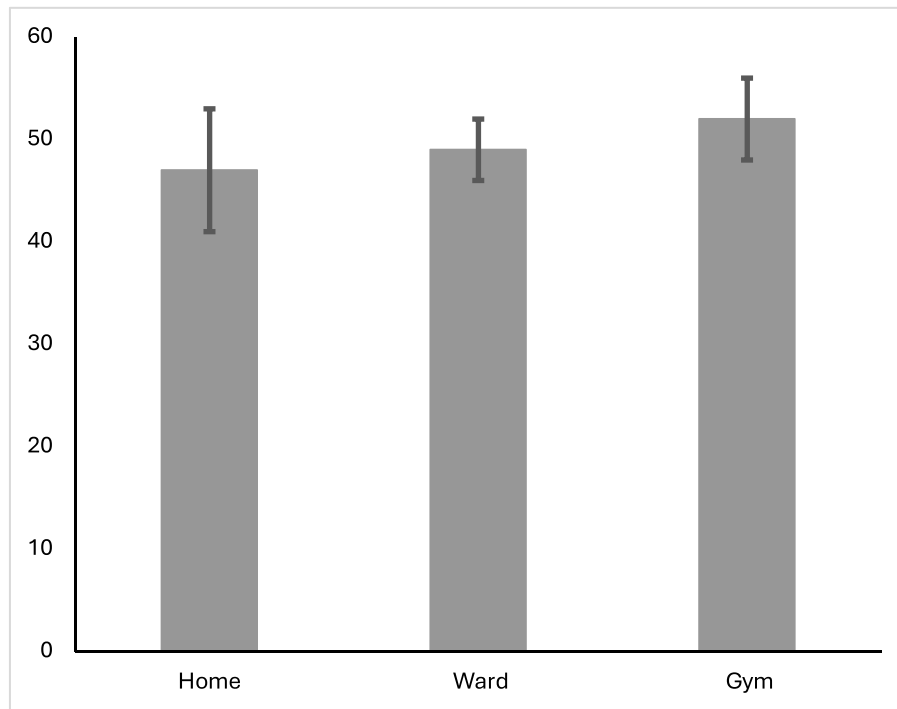


Fig 1 Mean \pm SD height (cm) of chairs in each environment.

Corresponding author
Natasha A. Lannin, PhD, Department of Neuroscience, School of Translational Medicine, Monash University, 99 Commercial Road, Melbourne, Victoria 3004, Australia E-mail address: natasha.lannin@monash.edu.

Disclosure

The investigators have no financial or nonfinancial disclosures to make in relation to this project.

Data availability statement

The datasets generated during and analyzed during the current study are available from the corresponding author upon reasonable request.

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