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Our stated mission is "to develop a leading edge Home Modification & Maintenance information clearing project designed with the assistance of and accessible to the full range of industry and consumer target groups."

## Selecting Diameters for Grabrails

By Lara Oram

This systematic review discusses grabrail diameters suitable for the elderly population living at home.

Grabrail installation, as an aspect of environmental modification, plays a major role in reducing falls risk around the home, particularly at changes in level and during transfers. Appropriate prescription of grabrails must consider the person, the intended activity and the specific context or environment where the activity occurs. Inappropriate prescription or design of grabrails has social and economic costs including non-use of the rail, secondary disability, injury to carers, premature admission to residential care, and decreased independence.

Suitable outside diameter of a grabrail is just one feature that enables a successful grasp. Other factors include:

- design features such as cross-sectional profile, coefficient of friction of the finished surface, texture of the finished surface
- environmental factors such as location, rail orientation, installation and the individual's orientation to the rail
- individual attributes such as hand size, grip strength, grip endurance and the type of grasp employed

To avoid a fall, maximum grip strength is desirable. Typically, power grasps (hand encircles the grabrail with all joints in a flexed position so that all segments of the hand contact the grabrail) enable greater grip strength than other types of grasp. However, a power grasp can only be achieved with the appropriate grabrail diameter for the user. Elderly people or children may require a smaller than average grabrail outside diameter. Australian Standard 1428.1 (2001) recommends an outside diameter of 30-40mm for public buildings, however for home modifications individual design can be achieved by matching the grabrail diameter with the user's grasp. Customary behaviour for measuring grip circumference is to record the distance from the tip of the third finger to the distal palmar crease. The required grip diameter can then be calculated.

The review concludes that although there is no empirical evidence for correctly measuring a person's grasp in order to match an appropriate grabrail diameter, individual prescription is crucial.

To view this publication and its complimentary industry fact sheet and checklist, and consumer fact sheet, go to the 'evidence based practice reviews' section of the 'resource library' at website www.homemods.info.

### How to contact us

HMM Information Clearinghouse
Faculty of Health Sciences
East St,
PO Box 170
Lidcombe, NSW 1825

Phone: 612 9351-9215
Fax: 612 9351-9197
Email: hmminfo@fhs.usyd.edu.au

## Featured Web Sites: Universal Design & Home Accessibility

By Catherine Bridge

The term 'universal design' has been around for some time; Ron Mace first coined the term over twenty-five years ago. Ron, a US architect who used a wheelchair and a ventilator acknowledged that one design was not perfect for everyone. He also strongly believed that striving to incorporate features that make each design more universally usable to the widest number of persons was a big step forward from 'accessible' and barrier-free design with their separatist disability connotations. Further development and support for this vision resulted in the seven principles of Universal design which are as follows:

- Equitable Use
- Flexibility in Use
- Simple, Intuitive Use
- Perceptible Information
- Tolerance for Error
- Low Physical Effort
- Size and Space for Approach & Use

(Connell, Jones, Mace, Mueller, Mullick, Ostroff, Sanford, Steinfeld, Story, & Vanderheiden, 1997 http://www.design.ncsu.edu/cud/newweb/about_ud/udprinciples.htm)

Historically, it was later again that housing became a focus with 'universal design in housing' being defined by the American Association of Retired Persons (AARP) as "those home design features that make a home safe and comfortable for everyone, young or old, whether they have a disability or not". An excellent collection of resources relevant to designing more universal housing is available at: http://www.extension.iastate.edu/pages/housing/uni-design.html. The AARP also has a lot of information written with consumers in mind. Specific links are as follows:

- Doors, Floors and Walkway design http://www.aarp.org/families/home_design/doors_floors/
- Bathroom design http://www.aarp.org/families/home_design/bath/
- Kitchen design http://www.aarp.org/families/home_design/kitchen/
- Safety, Lighting and Storage design http://www.aarp.org/families/home_design/safety_lighting/

Universally designed housing is becoming increasingly popular for two reasons. First, it "looks nice." People with disabilities don't feel like they are settling for an "ugly" house and people who don't have disabilities think that universal homes look and work much better than the old models. Second, we all want more comfort in our homes. Opening doors with arms full of groceries is as difficult at 30 years of age as it is at 70.

People now realise that they need homes that will grow old with them because people are living longer than they used to, so more people are living with disabilities. Younger people also want a home that will take care of them when they are sick or injured, as the traditional home that serves you well when you are healthy won't always take care of you when you break a leg or hurt your back.

So what makes a home deserve the term 'universal design'?

- No one needs to use stairs to get into their home or any of its main rooms. Places to eat, use the bathroom and sleep are all located on one level.
- Doorways that are 850 mm wide and hallways 1200 mm wide make it easy to move big things in and out of the house.
- Floors and bathtubs with non-slip surfaces help everyone stay on their feet.
- Thresholds that are flush with the floor keep everyone from tripping.
- Good lighting helps everyone see more clearly.
- Lever door handles and rocker light switches are great when arms are full of packages.

The Australian Network for Universal Housing Design (ANUHD) www.anuhd.org/ is working hard to get universal design features added to the Building Code of Australia for all new and extensively modified housing. ANUHD, in partnership with consumer and construction organisations, is planning to sponsor a two-day universal design in housing summit in December of this year, following the release of the final report into regulation of Accessibility. This report was commissioned by the Australian Building Codes Board and the Victorian Building Commission from Jaguar consulting. As more information about this event becomes available it will be posted at: www.homemods.info in our homepage news and events calendar.

## Publication Review: Understanding and Preventing Falls

Haslam, R., & Stubbs, D. (Eds.). (2006). *Understanding and Preventing Falls*. Boca Raton: Taylor & Francis Group.

By Lara Oram

This edited book by Roger Haslam and David Stubbs has useful chapters on aspects of falls that are often overlooked. One chapter of particular interest is: 'Steps and Stairs' by Mike Roys.

*The Steps and stairs* chapter discusses the design of stairs and important aspects for fall prevention including: gait when ascending and descending stairs; inconsistent step dimensions; inappropriate step sizes; inadequate handrails and poor step visibility.

Walking gait on stairs is different to gait on level ground. Walking on stairs requires initial precaution to test the dimension of the steps and respond with the body appropriately. After a couple of steps, proprioceptive (joint position sense) feedback determines the rest of the flight without relying on vision. In this sense, the first couple of steps measure the whole flight. When there are differences in step dimensions or inconsistencies due to wear, damage, poor construction or spiraling shapes, falls can occur. Therefore, when designing staircases it is crucial to calculate heights, treads (going) and gradients of steps accurately.

UK requirements for steps rises are a maximum variation of no more than 4-6 mm, otherwise the user may trip on the nosing of the step as the foot sweeps quite closely to the nosing when ascending or descending. Variations in the step tread (going) can also be a risk for falls, for example, if the next step upon descending is smaller than the previous, a user may overstep and slide off the edge of the nosing, eventually falling backwards. Often when a user's foot is bigger than the step tread, they will turn their foot away from the direction of travel and balance on the ball of their foot. Ideally the tread should be large enough to fit the whole foot on the step. However, step design won't suit everybody because of individual foot sizes and stride lengths.

Handrails then become a necessary feature for climbing successfully; providing support, guidance and direction to the user, and at times arresting falls. During ascent, handrails may be used to help lift the body weight up the stairs whereas upon descent, the handrail is often only lightly touched. The handrail needs to be adequately positioned and sized to enable the user to reach it quickly in the event of a fall. According to Mike Roys, a circular handrail with a diameter of 32-50 mm with appropriate frictional properties enables the strongest grasp. Similarly, Australian Standard 1428.1 (2001) recommends handrails with a circular profile and diameter of 30-50 mm.

Falls can also occur because of variations in lighting and shadows. Two-way artificial lighting switches should be provided at the top and bottom of the staircase. Natural lighting is also preferable but can often introduce shadowing and glare, which can lead to hazardous circumstances.

High contrast between the step and nosing is important for determining the edge of the step, particularly when lighting is poor or for a user who has poor eyesight. Nosing must be fastened properly so they don't become a trip hazard. Alternatively, painting a strip at the edge of the tread for contrast may be a safer option.

It should also be noted that many other factors can lead to stair falls: the material or finish of the steps, objects left on the steps, other people using the steps at the same time, inappropriate footwear worn, mobility of the user, visual ability of the user etc.

This chapter and others from this publication may remind therapists and home modification services of the many and varied aspects to step and staircase design, and should assist them when designing to prevent falls.

This book is available from the home modification clearinghouse library but cannot be copied or distributed without breaching copyright. The book can be found online at http://www.dadirect.com.au/
ISBN 0-415-25636-4

**Latest Publications:**

- Selecting Diameters for Grabrails: Evidence Based Research
- Effectiveness of Grabrail Orientations During the Sit to Stand Transfer: Evidence Based Research
- Selecting Coatings for Tiled Floors: Evidence Based Research, Industry Factsheet and Checklists

**Upcoming Publication:**

- Wayfinding Lighting: Evidence Based Research
- Selecting Doorbells for People with Hearing Impairment: Evidence Based Research
- Legalities of the Australian Standards and Alternative Access Solutions: Summary Bulletin

## Other HMMInfo Research Projects

- Costs and Benefits of using Private Housing as a 'Home Base' for Care for Older People - a joint project with Australian Housing and Urban Research Institute (AHURI). This research seeks to develop a robust method to determine the financial costs and benefits to both individuals and governments of in-home delivery of non-shelter services to elderly people, in order to guide future housing and care policy.
- HMMInfo was commissioned by The Department of Ageing, Disability and Home Care (DADHC) to determine the most effective design principles and design elements to be considered in capital development projects designed to deliver or expand out-of-home delivery of day services to elders with dementia.
- The HMMInfo Clearinghouse was responsible for the administration of an Australian Research Council grant application of almost one million dollars to fund a multi-disciplinary research project *Moving safely on timber decking.* This project involves the collaboration of many experts from relevant industries (e.g. National Parks and Wildlife, Outdoor Structures Australia and Insurance Australia Group) and disciplines (e.g. Biomechanics; Behavioural & Community Health Sciences; School of Leisure, Sport and Tourism; and HMMInfo). This application was submitted last year. The outcome is expected in the coming months.

## HMInfo New Website Launch

HMMInfo will lose one "M" and become the Home Modification Information Clearinghouse (HMInfo) as a new website is created under the Human Services Network (HSNet) server. The new website will be launched by Minister John Joseph Della Bosca at the World Federation of Occupational Therapists (WFOT) Congress held in Sydney in July 2006. Home and Community Care, Commonwealth and State, are the major funders of WFOT, as they perceive community services to be an important part of disability and aged care. The HACC program, as the primary sponsor will have a stall manned by DADHC Occupational Therapists involved in home modifications. At the stall, consumer and industry information will be distributed as well as FREE mouse pads with the new website address. Please watch the homepage and your mailboxes for more information and invitations to the launch. Note: we have already received a new website address www.homemods.info!

**Check out the latest news on the website www.homemods.info:**

- HMMInfo Usability Survey Results
- New Edition of Interior and Workplace Lighting Standard
- Current Evidence Based Practice Reviews
- Report on Existing HACC Service Models in NSW
- OHS Risk Management Standard and Handbook
- Renovate Your Plastering Skills

## HMMinfo Background

Our team brings together a range of experience. The Directors are Catherine Bridge from School of Occupation and Leisure Science, Faculty of Health Sciences and Peter Phibbs from Faculty of Architecture. Katrina is our librarian. Lara, Lisa, Stephanie and Tanja are the research assistants. Lawrence is our web designer.

**Editor:** Lara Oram