

Appendix A: Research Background

Secondary Research Summary

At the beginning of the project, background research was done into terms and concepts mentioned by the client, Ms. Semelroth, an occupational therapist at Misericordia Home, in her written project description. The project involves designing a device with enhanced safety features, specifically tailored to aid adults with a variety of disabilities in comfortably accessing and exiting the shower area. Adults with intellectual disabilities often face challenges when it comes to accessing and utilizing shower facilities, especially regarding balance, strength, endurance, and depth perception. The background research helps us understand various aspects of the problem mentioned by Ms. Semelroth. In particular, it researched: basic information about the different intellectual disabilities, devices already in use by Misericordia Home, interesting implementations in the market, and statistics about bathroom-related injuries/ accidents.

About Intellectual Disabilities

Intellectual disability (ID) can be considered when one has some types of cognitive limitations including but not limited to social, conceptual, or other necessary practical skills like language. Some of the different kinds of intellectual disabilities include speech and language difficulties, social judgment challenges, and often slow learning development.

Some of the most common types of intellectual disabilities in adults also include intellectual development disorder (limits in intellectual functioning and adaptive behavior), down syndrome (the presence of an extra copy of a chromosome), and autism spectrum disorder (social communication and behavior).

An important distinction is between intellectual disabilities and developmental disabilities. Differences in intellectual ability and adaptive behavior, such as social and life skills characterize intellectual disabilities. Developmental disabilities are a more broad category, which can result in both intellectual and physical challenges. The exact definition of either of these disabilities can vary depending on the source and context.

About Misericordia Home

In Misericordia Home, a Catholic residential care facility, certain older bathrooms are not tailored to meet the needs of individuals with physical and developmental disabilities. These bathrooms feature shower ledges ranging from 2 to 5 inches on the outside and 1 to 3 inches on the inside, posing significant challenges for residents to navigate. Moreover, the presence of rolling showers in these facilities increases the risk of injuries. It's imperative to address these

accessibility shortcomings to enhance the safety and comfort of residents with disabilities and foster a more inclusive environment within Misericordia Home.

About Bathroom-Related Accidents

Ensuring the safety and well-being of adults with intellectual disabilities within shower areas demands meticulous attention to design and equipment. By proactively addressing these concerns and implementing necessary modifications, we not only mitigate safety risks but also uphold principles of dignity, independence, and overall well-being for these individuals.

The statistics paint a grim reality regarding the perils associated with bathroom-related injuries, particularly in the United States. With approximately 370 individuals sustaining injuries in bathrooms daily, it's evident that these spaces rank as the second most dangerous rooms in homes, following only the kitchen. Of these injuries, about 66% occur during tub or shower use, with slips and falls constituting the leading cause, responsible for over one-third of all bathroom injuries. The repercussions of these accidents are profound, with roughly 235,000 adults and teenagers over 15 being admitted to emergency rooms annually due to slips and falls in bathrooms, resulting in approximately 32,900 hospitalizations. Shockingly, individuals aged 65 and above bear the brunt of these incidents, comprising 79% of bathroom-related injuries.

Despite these alarming statistics, preventive measures such as bathtub mats or non-skid strips are not widely implemented, with only 63% of U.S. homeowners having them, and even fewer homes, just 19%, having grab bars installed. Furthermore, the likelihood of sustaining an injury increases significantly with age, peaking at 85 years old. The consequences of these injuries can be severe, sometimes leading to a lifetime of treatment, including physical therapy, and in the worst cases, resulting in paralysis or death. Indeed, approximately 1 person in the U.S. dies each day from a bathroom-related injury occurring in either the bathtub or the shower. In addition, the ADA states that caregivers in the age range of 30-35 should not be required to lift on average more than 65 lbs.

Preventing bathroom-related accidents involves installing grab bars for stability, using non-slip mats and strips, ensuring adequate lighting, clearing clutter, and adjusting shower and toilet heights for accessibility. Providing seating options, utilizing assistive devices, and educating individuals and caregivers on safety practices are also crucial. By implementing these measures, the risk of accidents can be significantly reduced, promoting safety and independence for all bathroom users.

About devices on the market

Previous Users	Context
<ul style="list-style-type: none"> - The project partner describes the users as aging individuals facing issues with balance, strength, endurance, and depth perception. - Have mobility issues - Some users also have developmental disabilities [1] - “Diverse needs” implies that some users have more physical and developmental capabilities than others - As of now, users are TBD <ul style="list-style-type: none"> - Typical users are someone who uses a wheelchair, walker, or rolling shower chair 	<ul style="list-style-type: none"> - Some older bathrooms in catholic residential care facilities are not catered to individuals with physical and developmental disabilities - There are shower ledges that range from 2-5 inches on the outside and 1-3 on the inside that are very difficult to step over - Rolling showers are unsafe because of injury risk  

Previous Solutions	Ideal Solution
<ul style="list-style-type: none"> - They have tried using metal and rubber ramps to solve the issues of the ledge <ul style="list-style-type: none"> - They fixed the issues of the outside ledge, but not the inside ledge - The rubber ramps are heavy and not easily transportable - Some ramps are longer, which makes it difficult to turn and push a rolling shower chair up the ramp - Previous solutions available online weigh about 17 pounds, which may be hard to maneuver at times 	<ul style="list-style-type: none"> - A two-sided shower ramp <ul style="list-style-type: none"> - Eliminate the ledge step inside and outside the shower - Lightweight - Nonslip - Adjustable for heights of shower ledges - Alternative solutions - There are foldable solutions available to produce a ramp on either side, but are made for smaller ledges[2] - Carrying handles and a folding center allow for very easy transport - This was made for going in and outdoors, so it may not have the right traction / right use for inside a shower - Also, this is used for sliding doors,

	<p>which have consistent heights on the inside and outside</p> <ul style="list-style-type: none"> - Bathtubs at the facility have two different ledge heights  <ul style="list-style-type: none"> - Other options online have a fitted space for the shower ledge[3] <ul style="list-style-type: none"> - This would have to be adjustable for different ledge heights - Modular commercial options (like legos) for custom fitting  <ul style="list-style-type: none"> - Shower wide chair 
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Constraints	Questions
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<ul style="list-style-type: none"> - Different showers <ul style="list-style-type: none"> - 2-5 inch ledge on the outside - 1-3 inch ledge on inside - Varying ledge sizes - Different shower sizes - Showers are small-medium - Nonslip - Adjustable - Accommodates wheelchair, walker, or rolling shower chair. - Need to get a rolling shower chair inside - Depth Perception <ul style="list-style-type: none"> - Individuals with Alzheimer's may find it scary to step into water[5] - May find it harder as well with mobility issues - Stiffness <ul style="list-style-type: none"> - Adults may experience stiffness or a loss of flexibility through the back, hips, and waist, which would restrict washing[5] - Simplicity <ul style="list-style-type: none"> - Some adults with dementia may not remember how to shower or be afraid of the way water feels, so helping with comfort and simplicity of the experience is best[6] 	<ul style="list-style-type: none"> - Are there rails/places to hold on around or inside the shower? - Would the surface itself need to be non-slip? (Are rolling shower chairs non-slip?) - Would this need to be transported often? Or would it typically stay in one shower? - What is the maximum weight a caregiver can handle having to move? - What are the dimensions of the shower? - How are each of the devices (shower chair, walkers, wheelchairs) being used to assist in getting in and out of the shower? - Does every client have a caretaker? - How can we make the showering process a more comfortable process for the user?
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Sources

- Folding Two-Sided Threshold Ramp - Nithsdale Wheelchairs. Available at: <www.nithsdale-wheelchairs.com>
- Shower Wheelchair for Easy Accessibility, *Pinterest*. Available at: <<https://www.pinterest.com/559009372497289234/>>
- Bathing. Available at: <<https://www.alz.org/media/documents/bathing-ts.pdf>>
- Challenges of Impaired Mobility in the Bathroom and Ways to Overcome Them. Available at: <www.essentialaids.com>
- Caregiving: How to Help With a Shower Behavioral Health & Intellectual Disability. *Behavioral Health & Intellectual disAbility Services - Philadelphia*. Available at: <<https://philadelphia.pa.networkofcare.org/mh/library/article.aspx?hwid=abq1244>>