Publications | **Bathing For Older People With Disabilities**

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Introduction

The fundamental purpose of bathing is to maintain health and physical well being of the body. While most young, able-bodied people do not think twice about taking bath, bathing is more difficult, more time consuming, and more hazardous for older people with disabilities. The Gallup organization in 1983 surveyed 1,500 non-institutionalized people over the age of 55. "Using shower or tub" was one of the sixteen problem areas identified for maintaining activities of daily living. The National Center for Health Statistics in 1987 reported that about 10 percent of all people over the age of 65 have difficulty bathing, and about 6 percent receive help (Lawton, 1990). The magnitude of problems older people experience while bathing and the seriousness of the situation raises many important questions. Why do they continue to bathe? How difficult is it for older people to bathe? How safe is bathing for older persons with disabilities? Why do older people bathe in unsafe conditions?

Physiologically, bathing allows cleansing of the skin and removal of accumulated foreign matter. Bathing displaces dead skin, prevents irritations and rashes that would otherwise transform into infections, and washes away waste materials that can interfere with the normal functioning of the skin. Bathing allows people to: 1) maintain acceptable social standards of cleanliness, both appearance and olfactory, and 2) refresh, revive, and relax through the washing process.

Bathing, like all forms of body cleansing activities, is habitual and ritualistic. It is laden with social, psychological and philosophical overtones. Philosophically, bathing is equated with cleanliness of body and purity of soul, and it reflects aptly in the popular phrase, "Cleanliness is indeed next to Godliness." People's obsession to maintain a clean body is well known. Americans take at least seven baths a week. The rising sale of deodorants, anti-perspirants, and mouth washes supports the social emphasis for maintaining a clean body, and it reflects the cultural and aesthetic spirit of the society (Kira, 1966).

This paper will first examine the safety aspects of bathing. It will then present results of a study that investigated the safety and accessibility needs related to bathing among older persons and their care-providers. Finally, the conclusion will offer design directives to assist in design of a safe and accessible bathing equipment.

The Magnitude of the Problem

Accidental Deaths

Advocates of bathroom safety are astounded by the high incidence of bathing-related deaths. ABT Associates Inc.'s report to the Consumer Product Safety Commission in 1975 indicated that many as 70 persons over the age of 65 die of bathtub-related burn injuries every year. According to the National Safety Council, one person dies everyday from using

bathtub/shower in the United States. Of the 24,000 accidental deaths of people over the age of 65 every year, many are bathing related (Burdman, 1986). The National Safety Council reported that 345 people of all ages died in bathtubs in 1989, 364 in 1988, and 348 in 1987. Bathtub related deaths during the three-year period exceeded those due to handgun accidents, all forms of road vehicles accidents (excluding motor vehicles), ladders and scaffolding falls, and ignition of clothing. Because bathtub related deaths occur suddenly and in a supposedly protective environment, these deaths tend to cause a greater degree of psychological trauma for the families.

After the swimming pool, the bathtub is the second major site of drowning in the home. Budnick and Ross (1985) studied bathtub-related drownings between 1979-1981. They concluded that those with least control over their environments - young and the elderly -have the greatest risk of drowning. Children less than 5 years old accounted for 25 percent, and those over the age of 75, 15.5 percent of the bathtub-related deaths. Drowning deaths, for those over the age of 60, were primarily due to having fallen in the tub. Among children less than 5 years old, about 16 percent of the deaths were due to being left unattended. Bathtub-related drownings cut across age, sex and race barriers,. All people are prone to deaths in the common household bathtub. Females accounted for 52 percent, Whites 80 percent, and Blacks 17.3 percent of the all bathtub deaths. Seizure disorder was attributed as the most common cause of bathtub drowning among persons aged 5-39.

Bathing Injuries

On an average, 370 persons of all ages sustain injuries from bathtub/shower daily in the United States. The dangerous aspect of bathing is evident from the injury data reported by the Consumer Product Safety Commission: 117,230 bathtub/shower injuries in 1989; 136,616 in 1990; and 139,434 in 1991.Those between the ages of 25-64 accounted for 37 percent of all bathtub/shower injuries; the most vulnerable being those closer to the upper age limit. The elderly accounted for 17 percent of bathtub/shower injuries in 1989, 22 percent in 1990, and 20 percent in 1991. More elderly people were injured from using bathtub/shower than from other potentially dangerous equipment such as exercise equipment or cooking appliances (ranges or ovens).

No room at home poses more threats to safety than the bathroom (King, 1992; Koncelick 1982 ; Kira, 1966). The National Safety Council reports that in 1990, "7.8 percent of all injury episodes, or 4,547,000, involved persons of age 65 or older" (Accident Facts, 1992, p23). The majority of the accidents took place in and around the home. About 30 percent of all home accidents are due to falls, the sixth leading cause of death. Falls result in 200,000 hip fractures, and 25 percent of all hospital admissions for people over 65. The bathroom is the primary location where many falls take place. Confined space together with hard slippery surfaces create great risk for all people, irrespective of their age or physical condition. The greatest danger in the bathroom is slipping and falling when entering and exiting thebathtub or shower. The hardness of the bathtub surface and sharp, protruding fixtures are the chief agent of injury in slips and falls. The lack of support surfaces for grasping in older bathtubs is the primary reason why people slip and fall. This is particularly true for older homes, a place where many of America's elderly reside.

Inconvenience

The results of a study published by the National Institute on Disability and Rehabilitation

Research indicates that in 1984 more people were dependent in bathing than they were in dressing, transferring into and out of bed/chair, meal preparation or performing light house work (NIDRR, 1992). Bathing related difficulties escalate sharply with age. They vary greatly between the young-old(65-74), the old-old (75-84) and the very-old old (85+). About 40,000 young old people reported difficulty with bathing. There were twice as many old-olds and over five times as many very-old olds who had problems with bathing. Not all people experienced the same type of difficulties; some had more problems getting in and out of the bathtub, while others had difficulty adjusting the flow and temperature of water.

Bathing is a difficult task for a large number of the America's elderly. Another study by the NIDRR indicated that in 1987, "a total of 3.6 million persons (12 percent in the community of over 65) had difficulty with at least one Activity of Daily Living or mobility(walking) . . . ADL and mobility difficulties affecting the greatest number of elderly were bathing (2.5 million or 8.9 percent)" (NIDRR,1992, p66). Not all individuals with bathing difficulties required help; about 252,000 people bathed unassisted; 1.4 million individuals required human assistance; 308,000 were dependent on the use of bathing aids and equipment; and 280,000 needed both.

Safety problems among the aged are generally due to the loss of physical capabilities and poor design of bathing equipment. In order to compensate for loss of capabilities, the elderly tend to over-exert themselves. This seriously affects their security and personal well being. For example, the elderly have difficulty bending over and kneeling down. They are unable to access parts of their body when standing, and some even when sitting. Many attempt to challenge their capabilities to access difficult areas and injure themselves. The elderly are constrained by limited reach and poor grip strength. They feel exerted by the poor design and location of controls. They have problems reaching fixtures and grasping them. Many receive injuries from applying excessive force. Poor balance affects stabilization. This escalates their chances of slippage and falling when entering and exiting the bathtub or shower.

Current Design

Review of available bathtubs and showers suggests that safety was never the major issue in their design. Historically, the development of bathing equipment has been more of chance than conscious design. Institutional equipment has undergone a significant evolution because assisted bathingis very difficult for care-providers. But, the design of common household bathtub/showers has remained virtually unchanged. The earliest known bathtub dates back to the Minoan dynasty in 1700 BC, and its form is almost identical to the bathtub forms that are in use today. The present day bathtubs are much like the Minoan tub, the only difference being they are made of manmade materials and have flowing hot and cold water. Showers are relatively new. The earliest showers were developed for medicinal purposes (e.g. water cure or rain bath) in the early 1800s. Showers became common with the introduction of indoor plumbing. Their design has remained virtually unchanged since the end of the first World War.

There are many problems with the present designs of bathtubs and showers. First, these products are outdated and they fail to meet the physical needs of the aging population. Adaptive fixtures andequipment are "Band-Aid" solution to complex problems not satisfied by conventional showers and tubs. They highlight failures in conventional design and unresolved problems. Grab bars make up for the absence of adequate support and the need

for greater physical security in the bath area. Bath mats overcome the danger of the slippery floor surfaces. They reflect the need for safer footing. Bath seats are a reminder of people's inability to stand while bathing. They point the need for alternative ways of bathing. Second, bathtubs and showers are ability-specific products. They conform only to the functional capabilities and physical needs of young, able-bodied individuals, and place considerable physical and mental demands on the elderly, the children and those with disabilities. For example, the positioning of controls and accessories often require standing and a wide range of motion. Bathtubs and showers require good balance when transferring in and out of them. Third, the design of bathtub/showers do not reflect a lifespan perspective. Conceptually, children begin to bathe on their own by the time they are 6 to 7 years old. They continue to do so as grownups until they are about 50-60 years old. Beyond this age, they begin to inherit equipment-related dependence, followed by people-oriented dependence, and finally dependence on both. Bathtubs and showers do not meet the changing needs of people. They are not responsive to adaptation as people's functional capabilities and physical conditions undergo age-related changes. For example, when unable to stand and bathe, people sit down while bathing. The loss of reach from a person's restricted movement makes controls and accessories inaccessible. Thus for much of their lives, people either bathe in unsafe conditions or they are dependent on assistance.

The Study

Purpose

The present study was conducted to assess the bathing needs and preferences of older persons living at home, and their care-providers. It was designed to generate qualitative data on bathing, and it was aimed at understanding a variety of bathing issues. The results of the study are being used to design a bathing facility capable of providing greater safety and access to all.

Subjects

All together 40 participants (26 bathers and 14 care-providers) were interviewed for the study. All bathers were over the age of 62, with the exception of one 45 year old paraplegic male. The oldest person was a 90-year old female. The interviewees consisted of: 20 independent bathers (those who bathe on their own), 6 dependent bathers (those who are bathed by another individual), 3 family care-providers (persons who bathe their relatives/friends) and 11 homecare-providers (professionals who bathe clients). Only three participants had mobility problems; two depended upon the use of a walker, and one was a wheelchair user. With the exception of the paraplegic male, who received assistance from his wife once weekly, all independent bathers managed on their own. The four dependent bathers were assisted by care-providers. All of the bathers live in non-institutional settings, most of them in apartments, some in their own homes, and a few in housing projects for senior citizens.

The family care-providers are members of a care-provider support group. The homecare-providers are employed by three health care agencies, and their involvement was suggested by their respective employers. All participants (bathers and care-providers) were from theBuffalo area, and their participation in the interviews was voluntary.

Methods

The field research was based solely on three categories of interviews: focus group interviews consisting of four to seven participants, personal interviews with bathers and joint interviews with dependent bathers and their care-providers . The ambulatory bathers (independent) were contacted through senior centers, and they were interviewed in focus group settings in the senior centers. The non-ambulatory bathers (independent and dependent) were clients served by long-term care agencies. They were interviewed in their homes (some with aides and others without). The family care-providers were interviewed individually in their homes. Professional aides were interviewed simultaneously, with or without their clients, in focus group settings at their offices or in their clients' homes. The focus group interviews lasted between one-and-one-half to two hours, the personal interviews between three-quarters of an hour to an hour, and the joint interviews between an hour and one-and-one-half hours.

All interviews were audio-taped. The bathrooms of those people interviewed in their homes were video-taped. Each of the interviews was conducted in a discussion-like situation using a variety of open-ended questions. Due to the uniqueness of each person's background and the personal nature of the discussion topic, not all participants were asked identical sets of questions. Instead, questions followed the momentum of the discussion and responsiveness of the interviewee(s). They revolved around a set of pre-determined bathing themes. The videos were later reviewed to determine the environmental conditions of the bathrooms. The content of the interviews were evaluated based on the quality and frequency of responses received . The similarities, differences and uniqueness of the information helped develop a pattern of bathing needs andpreferences.

Findings

BathingDependence

Bathing dependence varies greatly between people and their physical conditions. Ability to bathe independently did not depend on any one factor. For example, a 63 year old female with left sided paralysis, hip replacement and arthritis in the sacroiliac was dependent upon being bathed, while an 85-year-old woman with arthritis, impaired vision and shortness of breath bathed independently. Several persons, in spite of as many as seven disabling conditions bathed independently. All three mobility-impaired persons bathed independently. An 80-year-old who lived independently in her own home was dependent on being bathed. While another person who had difficulties living independently, bathed on her own.

Bathing dependence generally resulted from illness and/or injury. For example, a 90-year-old mother's dependence was due to falls in the home, and an 80-year-old woman's dependence resulted from a physical injury. No individual was completely dependent on being bathed. They all offered various levels of assistance. For example, one person who required help with soaping, rinsing and drying, transferred on her own. Another person who only needed help in transferring in and out, bathed mostly on her own. Bathing dependence was both physiological and psychological. For example, one person phoned her daughter before and after her bath. Another person has her care-provider remain present in the bath area at all time. A 90-year old mother made sure that her daughter stood outside the closed bathroom door. People's ability to bathe on their own depended on age, severity of disabling

condition(s) and their willingness to do so.

Mechanical and Physical Difficulties

Bathing difficulties vary significantly. The most common problem was maintaining balance when bathing and making transfers. Those unable to make safe transfers had abandoned tub-oriented bathing. Other problems were largely due to inadequate reach, poor grasp and low level of thermal sensitivity. Many individuals indicated that because of their inability to "reach low," using controls from the outside of the tub was impossible. Opening faucets and adjusting water temperature are troublesome for many. Those who lack sensation in the hands frequently misjudged the water temperature and got scalded. Low level of illumination made it difficult for bathers to see controls and accessories. In the absence of auxiliary heating, people felt cold while bathing. Inadequate storage caused laying around of articles. This made it impossible to keep the bath space organized. The size of the bathing space presented diametrically opposite problems. Small size restricts movement of wheelchair users and those providing care. Excessively large space makes controls and accessories inaccessible, and wheelchair users become fatigued from wheeling around in an attempt to reach for accessories.

Accessible showers, specially built to provide a greater degree of convenience, are not free of problems. Several users of accessible showers indicated that they have trouble using controls and bathing accessories while sitting on built-in seats. Consequently, many of them were either forced to stand up with water running to reach for accessories, or store them on the seat. One individual had installed a transfer bench and a flexible hose to combat the reaching difficulty. Another individual who has a paralyzed right side, had no use of the grab-bar (since it was located only on the right side). In the absence of a bar on the left side, getting out of the shower safely was difficult. A third person, a lower limb amputee, found it impossible to make transfers to and from the built-inseat. She used a transfer seat to get in and out of the accessible shower, and used the built-in seat to hold accessories.

A majority of persons have difficulty using integrated level type controls.Even though they felt it was easier using such a control, the difficulties were due to: 1) the problems of understanding the color-coded signage for water temperature and flow, 2) the complex operational demands of the faucets requiring two simultaneous actions,push and turn, or pull and rotate, 3) the non-standard nature of these operations. Those with tremor of the hand or arthritis in the hand were unable to fine-tune the temperature and flow adjustments.

Practically all care-providers indicated that bathing people is the hardest task for them, and getting people out of tub is the most difficult part of the task. They reported that narrow passages and awkward layout of bathrooms make it difficult to handle clients with side-by-side movements. They also obstruct the movement of persons with mobility aids. Inadequate space in the bathroom makes it difficult to roll-in wheelchairs. According to homecare-providers, most clients have great difficulty accepting bathing-oriented assistance from other people. They felt that gaining clients' trust and cooperate in the bathing process are the most difficult part of their job. They complained about sliding glass doors and how they pose great difficulty in transferring people in and out of the tub. Some of the other difficulties they mentioned included:

- lack of space between tub and adjoining fixtures,
- inadequate space around the tub,

•unavailability of a proper transferring device,
•slippery floor conditions,
•inadequate lighting,
•excessive postural stress resulting from bending over,
•client's unwillingness to be bathed,
•client's ability to assist, and
•fatigue of bather. Care-providers find it difficult to shower clients in a shower stall because they themselves become completely drenched.

Unsafe Practice

Both individuals and care-providers frequently practiced unsafe methods while bathing or assisting with the task. This was due to not understanding the associated risk level. Standing while bathing in the absence of adequate grab-bars was the most common of all unsafe practices. Some people stood up to soap their underside knowing full well that they had a balance problem. Others reached out to grasp objects fearing they would fall. Some people had stored accessories on the bathseat, thereby decreasing the seating area and increasing the chances of sliding off. An individual who walks with the help of a walker adopted a series of very dangerous methods to make transfers and regulate water temperature. While transferring, he did several complex tasks simultaneously while holding on to the walker with one hand and grasping the wall-mounted grab-bar with the other. He then lifted, dragged and bumped his legs up against the tub. While his hands tremble from the excessive force, he transferred one leg at a time into the tub. The method he adopted for adjusting the water temperature is equally dangerous. He operated it by kneeling down on the narrow floor space between the tub and the toilet, grasping the walker with one hand, extending himself over the rim of the tub to reach the controls. The lighting level in the tub was also very low.

Numerous individuals observed unsafe bathing practices and jeopardized their safety and well being. For example, by placing throw rugs outside the tub, many individuals encouraged tripping and catching their walker/cane. Objects scattered around the bathroom constituted hazards for everyone, especially those with visual impairments. One individual admitted hanging on to the bathroom door and the sink to make transfers. Another person who had difficulty reaching the controls from outside the tub, regulated the water temperature from the inside and often got scalded. A care-provider bathed her 90-year-old mother in a tub that had no grab-bars. The tub was equipped with sliding glass doors. When stepping in and out of the tub, the mother leaned on the glass doors.

Common Accidents

Bathing-related accidents are due to the physical and mental stress that both care-providers and clients experience. These problems are compounded by medication and fatigue from heat. Several individuals had either fallen or come close to falling in the bathroom. An individual who has hip problems and arthritic knees, was unable to get up after a tub bath. She sat on the tub floor for thirty minutes, rolled over the tub edge to grab the sink, and dragged herself out of the tub. Many people have reported falling into the tub while arising from the toilet seat . One of these people used her emergency beeper for assistance and was rescued by her family. Although none of the participants were ever severely scalded, many have been and continue to be mildly scalded because of poor sensation of the hands.

The risk of falling along with clients is a well known fear among care-providers. Yet, only one

among those interviewed admitted having done so. According to the care-providers, if a bathing accident will usually occur under the following conditions: 1) toward the end of the bathing procedure since clients are both tired and relaxed at that time, 2) after a care-provider as been on a case for some time, because a client's ability to assist diminishes as his/her condition worsens, and 3) when transferring a client out of the tub, because the client's body is damp, the tub inside and the floor outside are wet and slippery, and the client and the provider are fatigued.

Unsafe Bathing Conditions

Even though a concern for safety is on the rise, a large majority of the elderly who live in older homes continue to bathe in unsafe conditions. In spite of all their difficulties, they make no modifications to their outdated bathroom, and expose themselves to unnecessary risk. There are several reasons why they make no environmental changes. During their early phase of functional decline, they simply make behavioral changes in the way they bathe, hoping that this will compensate for the lack of safety. Because a majority of them live on fixed incomes, retrofitting the bathroom is an economic burden they are unable to bear. Even if many individuals are willing to make modifications, the condition and layout of the buildings they live in do not lend themselv es to make bathroom modifications. Older residents are generally uninformed about the type of technical assistance they need andwhere to look for it. They see modifications as an acknowledgment of their own disabilities and they are embarrassed by it. They think modifications will effect the value of the property and/or burden the successor with undoing them.

Present Safety Measures

Both individuals and care-providers do take precautionary measures to ensure safe bathing conditions. For example, most bathers and care-providers place slip-resistant bath mats inside and outside the tub to prevent skidding and falling. Those with grab-bars in the tub area hold on to these bars when bathing. Many people make sure that hotel bathrooms have grab-bars before reservations are made. Most people ensure safety by being very careful about every activity. Care-providers ensure safety by remaining vigilant and remaining with the person all the time. Home care-providers wear sneakers in the bathroom and ensure good illumination in the bath area.

Constant Stresses and Fears

Falling and colliding with hard, pointed fixtures was the most common of all fears. People were afraid of falling while standing in the shower, during transferring in and out of the tub, and while holding on to a grab-bar. Some were afraid of getting scalded because of misjudging the water temperature. One person had abandoned tub-oriented bathing because of her fear about not being able to exit.

Both care-providers and clients experience physical and emotional stress due to bathing. The most common stress is physical. People get tired during and after showering, and they experience shortness of breath. Non-ambulatory clients tire themselves easily from movement and from the level of activity that is demanded by being bathed. Most home care-providers get fatigued by bathing clients, assisting them during transfer, and from bending over. Many experience serious emotional stress. This is because they develop a family-like bonding with their clients. The emotional stress results from the personal nature of the

service they perform and it is further heightened by the long hours of client contact and proximity they maintain.

Many family care-providers experience very high levels of mental stress from providing care to their relatives. Emotional stress is the most difficult part of being a family care-provider, who sometimes are themselves older and have other family responsibilities. In addition to looking after other family members, many work outside their homes as well. Consequently, they feel pressuredto meet their obligations. Most of them are exhausted from providing constant attention and are burdened from having to contend continually with family care. Often, lack of acknowledgment from the one receiving care greatly escalates the level of emotional stress.

Client-related stress varies with:

•size, shape and physical condition of the client, and •the level of nervousness, cooperation, and willingness the client may display during bathing.

Environment-related stress is dependent on:

•the availability of transferring devices, and •physical features of the bathroom such as the tub height, presence of sliding glass doors, bathroom layout, narrow width of clearances, floor conditions and low lighting level.

Care-provider related stress is a function of height, weight and physical condition of the care-provider, and the time pressure resulting from trying to complete all tasks quickly.

Conclusion

Safe and accessible bathing is not solely a concern of the elderly, disabled and those caring for them. It is of utmost importance to all people irrespective of their age, sex and cultural background. Eliminating accidental deaths and injuries is of prime importance in creating a safe bathing environment. To provide greater stimulation, control and personal empowerment for bathers and care-providers, the following design principles should be observed when making modifications to existing bathrooms and the design of the future bathing equipment. It is important that individuals consult their therapist and evaluate their needs before making modifications or purchasing devices.

1. EnhanceSecurity

Bathing safely and with comfort is largely an environmental issue and is guided by the quality and physical characteristics of the environment. As we know, the incidence of falling while bathing threatens all persons regardless of age but specially those with poor balance. In addition, falling while providing care threatens the safety and well being of care-providers.

Recommendations for Existing Bathrooms:

•Emergency Rescue Devices
Install emergency devices such as telephones or intercoms within effortless reach of the users. These devices provide greater personal security. They can alert monitoring

individuals about accidents, advise accident victims about how to get out of a crisis, and help individuals in the rescue operation. •Better Illumination
Low illumination together with poor vision makes it difficult to detect articles scattered around. Better illumination will direct attention to potential threats fromprotruding objects and other hazardous conditions. This can be achievedthrough:
•additional light source in the bath area, •natural daylight via appropriate size window, •light colored walls in the bathroom, and •using a transparent curtain.
•Storage
Accessories laying around create hazardous bathing conditions. Provide greater storage space through wall mounted shelves. This will prevent accidents from bumping objects into and skidding from articles scattered around the floor.

Recommendations for New Bathing Equipment:

•incorporate easy to use rescue device and locate them in a strategic position
•consider smart devices that will alert the central monitoring system at the time of an emergency •build-in lighting fixtures into the design of the equipment
•allow for adjusting the illumination level
•offer a choice of direct or diffused lighting
•build-in storage into the design of the equipment
•enable individuals to alter the location and size of storage
•round all edges and soften all corners to reduce the chances of injury in a fall
•give a safe appearance to the surroundings through recessed fixtures and rounded edges
•install anti-scalding device

2. Making Safe Transfers

Getting in and out of the tub is the most critical aspect of bathing independently. It is also the most difficult aspect of providing care. Poor balance and fear of falling greatly affects people's ability to make safe transfers. Awkward tub shape, inadequate maneuvering space and slippery floor conditions greatly adds to problem.

Recommendations for Existing Bathrooms:

•TransferBench
Install transfer bench for making easy transfers. These benches generally remain partly inside and partly outside the tub. A persons would sit on the part outside the tub and gradually slide his/her body inside the tub. Transfer benches are available in various sizes and seat types. Some are height adjustable and come with or without a backrest. Benches with rubberized legs ensure safe positioning inside the tub.
•Grab Bars
Mount grab bars in the critical support areas. They can greatly assist in easy and safe transferring in and out of the tub. Grab bars come in various designs: horizontal, vertical, diagonal, hockey stick like, combination, wrap-around, swing away or detachable. Grab bars can be wall, floor, ceiling or tub mounted. Ridged, brushed, knurled or vinyl coated grab bars provide better grasp. Because people's physical capabilities and method of transfer vary significantly, their placement must accommodate unique requirements of users. In addition to following codes, the positioning of grab bars must be carefully tested under actual operating conditions.

Recommendations for New Bathing Equipment:

•eliminate the need for making transfers in and out of the tub and the hazards caused by the activity •use mechanical devices such as bathlifts before offering human assistance
•provide a build-in transfer device for those who need it
•explore alternative, non-threatening soaking possibilities that are comfortable and less demanding •locate grab bars at strategic points capable of facilitating transfers
•allow personalization of grab bars to meet unique needs of individuals

3. Prevent Slipping Inside and Outside theTub

Slipping inside the tub happens due to the smooth condition of the wet tub surface. When getting out, slipping is caused by the smooth, wet floor surface. Lack of hand rails further contributes to the problem.

Recommendations for Existing Bathrooms:

•Non-Slip Tub Floor
Non-slip tub floors can greatly add to the security of the bathers and care-providers. Install bathmats, tub patches or non-skid surface in the tub. Bathmats are rubberized floor coverings and they fit inside the tub. They are placed temporarily and can be removed for cleaning and/or repositioning. Unless they have suction cup-like backing, many bathmats tend to get loose and slip. Bath patches are smallnon-skid pieces. They are inexpensive and need to be permanently glued to the tub surface. Non-skid tub surfaces are integral part of the tub floors and they cover the entire floor surface. •Non-Skid Bathroom Floor
Carpet the bathroom floor or place a thick variety of throw rug outside the tub. Even though carpeting is more effective than throw rugs, it is generally harder to maintain. Thicker throw rugs are more slip resistant than thinner ones. The floor underneath the rug must be dry and free of unwanted objects. When stepping on the rug, individuals must not rely solely rely their balance. They must use hand rails to support and distribute their body weight.
•Grab Bars
Install grab bars inside and outside the tub. Because slip prevention depends greatly on the quality of the support, it is important that attention is paid to the selection of the grab bars and their placement is carefully studiedunder actual conditions of use.

Recommendations for New Bathing Equipment:

•incorporate permanent, non-skid tub floor surfaces into the design of bathtub
•extend same non-skid floor outside the tub
•install widespread distribution of grab bars in the form of handrails
•provide "invisible support" that offers assistance when needed
•strengthen soap holders or towel rods so that they can act as invisible supports

4. Prevent Over-exertion

Over extension can be attributed to poor design of the physical environment and to an individual's psychological state of mind. First, it is caused from labor of stretching for

accessories and controls that are not within easy reach. Second, over-extension is caused by difficulty in reaching various parts of the body. Third, individuals concerned with poor reach tend to challenge their reaching capabilities and over-extend.

•Articles Within Easy Grasp
Easy reach for bathers and care-providers is critical. To achieve this, position all accessories and controls within comfortable reach. Appropriately placed wall mounted storage greatly increase reach. Their placement must be carefully examined and the final location thoroughlytested on the basis of individual needs.
•Handheld Fixtures
Locate manual fixtures such as hand held showers to combat the difficulties due to inflexible positioning of tub/shower controls. Such fixtures will greatly increase access and prevent physical strain from over-extension.
•Bathing Devices
Devices such as wash mittens and bath brushes can greatly increase access to parts of the body. The wash mittens are usually made out of terry cloth, plastic mesh or soft sponge. Bath brushes are available in long, short or curved handles. They come with cloth head, sponge tip or nylon bristles. Wash mittens and bath brushes provide a person a great range of access and bathing independence. •Plan Ahead and Take Time
It is essential that people pl an ahead for the type of accessories they need before plunging into the bathtub. Make sure towels, soap and shampoo arewithin easy reach. Bathing in a hurry can seriously jeopardize safety. Allocate enough time to make transfers and when reaching for articles. This will decrease psychological stress and increase bathing pleasure.

Recommendations for New Bathing Equipment:

•locate accessories and controls within easy reach
•allow making easy adjustments to meet the changing needs of people
•built-in hand held fixtures into the design of the equipment
•remove all loose, add-on fixtures such as bathseat and bathmat, and replace them with secure built-in products

Bathing independence for the elderly requires taking several considerations into account. For example, personalization of the bathing environment , on the one hand provides independence. But on the other hand, it is unsuitable for people's general use. Custom design environments is particularly beneficial for those with disabilities. They provide maximum utilization of individual capabilities, enable a high degree of independence, and offer a great deal of self-control. Adaptability of the bathing environment will respond to the needs of a great variety of individuals, allow making easy adjustments as people's needs and preferences change, and address individual differences based on age, sex and physical conditions. It will also provide a wider range of options, transform itself easily to a variety of situations (i.e., for wheelchair use and those not confined to use wheel chair use) and adjust to various space limitations (i.e., older bathrooms and newer construction).

Simple design of the bathing equipment is the key to safe and efficient use of the product. In the case of the elderly, simplicity is synonymous with age-sensitivity. It requires avoiding complicated gadgetry, removing physical demands that contribute to emotional stress, and utilizing easy-to-use mechanical means of assistance. Cultural compatibility of bathing fixtures is essential to providing safety. Older people, by the virtue of their social and

technological beliefs represent a subculture known as "traditional." Design for the elderly, therefore, must respect their background and their cultural needs. The difficulties people have with lever-type controls as explained in the finding is typical of cultural issues designers must consider when developing a product environment for them. Straight forward ergonomic solutions designed for human convenience must to be examined against the backdrop of their socio-cultural beliefs. Cultural compatibility will greatly influence the usability and social acceptability of designed products. It can be achieved through respecting the technological understanding of individuals, paying attention to how people make decisions, and valuing their cultural backgrounds

Accessible design should not be the exclusive domain of the majority of the older and disabled population - it concerns everyone. Because the elderly live with people of different ages, sexes and physical conditions, and reside in homes where the bathroom is shared by others, a safe bathing facility should not focus solely on their exclusive needs. It is vitally important that the design of a the new bathing equipment adopt a lifespan - all ages- approach to product development. Such an approach will eliminate the need for "special design" situations that result in a mismatch between the user's needs andthe confines of the environment . It will also prevent making costly retrofits and rehabilitation of obsolete structures. The life span approach will allow the product to adapt to the continually changing needs of people and prevent millions of individuals from bathing under unsafe conditions. In summation, a universal design responsive to the lifetime needs of all people, will ensure greater use, safety, privacy, independence and dignity. It will meet both the physical and psychological needs of people of all ages through their entire lifetime.

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