

An Investigation of Non-compliant Toilet Room Designs for Assisted Toileting

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A study conducted by the AIA Tampa Bay-Academy of Architecture for Health



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Optimizing Toilet Location for Assisted Toileting

Abstract

Objective: By comparing an Americans with Disabilities Act Accessibility Guidelines (ADAAG) compliant design with alternative designs, this pilot study resulted in recommendations for designing patient bathrooms to facilitate assisted toileting.

Background: The ADA Accessibility Guidelines were developed primarily to address the needs of a disabled population, such as returning Vietnam veterans, with sufficient upper body strength to transfer independently directly from a wheelchair to the toilet. However, the majority of older persons with disabilities (90%) stand to transfer to the toilet, rather than laterally moving from the wheelchair to the toilet.

Methods: The research used a repeated measures research design to evaluate caregiver responses during assisted toileting for various toilet configurations. The study included 20 patients who were transferred onto and off of a toilet for each of four different configurations by one or two caregivers. Toileting trials were videotaped and analyzed by an occupational therapist. Additionally, caregivers completed 5-question, self-report surveys after each toileting trial.

Results: Survey data indicate that staff members prefer the largest of the tested configurations, where the centerline of the toilet is 30" from the sidewall, rather than the 18" required by the ADAAG and where there are 2 fold-down grab bars provided. Care givers perceived the grab bar locations as better for helping them safely transfer subjects in a modified (non-ADAAG) configuration, and also that the grab bar style in a modified configuration (non-ADAAG) improved safety when transferring subjects.

Conclusions: Although care givers were observed to safely transfer residents to and from the toilet for all configurations tested, regulations regarding accessibility of patient bathrooms should acknowledge the perceived benefits of increasing the distance from the side wall to the centerline of the toilet to as much as 30" and allowing 2 fold-down grab bars instead of the required side-wall and back wall grab bars.

Background

The ADA Accessibility Guidelines, which were originally adopted in 1991, were based on accessibility requirements (e.g., ANSI A117.1, 1980 and the Uniform Federal Accessibility Standards) that were developed primarily to address the needs of a population of people with disabilities, such as returning Vietnam veterans, who were young and had sufficient upper body strength to transfer independently directly from a wheelchair to the toilet. However, an increasingly large percentage of the U. S. population is elderly or has other conditions requiring toileting assistance. According to the National Center for Assisted Living (Kraditor 2001), 41% of residents in assisted living facilities and 78% of patients in skilled nursing facilities need assistance with toileting. In the hospital setting too, an increasing percentage of patients require toileting assistance. In a national survey of 1193 individuals with disabilities, only 20% of the sample reported disability due to impairments, including paraplegia, quadriplegia and amputation, with 80% of the respondents having age related disabilities associated with conditions such as arthritis, poor balance and stroke (Sanford, Echt and Malassigné 1999). The vast majority of older persons with disabilities (90%) stand to transfer to the toilet, rather than laterally moving from the wheelchair to the toilet (Sanford et al 2001).

The ADAAG, first implemented in 1991, is a set of prescriptive requirements for accessible design in public facilities. The toilet must be placed so that it is no more than 18" from the side wall to the centerline of the toilet so that an individual with a disability can reach a grab bar mounted on the side wall. An additional wall mounted grab bar behind the toilet is intended to assist in lateral transfers from a wheelchair to the toilet. Unfortunately, this configuration does not provide for clearances on the sides of the toilet for an assistant, and may, in fact, pose a safety hazard for patients and caregivers alike (Sanford, 99, 01). For patients needing assistance by staff or family members, additional clearances to adjacent walls or obstructions on both sides of the toilet are critical. To facilitate the additional clearance, a number of grab bars have been developed in the past two decades that are cantilevered from the wall behind the toilet. These grab bars no longer necessitate that the toilet be located within reach of a sidewall and can swing up to provide clearance when needed for caregiver assistance.

Clearances to adjacent walls, grab bars and other assistive devices need to be considered for each patient type and flexibility may be helpful in addressing the many diverse needs and levels of

mobility. Where patient lifts are used, this clearance is also helpful. The unique needs of individuals including children, elderly, bariatric, amputee, stroke, spinal cord and brain injury and long term acute-care patients require special consideration in the design of toilet facilities, but are outside the scope of the proposed study.

ADA Accessibility grab bar requirements can be a hindrance to many persons with disabilities needing toileting assistance, as well as their caregivers. This problem is significant, but it is not new. Unfortunately, there has been little research devoted to this topic, and scientific data regarding technical requirements for the toilet room are sparse. Architects designing hospitals, assisted living, and skilled nursing facilities wrestle with how best to design bathrooms that meet ADA requirements AND address the needs of patients/residents for both independent and assisted transfers. The toilet room is replicated many times over in a capital project, as are any deficiencies in design. Failure to address user needs adversely affects many persons over the life of a facility. Findings from this study provide a significant contribution towards understanding the technical specifications required to ensure safe, effective toileting assistance.

Research Question

Are alternative bathroom designs potentially safer and easier for caregivers and their care recipients during assisted toileting transfers when the distance from the center line of the toilet to the side wall is larger than the required 18" and when two fold-down grab bars are provided?

Objective

The research used a repeated measures research design to evaluate caregiver responses during assisted toileting for various toilet configurations. By comparing an Americans with Disabilities Act Accessibility Guidelines (ADAAG) side grab bar design (the rear grab bar was unnecessary as it does not impact transfer space) with alternative designs, this pilot study focused on recommendations for space requirements adjacent to the toilet in patient/resident bathrooms to facilitate assisted toileting.

Methods

Test Facility and Grab Bar Configurations. The test facility was a 5' X 7' portable unit developed by the Center for Assistive Technology and Environmental Access at Georgia Tech

(Figure 1). The unit consisted of movable support structures that allowed the position of the side walls to be adjusted closer and further away from the toilet; the toilet can be moved up and down as well as in and out from the back wall; and grab bars can be moved up and down and closer to and further away from the toilet (Figure 2). In this study, only the grab bars and sidewall were moved for comparison.

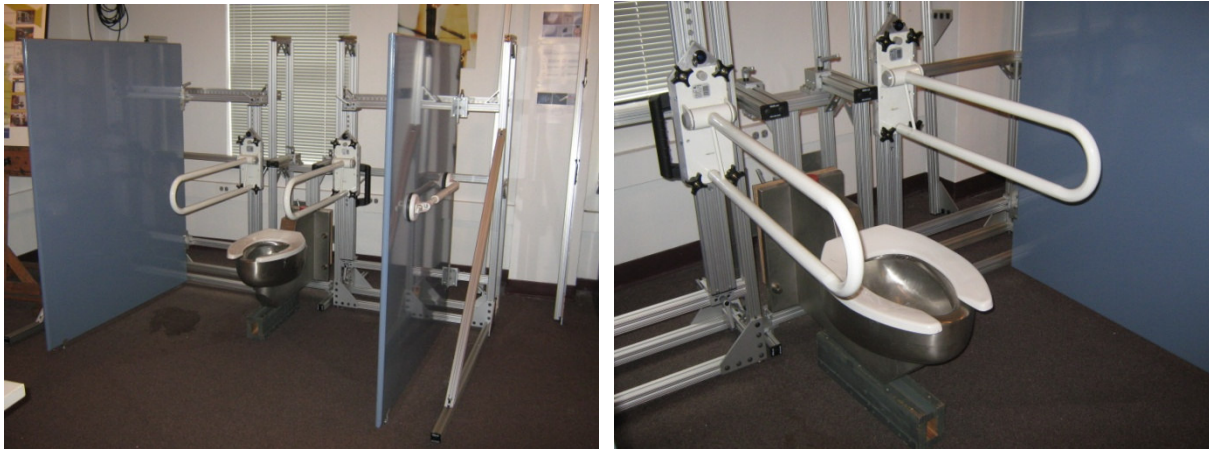


Figure 1. Test Facility

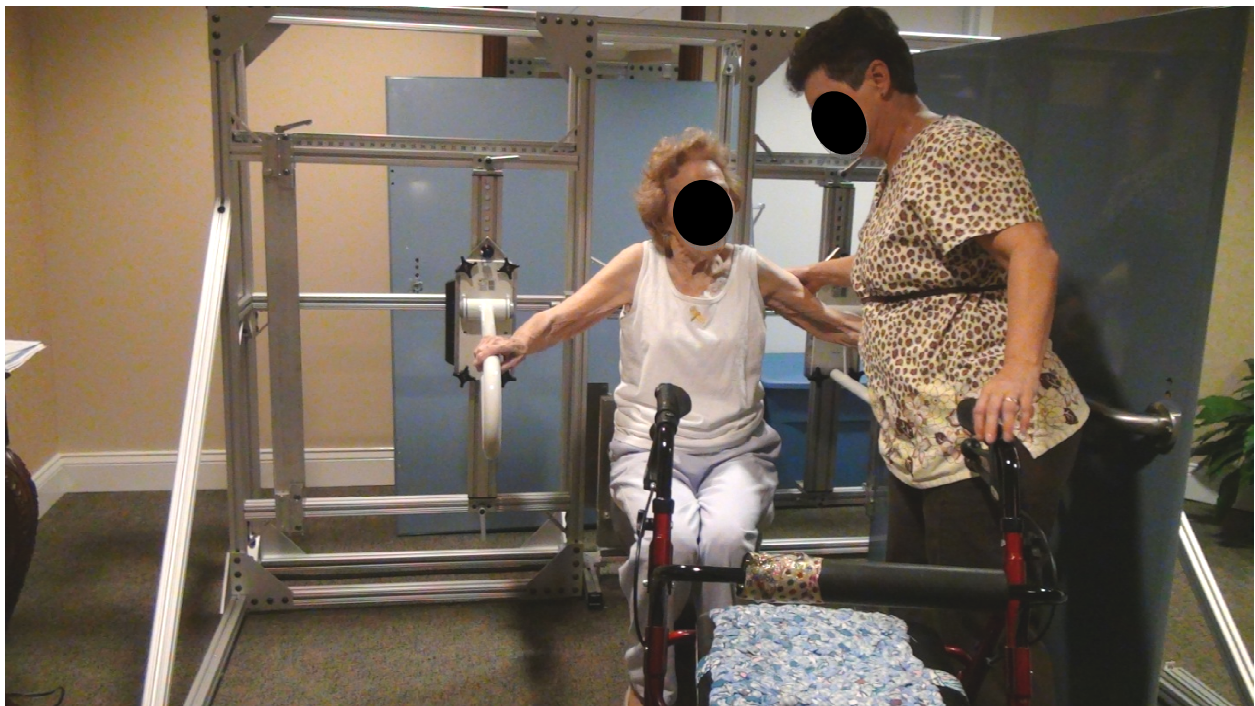


Figure 2. Test facility in use during data collection

Four different configurations were compared to identify the optimal distance from the side wall to the centerline of the toilet that is easiest and safest for use by caregivers. The grab bars that were compared are cantilevered, swing away grab bars, which are commonly used as a best practice in long term care facilities (Sanford, 2001) and have been shown to be safer and easier to use by non-ambulatory and ambulatory subjects when compared with 3 alternate grab bar configurations (Sanford et al 1999). Unlike the traditional side-wall mounted grab bars, these bars hang off the back wall behind the toilet, enabling them to extend, parallel to the toilet on both sides without the need for side walls.

In addition, best practices in toilet design in skilled nursing facilities (Sanford 2001) located the toilet further from the sidewall than the 18” required by the ADAAG. Typically the toilet was located at 24”, but it was as much as 30” from the side wall. Based on these data, 18”, 24” and 30” between the centerline of the toilet and the side wall(s) were the three alternatives tested in this study. However, the distance between the centerline of the toilet and the grab bars was held constant at the ADA-specified 18”. The four configurations tested (Figure 3) were as follows:

- **Configuration 1 (ADAAG design baseline without rear bar):** Toilet centerline is 18 inches on center, grab bar on the side wall only.
- **Configuration 2:** Toilet centerline is 18 inches to the side wall, one wall mounted grab bar and one swing away bar on the second side of the toilet at 18”.
- **Configuration 3:** Toilet centerline is 24 inches from side wall with swing away bars on both sides of the toilet at 18 inches.
- **Configuration 4:** Toilet centerline is 30 inches from sidewall with swing away bars on both sides of the toilet at 18 inches.

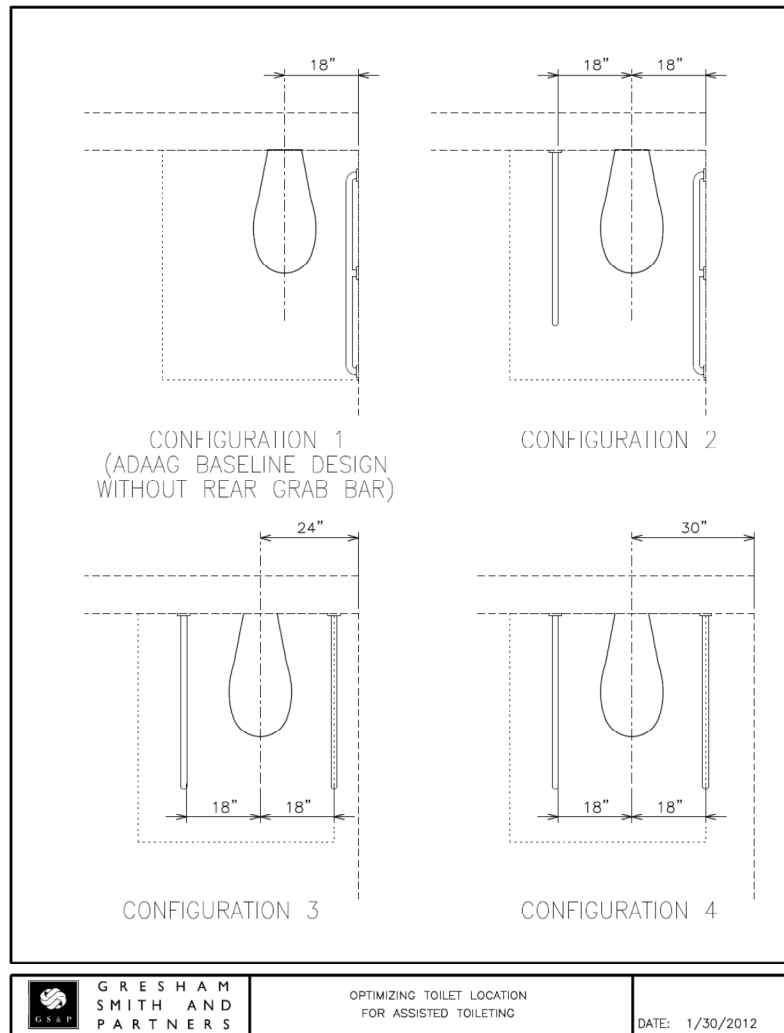


Figure 3. Configurations tested

Subjects: The primary focus of this research was to understand space requirements for caregivers who assist residents/patients with toileting. Nurses were assigned specific times to participate in the experiment and they recruited residents for the study. Appendix A includes the flyers that were used to recruit caregivers and residents for the study. Consent was obtained from caregivers and residents prior to participating. Then caregivers were asked, individually or in teams of 2, to assist a resident onto and off of the toilet for each of four configurations and to answer 5 questions about the transfer, immediately following each transfer. The study was strengthened by the fact that actual physically impaired persons, rather than mock patients, were included in the study. Caregivers and residents received gift cards to a local restaurant as a “thank you” for participating.

Site: Although the sponsor requested that the study be conducted in an acute care setting and reflect a range of predicted care types; prospectively including: bariatric care, geriatric care, and post-surgical/post-partum care of otherwise healthy individuals, the research team was unable to identify an acute care hospital willing to participate in this research. Therefore, the study was conducted in a continuing care community, Florida Presbyterian Homes, in Lakeland, Florida.

Florida Presbyterian Homes is a faith-based retirement community on 48 acres of mostly wooded property along Lake Hunter. The test facility was set up out of the way in the Porter McGrath lobby space on the Florida Presbyterian Homes campus.

Independent Variables: Four environmental measures served as the independent variables. These included: 1) the amount of space available for transfer assistance as defined by the distance from the side wall to the centerline of the toilet (18," 24" and 30"); 2) location of the grab bars; 3) type of grab bar (side-wall mounted fixed grab bar vs rear wall mounted swing up grab bar) and overall configuration (configurations 1-4 described above).

Outcome measures. Outcome measures included both objective expert observations and subjective participant (i.e., caregiver) ratings of transfers in each of the four configurations.

Objective expert ratings: An occupational therapist analyzed each transfer for three outcomes - safety, quality and process - using the a four-point rating scale (0-3) used in the Performance Assessment of Self-Care Skills (PASS), which is an internationally recognized performance-based, criterion-referenced tool for measuring occupational performance in the clinic and home (Holm and Rogers, 2008). Based on definitions used in the PASS, safety is the extent to which the task was performed in a manner that placed neither the person nor the environment at risk. Quality is defined as the degree of match between the end product and criteria identified as acceptable. Process is the level of efficiency of task initiation, continuation, and completion.

Subjective participant ratings: A post-trial questionnaire (Table 1) was developed to capture caregivers' perceptions of transfer safety provided by the space (Q1), the grab bar location (Q2); type of grab bar (Q3) and space at the toilet (Q4) as well as personal safety provided by each configuration (Q5). Responses used a 5-point Likert scale where "1" was selected for "strongly disagree" and a "5" was selected for "strongly agree" about the ease or safety of each

configuration. In addition, caregivers were asked to rate the configuration that they liked best with an open ended question that allowed them to expound upon their experience, potentially providing depth of insight.

Table 1. Survey Questions Asked of Caregivers After Assisting Residents with Getting On and Off of the Toilet for Each of Four Configurations.

Survey Questions
Q1: This configuration provided enough room between the wall and the toilet for me to safely help the subject transfer to and from the toilet.
Q2: Grab bar locations helped me safely transfer the subject.
Q3: Grab bar style helped me safely transfer the subject.
Q4: I could get close enough to the subject to assist transfer safely.
Q5: I could position my body properly to protect myself from injury.

Procedures: Data collection occurred during August and September of 2011 following approval by the Georgia Tech Institutional Review Board on July 21, 2011. Caregivers were scheduled to participate at specified times and they recruited patients to participate during those time slots.

Prior to testing, demographic information about the caregiver, including age, gender, and experience was recorded. In addition, gender and level of resident function was recorded. Participants were then oriented to the experimental procedures.

Testing consisted of 4 trials, one for each of the 4 configurations described above. The order in which the various configurations were presented was randomly selected to counterbalance the effects of learning. Each trial consisted of one or two caregivers assisting a community resident get onto and off the toilet and then filling out the self-report questionnaire. Each trial took between 20-30 minutes to complete. Each resident participated in only one set of four trials. Some caregivers participated in more than one set of four trials.

The transfers were simulations of the type of transfers that caregivers assisted with during their everyday work duties as a CNA or similarly qualified clinician. Depending on the level of resident function, assistance with transfers was provided either between a wheelchair and a toilet or from a standing position. Residents were not asked to disrobe. Caregivers were instructed to

assist in any manner that they felt most comfortable and safest, including the use of assistive technology. After the resident is safely transferred off the toilet, caregivers were asked to complete the post-trial questionnaire. Each trial was videotaped for analysis by an occupational therapist.

Data Analysis: The following paragraphs describe the approach to data analysis for the surveys and observations.

Surveys: The survey data were analyzed using SPSS, a statistical program. Analysis of variance (ANOVA) for the entire population, as well as for 1- and 2-person assisted transfers only, was conducted. A Bonferroni post-hoc test was conducted to compare means across pairs of configurations. Chi Squares analyses were also conducted.

Observations: An experienced occupational therapist reviewed videotaped observations of each toileting trial to evaluate ease of use and safety of the transfers. Videotapes of all transfers were analyzed and scored by an occupational therapist for transfer technique/body mechanics by the CNAs, level of physical assistance provided by the CNAs, location of transfer, and incidents that put the resident at risk of injury. Data were analyzed separately for one- and two-person assisted transfers. Chi square analyses were used to determine differences between the four test configurations for transfer technique (rated on a 5-point Likert Scale from 0-4, where 0 = no proper mechanics to 4= all proper mechanics), level of physical assistance at 4 levels (from no assistance, hands on arm, support under arm and support at waist) and location of transfer assistance (side of toilet, angled front of toilet adjacent to grab bar, and in front of toilet beyond the grab bar). ANOVA was used to compare differences in means for ratings of transfer mechanics and number of incidents for the four configurations.

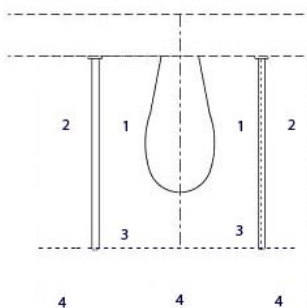


Figure 4. Location of Transfer Assistance

Results

Subjects: A total of 18 different caregivers participated in the study. Five out six caregivers (n=15, 83%) were certified nursing assistants (CNAs), with the remainder being LPNs. The caregivers' amount of experience in the healthcare industry varied from 4 months to 40 years, with a mean of 9.5 years and a median of 5 years. Caregiver ages ranged from 23 to 61, with an average age of 37.6 years and a median age of 36 years. All of the caregiver participants were female. Caregivers, individually or in teams of 2, were asked to assist residents onto and off of the toilet for each of four configurations and to answer 5 questions at the end of each transfer.

To ensure that data were reliable, residents that required transfer assistance were recruited to participate in the study. A total of 20 residents participated. The residents ranged in age from 27 to 100 years of age, with an average age of 87 and a mean age of 89 years. The majority of the residents were female (70%). The medical conditions that caused the residents to need assistance with toileting varied widely, from blindness, Parkinson's Disease, stroke, and "stiffness" to stenosis of the spine, diabetic neuropathy, and being a fall risk. Five of the participants could not name the condition that caused them to need assistance. Nine patients required 1 assistant, one required 0-1 assistants, three required 1-2 assistants, and seven required 2 assistants for toileting. Ten residents were transferred by one assistant and ten were transferred with the help of two assistants.

Surveys: When asked which configuration they preferred, the majority of caregivers stated that configuration 4, the largest configuration, was preferred for assisted toileting (Figure 4), with 88% of care givers indicating a preference for configurations that deviate from the ADAAG requirements. We analyzed data for 5 additional survey questions across the four configurations for a data set containing all of the data, then separately for 1-person and 2-person assisted transfers only.

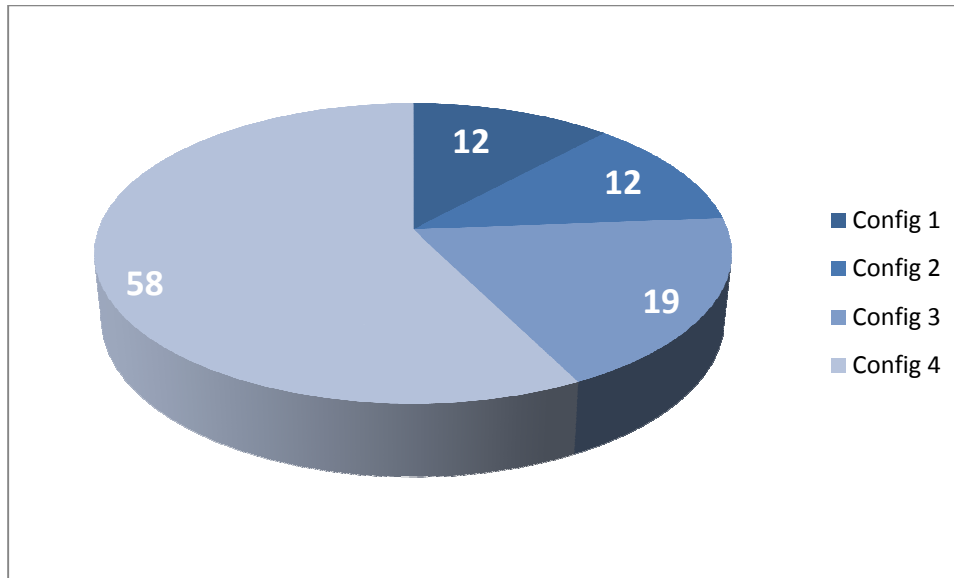


Figure 5. *Percentage of Care Givers that Prefer Each Configuration*

Combined 1- and 2-person Assisted Transfers

ANOVA (Table 2) demonstrates that there are significant differences in the means for Q2 (grab bar locations) and Q3 (grab bar styles). Bonferroni comparisons indicate that significance is primarily attributable to differences in means for Q3 ($p=.041$) (grab bar styles) and approaching significance for Q2 ($p=.055$) (grab bar locations) between Configuration 4 (mean =3.82 and 3.86 for Q2 and Q3, respectively) and Configuration 1 (mean = 2.93 and 2.96, for Q2 and Q3, respectively).

Table 2. Significant Differences Observed for Questions 2 and 3

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Q2	Between Groups	12.855	3	4.285	2.704	.049
	Within Groups	166.393	105	1.585		
	Total	179.248	108			
Q3	Between Groups	12.628	3	4.209	2.913	.038
	Within Groups	150.289	104	1.445		
	Total	162.917	107			

Chi Square analyses indicate significant differences in frequencies of responses for Q2 ($p=.042$) (grab bar locations). Cell distributions indicate increasing ease (rating of 5) from Configuration 1 to Configuration 4 and decreasing difficulty (rating of 2) progressively from Configuration 1 to Configuration 4.

1-person Assisted Transfers Only

There were no significant differences in means observed between configurations for any of the survey questions when only 1-person assisted transfers were included in the data set.

2-person Assisted Transfers Only

ANOVA indicates significant differences in mean ratings for Q2 ($p=.018$) (grab bar locations) and Q3 ($p=.020$) (grab bar style) that are wholly attributable to mean differences in Configuration 1 (mean = 2.60 and 2.68 for Q2 and Q3, respectively) and Configuration 4 (mean = 3.85 and 3.90 for Q2 and Q3, respectively).

Although not significant, trends indicate that mean ratings increase for each successive configuration for Q1 (provided enough room), Q4 (could get close enough to subject) and Q5

(could position body properly) with ratings jumping .70 - .75 points from Configuration 1 to Configuration 4.

Chi Square analyses also indicate significant differences in cell frequencies for Q2 (p=.001)(grab bar locations) and Q3 (p=.015)(grab bar style) that appear to be attributable to progressively increasing ease (rating of 5) from Configuration 1 to Configuration 4 and progressively decreasing difficulty (ratings of 1 and 2) from Configurations 1 to Configuration 4.

Configuration 1 consistently had the lowest ratings across the 5 questions with mean ratings ranging from 3.10 to 3.35, whereas configuration 4 had the highest mean ratings ranging from 3.80 – 4.10.

Table 3 lists the finding from all of the analyses.

Table 3. Summary of Findings from Care Giver Surveys

Data Set	Findings
Combined 1- and 2-person assisted transfers	Significant differences in Q2 and Q3, indicating that caregivers perceive Configuration 4 to be better than Configuration 1 in terms of grab bar location and style.
1-person assisted transfers only	No significant differences observed
2-person assisted transfers only	Significant differences in Q2 and Q3, indicating that caregivers perceive Configuration 4 to be better than Configuration 1 in terms of grab bar location and style.

Figure 5. Percentage of Staff Members That Prefer Each Configuration

Observations: Mean ratings for proper mechanics (Table 4) ranged from a low of 2.13 to a high of 4.88. Both high and low were for a 2-person assist on Configuration 4. The mean number of incidents (Table 5) ranged from a low of 0.29 to a high of 1.38. The low was for a 1-person assist on Configuration 4 and the high was for a 2-person assist on Configuration 3. However,

there were no significant differences in either the mean ratings of proper body mechanics or mean number of incidents among the four configurations.

Table 4. Mean Ratings for CNA Transfer Body Mechanics by Configuration

Type of Transfer	Configuration				Sig
	1	2	3	4	
1 Person Assist to Toilet	3.10	2.90	3.25	3.00	NS
1 Person Assist from Toilet	3.40	2.60	3.13	2.71	NS
2 Person Assist to Toilet CNA1	2.60	2.30	2.75	2.56	NS
2 Person Assist from Toilet CNA1	2.90	2.50	3.25	4.88	NS
2 Person Assist to Toilet CNA2	2.40	2.70	2.50	2.89	NS
2 Person Assist from Toilet CNA2	2.80	2.70	3.00	2.13	NS

Table 5. Mean Number of Incidents by Configuration

Type of Transfer	Configuration				Sig
	1	2	3	4	
1 Person Assist to Toilet	1.00	0.50	1.13	0.71	NS
1 Person Assist from Toilet	0.80	0.90	0.38	0.29	NS
2 Person Assist to Toilet	1.30	1.00	1.38	1.00	NS
2 Person Assist from Toilet	0.80	0.60	0.50	1.00	NS

Chi square analyses of frequencies also showed a lack of significance among the four configurations for transfer mechanics and the amount of physical assistance provided. Similarly, there were no significant differences among the configurations in the amount of assistance provided. However, for 1-person transfers there were significant differences in the location where transfer assistance was provided for getting off ($p=.011$) the toilet (Table 6) and a trend that approaches significance for getting on ($p=.057$) the toilet (Table 7).

Table 6: One-Person Transfer from toilet: Location by Configuration

			Grab bar configuration - trial #				Total
			1	2	3	4	
Transfer from toilet: CNA 1 location	1	Count	5 _a	1 _{a, b}	0 _b	0 _b	6
		% within Transfer from toilet: CNA 1 location	83.3%	16.7%	.0%	.0%	100.0%
		% within Grab bar configuration - trial #	50.0%	10.0%	.0%	.0%	17.1%
		% of Total	14.3%	2.9%	.0%	.0%	17.1%
	2	Count	0 _a	2 _a	0 _a	1 _a	3
		% within Transfer from toilet: CNA 1 location	.0%	66.7%	.0%	33.3%	100.0%
		% within Grab bar configuration - trial #	.0%	20.0%	.0%	14.3%	8.6%
		% of Total	.0%	5.7%	.0%	2.9%	8.6%
	3	Count	1 _a	4 _{a, b}	6 _b	6 _b	17
		% within Transfer from toilet: CNA 1 location	5.9%	23.5%	35.3%	35.3%	100.0%
		% within Grab bar configuration - trial #	10.0%	40.0%	75.0%	85.7%	48.6%
		% of Total	2.9%	11.4%	17.1%	17.1%	48.6%
4	Count	4 _a	3 _a	2 _a	0 _a	9	
	% within Transfer from toilet: CNA 1 location	44.4%	33.3%	22.2%	.0%	100.0%	
	% within Grab bar configuration - trial #	40.0%	30.0%	25.0%	.0%	25.7%	
	% of Total	11.4%	8.6%	5.7%	.0%	25.7%	
Total	Count	10	10	8	7	35	
	% within Transfer from toilet: CNA 1 location	28.6%	28.6%	22.9%	20.0%	100.0%	
	% within Grab bar configuration - trial #	100.0%	100.0%	100.0%	100.0%	100.0%	
	% of Total	28.6%	28.6%	22.9%	20.0%	100.0%	

Table 7. One-Person Assist Transfer to Toilet: CNA location by Configuration

			Grab bar configuration - trial #				Total
			1	2	3	4	
Transfer to toilet: CNA 1 location	1	Count	3 _a	1 _a	0 _a	0 _a	4
		% within Transfer to toilet: CNA 1 location	75.0%	25.0%	.0%	.0%	100.0%
		% within Grab bar configuration - trial #	30.0%	10.0%	.0%	.0%	11.4%
		% of Total	8.6%	2.9%	.0%	.0%	11.4%
	2	Count	0 _a	2 _a	0 _a	0 _a	2
		% within Transfer to toilet: CNA 1 location	.0%	100.0%	.0%	.0%	100.0%
		% within Grab bar configuration - trial #	.0%	20.0%	.0%	.0%	5.7%
		% of Total	.0%	5.7%	.0%	.0%	5.7%
	3	Count	3 _a	5 _a	7 _b	7 _b	21
		% within Transfer to toilet: CNA 1 location	14.3%	23.8%	33.3%	33.3%	100.0%
		% within Grab bar configuration - trial #	30.0%	50.0%	100.0%	100.0%	60.0%
		% of Total	8.6%	14.3%	20.0%	20.0%	60.0%
4	Count	4 _a	2 _a	0 _a	0 _a	8	
	% within Transfer to toilet: CNA 1 location	50.0%	25.0%	.0%	.0%	100.0%	
	% within Grab bar configuration - trial #	40.0%	20.0%	.0%	.0%	22.9%	
	% of Total	11.4%	5.7%	.0%	.0%	22.9%	
Total	Count	10	10	8	7	35	
	% within Transfer to toilet: CNA 1 location	28.6%	28.6%	22.9%	20.0%	100.0%	
	% within Grab bar configuration - trial #	100.0%	100.0%	100.0%	100.0%	100.0%	
	% of Total	28.6%	28.6%	22.9%	20.0%	100.0%	

Conclusions

Despite the lack of significant findings in the observation data, there were several trends that are worthy of note. First, there was a general downward trend in the number of incidents with the fold-down grab bars compared to the side-mounted grab bar with fewer incidents associated with an increase in the amount of space provided adjacent to the toilet, particularly for the one-person assist. Importantly, this trend may be related to the significant findings for caregiver location when one-person transfer assistance was provided. Clearly, in the ADA configuration, caregiver location was equally divided between adjacent to the toilet on the open side and in front of the toilet beyond the 42" grab bar. However, when the fold-down bars were added and as more space was available, the number of caregivers positioned outside the length of the grab bars declined to zero while the number of transfers from the front quarter of the toilet (position 3) increased dramatically. In contrast, despite additional space in configurations 3 and 4, only one caregiver assisted from alongside the toilet (position 2). This is likely due to caregivers' reluctance to move the grab bars to their upright position where they would be out of the way. Moving the grab bars would have allowed the caregivers to move closer to the toilet and the point of transfer, similar to position 1 used in 40% of the transfers on and off the toilet in configuration 1. In future testing, an explicit instruction that grab bars can be folded up or down as needed would likely show a stronger relationship between space and proximity to the resident.

Nonetheless, overall the data are encouraging. The self-report data overwhelmingly indicate a strong preference for more space to decrease transfer difficulty and increase its safety. Clearly, further testing is needed. The sample size of 20 caregivers was small. A second limitation was the homogeneity of the sample. In an effort to involve individuals who require transfer assistance, rather than using therapists to simulate transfer dependence, we were only able to find one skilled nursing facility that was willing to participate. There is a need to increase the sample with individuals who represent a wider range of ages and functional limitations, particularly individuals who are more dependent in transfer. While residents who participated required transfer assistance, not all of them required two-person assisted transfers. As a result, caregivers providing 2-person assistance did not have to exert the amount of effort that they might have had to otherwise, which might explain why the relationship between space and assistance for the two-person transfers were not as strong as would have been expected.

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Appendix A

Flyers Used to Recruit Caregivers and Residents

Research Study at Florida Presbyterian Homes

During the week of August 8th, Florida Presbyterian Homes will be participating in a research study being conducted by the Academy of Architecture for Health – Tampa Bay Chapter and the Georgia Institute of Technology.

The purpose of this study is to better understand how the design of the bathroom affects the ability of care givers to properly assist others with getting onto and off of the toilet. Our findings, with your input, will inform future bathroom designs and possibly regulatory requirements.

We have built a 3-walled partial toilet room for the study, which we will set up in the Porter McGrath lobby. We will be **looking for at least 20 volunteers** - people who need assistance with toileting - who are willing to get onto and off of the toilet (fully clothed, of course) with assistance, 4 times, once for each of 4 different bathroom configurations. We expect the entire process to take 30 minutes or less.

The mock toileting events will be video taped and later analyzed by an occupational therapist at Georgia Tech. As a “thank you” for participating, **you will receive a \$20 gift card from Long Horn Steak House** and later enjoy dinner there together as a group.



Research Study at Florida Presbyterian Homes

During the week of August 8th, Florida Presbyterian Homes will be participating in a research study being conducted by the Academy of Architecture for Health – Tampa Bay Chapter and the Georgia Institute of Technology.

The purpose of this study is to better understand how the design of the bathroom affects the ability of care givers to properly assist others with getting onto and off of the toilet. Our findings, with your input, will inform future bathroom designs and possibly regulatory requirements.

We have built a 3-walled partial toilet room for the study, which we will set up in the Porter McGrath lobby. We will be **looking for care givers, principally certified nursing assistants**, who are willing to assist residents (fully clothed) with getting onto and off of the toilet 4 times, once for each of 4 different bathroom configurations. Participants will then be asked to take a survey about their experience transferring residents in each of the 4 configurations. For each resident participating in the study, we expect the process to take 30 minutes or less. You may be asked to transfer more than one resident during the study.

The mock toileting events will be video taped and later analyzed by an occupational therapist at Georgia Tech. As a "thank you" for participating, **you will receive a \$25 gift card from Long Horn Steak House** to enjoy.



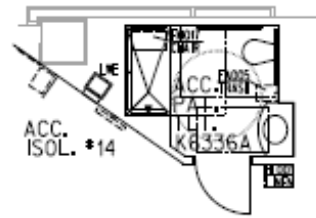
Appendix B
Benchmarking

Project A: Accessible Toilet Room Configurations

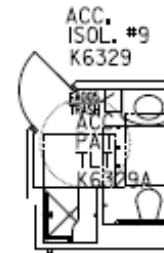
(10% of total toilet rooms sampled are ADAAG compliant)



area: 70.66sf
 sink location
 from the wall : 1'-6"
 water closet location
 from the wall : 1'-6"
 water closet Grab bar
 on back wall: 3'-0"
 water closet Grab bar
 on left wall: 3'-6"
 distance between
 water closet
 and sink: ??(OPPOSITE WALL)
 Tilt Paper dispenser:
 Left Wall
 door size: 3'-0"
 shower: roll in type shower
 shower length: 60"
 shower width: 30"
 shower grab bar: yes
 shower seat: YES



area: 58.83sf
 sink location
 from the wall : 1'-6"
 water closet location
 from the wall : 1'-6"
 water closet Grab bar
 on back wall: 3'-0"
 water closet Grab bar
 on left wall: 3'-6"
 distance between
 water closet
 and sink: 4'-3 7/8"
 (center to center)
 Tilt Paper dispenser:
 Right Wall
 door size: 3'-0"
 shower: roll in type shower
 shower length: 60"
 shower width: 30"
 shower grab bar: yes
 shower seat: yes



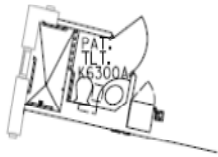
area: 48.57sf
 sink location
 from the wall : 1'-6"
 water closet location
 from the wall : 1'-6"
 water closet Grab bar
 on back wall: 3'-0"
 water closet Grab bar
 on left wall: 3'-6"
 distance between
 water closet
 and sink: ?
 Tilt Paper dispenser:
 Right Wall
 door size: 3'-0"
 shower: transfer type shower
 shower length: 36"
 shower width: 36"
 shower grab bar: yes
 shower seat: yes



area: 58.57sf
 sink location
 from the wall : 1'-6"
 water closet location
 from the wall : 1'-6"
 water closet Grab bar
 on back wall: 3'-0"
 water closet Grab bar
 on left wall: 4'-0"
 distance between
 water closet
 and sink: ?
 Tilt Paper dispenser:
 left wall
 door size: 3'-0"
 shower: transfer type shower
 shower length: 36"
 shower width: 36"
 shower grab bar: yes
 shower seat: yes

Project A: Non-Accessible Toilet Room Configurations

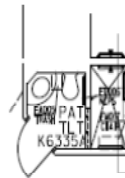
(90% of toilet rooms are not ADAAG compliant)



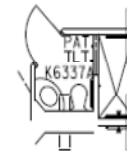
area: 42.3sf
 sink location
 from the wall : Corner /Angled
 water closet location
 from the wall : 1'-3"
 water closet Grab bar
 on back wall: No Grab bar on back wall
 water closet Grab_bar
 on left wall: 2'-0"
 distance between
 water closet
 and sink: 2'-7 1/2"
 (center of water closet and
 center of sink)
 Tilt Paper dispenser:
 Left Wall
 door size: 3'-0"
 shower: non ada shower
 shower length: 72"
 shower width: 36"
 shower grab bar: three 2'-0" grab bars
 shower seat: yes



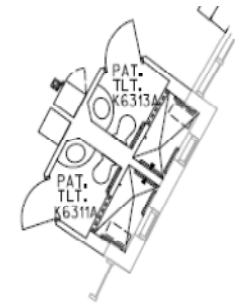
area: 43.5sf
 sink location
 from the wall : Corner /Angled
 water closet location
 from the wall : 1'-3"
 water closet Grab bar
 on back wall: No Grab bar on back wall
 water closet Grab_bar
 on left wall: 2'-0"
 distance between
 water closet
 and sink: 2'-7 1/2"
 (center of water closet and
 center of sink)
 Tilt Paper dispenser:
 right Wall
 door size: 3'-0"
 shower: non ada shower
 shower length: 74"
 shower width: 36"
 shower grab bar: three 2'-0" grab bars
 shower seat: yes



area: 44.15sf
 sink location
 from the wall : Corner /Angled
 water closet location
 from the wall : 1'-3"
 water closet Grab bar
 on back wall: No Grab bar on back wall
 water closet Grab_bar
 on left wall: 2'-0"
 distance between
 water closet
 and sink: 2'-6"
 (center of water closet and
 center of sink)
 Tilt Paper dispenser:
 left Wall
 door size: 3'-0"
 shower: non ada shower
 shower length: 74"
 shower width: 36"
 shower grab bar: three 2'-0" grab bars
 shower seat: yes



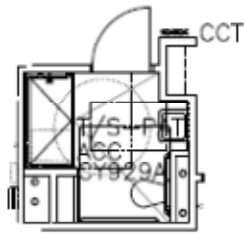
area: 44.15sf
 sink location
 from the wall : Corner /Angled
 water closet location
 from the wall : 1'-3"
 water closet Grab bar
 on back wall: No Grab bar on back wall
 water closet Grab_bar
 on left wall: 2'-0"
 distance between
 water closet
 and sink: 2'-6"
 (center of water closet and
 center of sink)
 Tilt Paper dispenser:
 right Wall
 door size: 3'-0"
 shower: non ada shower
 shower length: 74"
 shower width: 36"
 shower grab bar: three 2'-0" grab bars
 shower seat: yes



area: 45.2 sf
 sink location
 from the wall : Corner /Angled
 water closet location
 from the wall : 1'-3"
 water closet Grab bar
 on back wall: No Grab bar on back wall
 water closet Grab_bar
 on left wall: 2'-0"
 distance between
 water closet
 and sink: 2'-7 5/8"
 (center of water closet and
 center of sink)
 Tilt Paper dispenser:
 left Wall
 door size: 3'-0"
 shower: non ada shower
 shower length: 68"
 shower width: 36"
 shower grab bar: three 2'-0" grab bars
 shower seat: yes

Project B: Accessible Toilet Room Configurations

(100% of toilet rooms sampled are ADAAG compliant)



area: 54.7sf

sink location
from the wall : 1'-3"

water closet location
from the wall : 1'-6"

water closet Grab bar
on back wall: 3'-0"

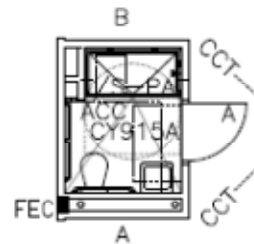
water closet Grab bar
on left wall: 4'-0"

distance between
water closet
and sink: 3'-6 1/8"

Tilt Paper dispenser:
left wall

door size: 3'-0"

shower: roll in type shower
shower length: 60"
shower width: 30"
shower grab bar: yes
shower seat: ?



area: 42.5sf

sink location
from the wall : 1'-3"

water closet location
from the wall : 1'-6"

water closet Grab bar
on back wall: 3'-0"

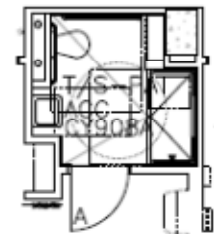
water closet Grab bar
on left wall: 4'-0"

distance between
water closet
and sink: 3'-3"

Tilt Paper dispenser:
left wall

door size: 3'-0"

shower: roll in type shower
shower length: 60"
shower width: 30"
shower grab bar: yes
shower seat: ?



area: 54.99sf

sink location
from the wall : 1'-3"

water closet location
from the wall : 1'-6"

water closet Grab bar
on back wall: 3'-0"

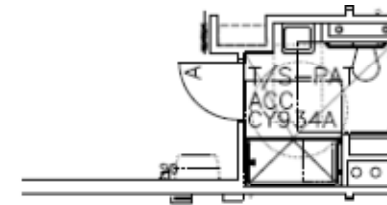
water closet Grab bar
on left wall: 4'-0"

distance between
water closet
and sink: 3'-6 1/8"

Tilt Paper dispenser:
left wall

door size: 3'-0"

shower: roll in type shower
shower length: 60"
shower width: 30"
shower grab bar: yes
shower seat: ?



area: 54.7sf

sink location
from the wall : 1'-3"

water closet location
from the wall : 1'-6"

water closet Grab bar
on back wall: 3'-0"

water closet Grab bar
on left wall: 4'-0"

distance between
water closet
and sink: 3'-6 1/8"

Tilt Paper dispenser:
left wall

door size: 3'-0"

shower: roll in type shower
shower length: 60"
shower width: 30"
shower grab bar: yes
shower seat: ?