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Assessing the physical needs and Creating a Barrier Free Environment at Home for the Person with Challenging Conditions and Elderly

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Abstract

The implementation of Occupational therapy based Home modification program has shown to be successful in reducing risk for falls, injury and accidents. The study aided in increasing the overall safety of people with challenging conditions. Occupational therapy assessment helps in identify barriers and risk factors that enabled us in obtaining a positive outcome. The people with challenging needs can learn how to self-assess the risk factors at home and modifying their environment through this project. Minor modification at home like clearing the floor of any clutter to allow for safe mobility throughout the home, removing any throw rugs, reorganizing kitchen items that are used frequently, replacing light bulbs to higher wattage to increase lighting, rearranging furniture to allow easy access to other rooms etc. can bring a big change to the people's life. This study also suggested that implementing Occupational therapy based Home modification programs is an effective way to improve the quality of life as well as daily functioning of people with challenging needs.

Keywords: *Barrier Free Environment, Elderly, Falls, Home Modification, Occupational Therapy.*

Introduction

The elderly population in India is growing at a quick rate. Consistent with a report from the Ministry of Statistics, the amount of citizens over the age of 60 has jumped 35.5% within the period spanning from 2001-2011. During this era, the elderly population (citizens above 60) has increased from 7.6 crore to 10.3 crore. This can be a staggering rate of growth and is twice the speed at which the population grew; it's also a record high since 1950. We all have senior people in our families and are conversant in the daily problems they need to travel through[6].

The NSO, a wing of the Ministry of Statistics and Programme Implementation, has conducted a Survey of Persons with Disabilities during July 2018 to December 2018 as a component of 76th round of

National Sample Survey (NSS). In India, prevalence of disability found to be 2.2 per cent - with 2.3 per cent in rural and a pair of per cent in urban areas. Prevalence of disability was higher among males than females," it's said that among males, prevalence of disability was 2.4 per cent, while it absolutely was 1.9 per cent among females. Senior citizens similarly as person with challenging

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needs require more help in doing normal everyday tasks. Accessible housing is important for the independence of the aging and folks with disabilities[10].

According to a survey, most of older people and other people with disabilities want to remain in their current homes as long as they'll," but as homes don't seem to be designed to accommodate the requirements of the persons, this becomes difficult. Research by the National Centres for Disease Control and Prevention shows that home modifications and repairs may prevent 30% to 50% of all home accidents among seniors and other people with challenging needs, including falls that happen in these older homes. to form sure their time of life are lived with none inconvenience there are some basic changes we are able to usher in to our own homes [4].

Occupational therapy provides clients with the tools to optimize their home environments relative to individual abilities and promote full participation in existence activities. *Occupational therapist* plays a key role in identifying strategies that enable individuals to change their homes, thereby maximizing their ability to participate in daily tasks/ activities similarly as provides client-focused intervention to adapt the environment so as to extend independence, promote health, and forestall further decline or injury [16,17]. Occupational therapist works on the principles of Ergonomics and Universal designs to assist persons with disability, elderly population and reduces the danger of injury and fall. Occupational therapists analyze the private factors unique to every client and make recommendations for home modifications that account for these individual factors[18].

Ergonomics is defined as a "scientific discipline concerned with the understanding of interactions among human and other elements of a system, and therefore the profession that applies theory, principles, data and methods to style so as to optimize human well-being and overall system performance". Ergonomics deals with general design principles, providing design guidance by using data on human work performance. "Properly applied, ergonomics optimizes the performance and effectiveness of the work system, including the workers, without detriment to their health, well-being or safety." The three areas of Accessibility, Usability and Safety may be seen as specialized facets of Ergonomic Design[14]. Accessibility refers to the planning of products, devices, services, or environments for those that experience disabilities. A home modification is any alteration made to a home to fulfill the wants of individuals with physical limitations in order that they can live independently and safely. These are the changes made to the house environment to assist people to be more independent and safe in their own residence and reduce any risk of injury. The best thing about making home modifications is that they promote independence and stop accidents [4,18].

It is important to perform a home assessment to grasp how a senior, or people with disabilities, use his or her environment within the house. to work out what styles of modifications a selected home needs, occupational therapist can help to judge the house and supply advice regarding how and where to urge modification services and training on a way to use modified equipment. Modifications can change the organic structure of a home by widening doorways and lowering countertop height, using ramps rather than steps, chair lifts rather than stairs, accessible bathrooms and free-standing showers. Other changes are less extensive and might include grip-friendly doorknobs, switches; non-slip flooring, door push bars, transfer benches, modified shelving, modified faucets, modified wall sockets, and the toilet grab bars [7,15].

Rationale of the Study

Occupational therapy provides clients with the tools to optimize their home environments relative to individual abilities and promote full participation in way of life activities. to work out what styles of modifications a particular home needs, occupational therapist can help to judge the house and supply advice regarding how and where to induce modification services. There's little evidence available within the literature considering the creation of barrier free environment reception for person with challenging needs and elderly. There also are minimum numbers of studies available regarding the occupational therapy based Environmental modification in several settings, especially among Indian population. These issues draw our interest to conduct the research study.

Aims and Objectives

- To assess the home environment of Person with challenging conditions and Elderly using Researcher assisted checklist for community people.

- To assess the physical problems faced by Person with challenging conditions and Elderly using Researcher assisted checklist.
- To design the floor plan, house design and to select all of the appliances and furnishings for the home, following the principles of universal designs and certain Standard exemplary layouts.
- To implement the floor plan, house design/layout and furnishings into a Project Model using wooden blocks, sun board sheet, clay glass and other materials.

Material and Method

Materials Used:

- Wooden blocks for whole structure
- Sun board sheet for flooring and other internal material: Chair, Table, Almirah etc.
- Clay glass for Windows and Gates

Dimensions: Whole area- 1 meter breadth x 1 meter width

- Entrance area: 12'*0"x6'-3"
- Living area: 24'*0"x15'–0"
- Bedroom area: 14'-6"x15'-6"
- Bathroom area: 6'-0"x5'-6"
- Stair case area: 14'-6"x8'-0"
- Kitchen: 15'-0"x15'6"

Participants

Home modifications are suitable for Elderly population, Person with disability, Patients suffering from Neurological Conditions, Orthopedic conditions or Psychiatric conditions or other Chronic—Static or progressive disease, Temporary health condition or terminal disease.

Procedure

A. Assessment: ***Following researcher's assisted checklist was considered for the assessment***

a. Living environment

- Stairs
- Number of floors in home
- Number of steps to entrance
- Location of laundry services
- Location of bedroom or sleeping area
- With whom does person live (e.g., caregiver, family members)
- Kitchen set-up
- Environmental hazards such as throw rugs or cords.

b. Entrance

- Is there a clear pathway (devoid of clutter) through the entry hall?
- Are thresholds low enough (less than 1 inch) so someone does not trip over them?
- Is there adequate lighting?
- Is the light switch at the entrance to the room? Is the entryway wide enough for a wheelchair/walker?
- Are there railings at the front entrance?

c. Toilet

- Height of toilet seat
- Presence of non-skid mat for tub
- Bathroom chair/tub transfer bench

d. Kitchen assessment

- Observe height of sink and countertops; are they a functional for the person?
- Proper lighting throughout the kitchen
- Determine what type of lever system may be required for faucets and sinks
- Organization of kitchen equipment
- Are the items used most frequently easily accessible?

e. Bedroom assessment

- Are there easily accessible light switches or lamps?
- Remove any rugs, cords, or environmental hazards that may increase the risk for falls
- Is there's requirement of bed-side hand rails to get in/out of bed safely?

f. Other things to consider throughout the home

- Assess doorway width (According to the ADA, minimum clear width of doors should be at least 32 inches)

- Is there adequate lighting throughout various parts of the home?
- Is there any loose carpeting or uneven flooring?

Throw rugs/Grab bars

- Are they placed in proper locations?
- Are they secured properly?
- Are there towel bars located in places where they could be used for grab bars?
- Using towel bars as grab bars is a significant safety risk.

g. Along with the home assessment we have also assessed the physical problems faced by the elderly and person suffering from different conditions in the community and following were the *problems faced by them*

- Poor walking and standing tolerances
- Poor balance
- Poor Transfer ability/technique-on/off bed, chair, toilet; in/out bath, shower
- Mobility problems
- Poor vision
- Trouble Lifting legs up
- Trouble getting up and down on the stairs
- Knee pain, Backache
- Sleep problems

B. The following principles of universal design were used while designing the floor plan and selected all of the appliances and furnishings for the home.

Principle One: Equitable Use: The design is useful and marketable to people with diverse abilities.

- It provides the same means of use for all users: identical whenever possible; equivalent when not.
- It avoids segregating or stigmatizing any users.
- Provisions for privacy, security, and safety are equally available to all users.
- The design is appealing to all users.

Principle Two: Flexibility in Use: The design accommodates a wide range of individual preferences and abilities.

- It provides choice in methods of use.
- It accommodates right or left handed access and use.
- It facilitates the user's accuracy and precision.
- It provides adaptability to the user's pace.

Principle Three: Simple and Intuitive Use: Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.

- It eliminates unnecessary complexity.
- It is consistent with user expectations and intuition.
- It accommodates a wide range of literacy and language skills.
- It arranges information consistent with its importance.
- It provides effective prompting and feedback during and after task completion.

Principle Four: Perceptible Information: The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.

- It uses different modes (pictorial, verbal, tactile) for redundant presentation of essential information.
- It provides adequate contrast between essential information and its surroundings.
- It maximizes "legibility" of essential information.
- It differentiates elements in ways that can be described (i.e., make it easy to give instructions or directions).
- It provides compatibility with a variety of techniques or devices used by people with sensory limitations.

Principle Five: Tolerance for Error: The design minimizes hazards and the adverse consequences of accidental or unintended actions.

- It arranges elements to minimize hazards and errors: most used elements, most accessible; hazardous elements eliminated, isolated, or shielded.
- It provides warnings of hazards and errors.
- It provides fail safe features.

- It discourages unconscious action in tasks that require vigilance.

Principle Six: Low Physical Effort: The design can be used efficiently and comfortably and with a minimum of fatigue.

- It allows user to maintain a neutral body position
- It uses reasonable operating forces.
- It minimizes repetitive actions.
- It minimizes sustained physical effort.

Principle Seven: Size and Space for Approach and Use: Appropriate size and space is provided for approach, reach, manipulation, and use, regardless of user's body size, posture, or mobility.

- It provides a clear line of sight to important elements for any seated or standing user.
- It makes reaching to all components comfortable for any seated or standing user.
- It accommodates variations in hand and grip size.
- It provides adequate space for the use of assistive devices or personal assistance.

C. Universal Designing Examples were considered while designing the project

Settings

Our modified home project has been designed considering the universal design and accessibility and consisted of Entrance, ramp with hand rail and wheelchair clearance space, one bed room and an addition room, one living room, one bathroom, one kitchen and stairs

Modifications included following adaptive equipment's

- Hand rails at stairs and ramp with non-slip materials on step and ramps.
- Low Riser type of stairs.
- De-clutter spaces and clear walkways for easy movement.
- Shelf near entrance to put packages while opening and closing door
- Bright lighting inside and outside entries
- Lighted doorbell at an easily reachable height
- Level flooring throughout the house
- Increased lightening in stairs area, bedroom and kitchen
- Easy-open door locks, such as keyless locks with remote or keypad codes
- 36-inch-wide doors for easy access
- Sturdy furniture
- Non-slippery flooring in bathroom, bedroom and living room
- Raised toilet seats,
- Grab bars
- Remove all area or throw rugs
- Sleep Accessories and Mattresses

Results

A total of 120 Person with challenging needs and Elderly filled out Researcher's assisted checklist. The mean age of the participants was 68.87 years. 43% females and 57% males participated in the study. Table 1 shows the common problems reported by the participants.

Table 1: Participants Characteristics (N=120)

Characteristics	Frequency	Percentage
Age (M = 68.87 years, SD = 6.70 years)		
65-74years old (Early Elderly)	25	21%
over 74 years old (Late Elderly)	62	52%
Person With Challenging Conditions	33	28%
Gender		
Male	68	57%
Female	52	43%
Major problems faced by participants		
Poor walking and standing tolerance	48	40%
Poor Balance	30	25%
Poor transfer ability	25	22%
Mobility problems	82	68%
Poor vision	74	62%
Trouble getting up and down the stairs	85	71%
Ache problems	92	77%
Sleep problems	90	75%
Factors responsible for accidents and injury at home on Home Inspection		
Slippery Steps	43	36%
Lack of Hand rails and grab bars	78	65%
Poor lightening	58	48%
Loose carpeting and uneven flooring	30	25%
Door width less than 32 inches	92	77%
Lack of easily accessible switches	54	45%
Poorly accessible toilet seat height	70	58%

- Findings of Researcher's Assisted Assessment Checklist

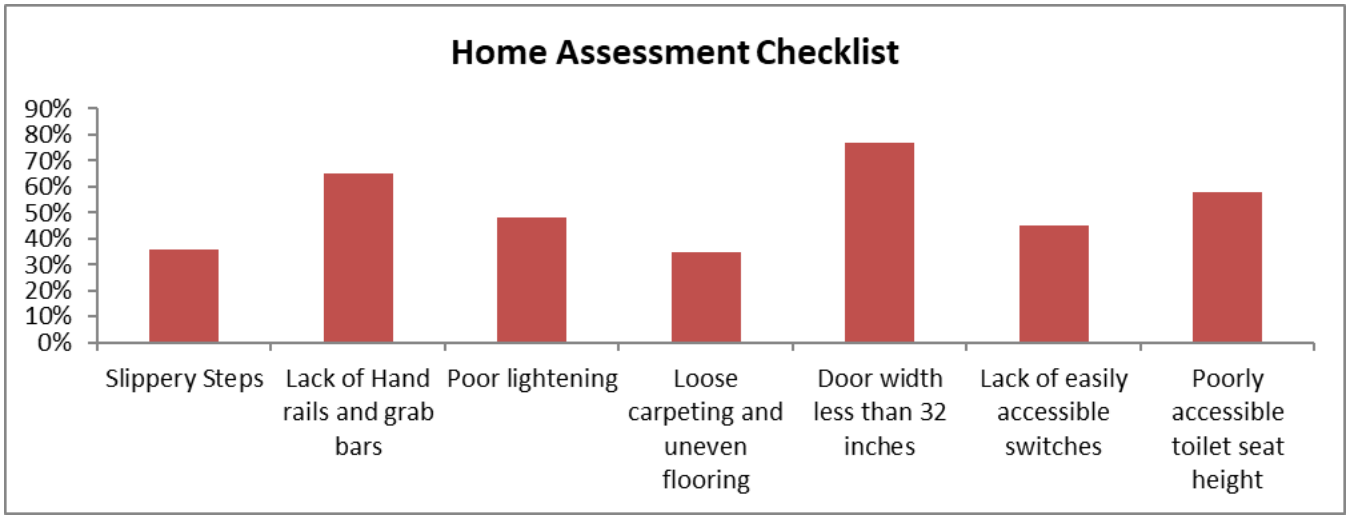

Figure 1: Factors that leads to risk of fall and accidents at home, reported by people with challenging conditions

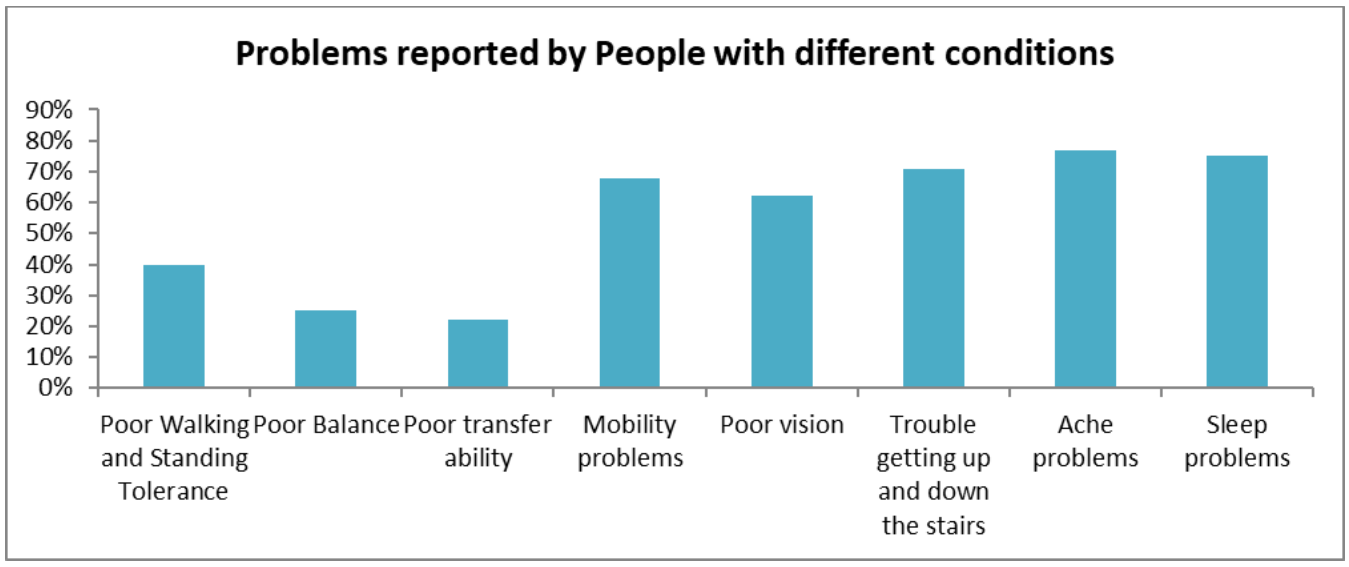

Figure 2: Problem reported by Participants

Discussion

This project elucidated the effect of Home modification in improving daily activity performance, reduce the rate and risk of falls, slowing down the rate of functional dependence for older adults and enhance caregiver self- efficacy. Home modification helps Elderly population, Person with disability, Patients suffering from Neurological Conditions, Orthopedic conditions or Psychiatric conditions or other Chronic—Static or progressive disease, Temporary health condition or terminal disease. Adaptive equipment's used while modifying the home help compensates for impairments and improves performance of daily functioning. Home modification interventions delivered by occupational therapists have demonstrated greater efficacy in reducing falls and accidents.

Researcher assisted checklist for community people was used to assess their home environment and the physical problems faced by them. Our study provided the evidence that for most of the people suffering from challenging conditions, like Poor walking and standing tolerances, poor balance and coordination, Poor Transfer ability, mobility problems, visual problems, trouble getting up and down on the stairs, knee pain, backache, sleep problems and their home environment is the biggest challenge and limiting their independence in daily functioning. Master bedroom and bathroom is upstairs, slippery steps, poorly constructed handrails or lack of handrails, poor lightening, loose carpeting and uneven flooring, door width, poorly accessible toilet seat height, lack of easily accessible switches was the problems that resulted in falls, accidents, and limitations in daily functioning[3].

Hence our project considered several modifications and adaptive equipment's to address all the problems faced by people with challenging conditions[12-9]. At least one no-step pathway into the house, ample and level maneuvering room, 5 feet by 5 feet, in entryway, 36-inch-wide entry door with lever-style handle, zero-threshold doorway, covered entrance to protect from inclement weather, bright lighting inside and outside entries, lighted doorbell at an easily reachable height and slip-resistant walkways and entryways are the modifications that can be consider for entrance.

It is very helpful to move the bedroom and bathroom down to the ground floor in order to reduce or eliminate the need to use the stairs. Carpeting the staircase (installing rubber mats) and installing double handrails can reduce the risk of fall[5, 8.] It's always best to have two sets of handrails, one on either side of the stairs if possible. It's simply safer and usually an easy solution. The person with challenging conditions should be able to put all of his or her weight on the handrail and feel secure. They should also be able to wrap their hand fully around the top of the handrails. For the people with poor vision — it's best to install step lights and increase the intensity of lights or Contrasting colour at front edge of steps, to provide visual orientation, or non-slip adhesive strips. For people having difficulty in getting up and down the stairs it is safe to alter the height of

steps. Modifying Staircases with Stair Aides or Stair Lifts or Elevator[1].

It is also best to De-clutter spaces, clear walkways by removing loose rugs for easy movement in the home. A *safety* bed rail keeps you from rolling and falling out of the bed. Over bed tables can help those who have to spend periods of time in their beds. To avoid accidents and falls make sure that all bedroom furniture is sturdy and secure. Tall furnishings like bookshelves and wardrobes should be anchored to the wall are the best options. Rearrange furniture and remove any clutter to allow for clear, wide passageways[6]. Bathroom commode chairs, Elevated toilet seat (17 to 19 inches off floor for older persons), shower chair, non-skid mats in washroom, grab bars, towel bars, soap and toothbrush holders should be 48 inches off floor, use of safety poles, lever handle, anti-scald faucets on sink, bathtub, and shower, hand-held, adjustable-height showerhead with easily operable controls, maneuvering space that accommodates a 60-inch turning radius, knee space under sink for seated users, countertops with rounded edges, full-length and/or tilted mirror that can be used seated or standing, integral transfer seat in tub and built-in bench or shower chair in shower are the best options to prevent the fall in bathroom and to make people with challenging conditions independent[11].

D-shaped or pull-style cabinet and drawer handles, easy-glide drawers that close automatically, drawer-style dishwasher or raised platform under dishwasher, easy-access side-by-side refrigerator/freezer, drawer-style refrigerator, Rocker-style light switches, 42 inches off the floor, Wall-mounted folding table that lies flat when not in use are the best modifications for the kitchen [2,13]. Thus Occupational therapy based Home modification interventions is the best therapeutic tool for reducing falls and accidents.

Conclusion

Our study is one of the few available studies, which demonstrate that modifications affect the experience of home. The high numbers of environmental barriers and the physical problems faced by people with challenging conditions illustrate the need for occupational therapists to routinely evaluate home and bring the modifications to compensates for impairments.

Conflicts of Interest: The authors report no conflicts of interest in this work.

Findings Sources: Self

Ethical Clearance: Necessary permission was obtained to conduct the study. Verbal consent and written consent were obtained from all the participants who elected to participate in the survey.

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