

Developing a Space-Making Vocabulary for the Design of Dementia Friendly Spaces

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Abstract— This study discusses the interventions that could be made in interior spaces to improve the quality of life of dementia patients. It also aims to explore the key factors in space making that can help in designing dementia friendly spaces. It focuses on understanding the design of interior spaces to help people with dementia to become independent and to be able to develop a sense of belonging for the space they are using. This is done through an interior-based approach, by developing a vocabulary for space design of various areas catering to Dementia patients.

Keywords— Alzheimer’s disease; Dementia friendly; Interior-Design; Memory care; Space design; Space-making; Wayfinding.

I. INTRODUCTION

The aim of this study is to explore the key factors in space design that can help in improving the quality of life for dementia patients. As part of the primary study an attempt has been made to track the user experience and to collect information from the experts in this field. A survey has also been conducted to collect primary data for the research and adding more relevance to the study. Interviews were conducted with patients and their caretakers for in depth understanding of their daily routine, behaviour and symptoms. The secondary study was done through a series of case-studies where a similar approach had been adopted towards creating dementia friendly spaces in different contexts. Following this, iterations were produced through diagrams/models and sketches of various kinds of spatial interventions that can be made to design dementia friendly spaces.

The various symptoms, causes, types, stages and treatments of Dementia are introduced to understand the disease. Also various types of spaces where care is provided to such patients are analysed, so as to understand the spatial requirements for treatment. These studies could aid in making spatial interventions in order to ease the condition in terms of navigation of space, sense of belonging as well as improved independence for dementia patients.

II. WHAT IS DEMENTIA?

Dementia is a decline in cognitive functioning- thinking, the ability to grasp new information, speech, and reasoning. It is also referred to as an umbrella term that is used to describe a range of neurological conditions which affect the brain and which can worsen over time. People suffering from dementia cannot control their emotions, and their personalities may change making them moody and petulant. There are mainly three stages of dementia, ranging in severity from the mildest stage to the most severe stage when a person depends completely on others for basic activities of living and requires round-the-clock assistance.

It is most commonly seen in older adults above the age of 60 years and in some cases symptoms can be seen in younger people too. As one ages ones’ brain changes, and hence one occasionally suffers from memory lapses. It is normal to forget

things once in a while but dementia is different from occasional forgetfulness. If one starts forgetting common tasks, the people whom one knows or is unable to retain information that has been provided; then the person may be suffering from dementia and should seek medical help if experiencing any of these symptoms.

The symptoms of dementia can vary with its types but some common symptoms include:

- Problems in communicating
- Experiencing day-to-day forgetfulness
- Difficulty in problem solving
- Change in mood, behaviour or personality
- Poor judgment or decreased judgment
- Confusion of time and place
- Difficulties in completing familiar tasks
- Difficulty in speaking, understanding, and expressing thoughts, or reading and writing
- Confusion in familiar environments
- Confusion with time or place
- Difficulties in completing familiar tasks
- Misplacing things



Fig. 1. Symptoms of Dementia

A. Causes of Dementia:

Dementia can be caused due to multiple factors: the build-up of proteins in the brain, narrowing or blockage of blood vessels inside the brain, damage to neurons, or brain damage

due to an injury or certain tumours that can cause dementia. Due to all these reasons, the healthy neurons or nerve cells lose connection with other cells, stop working, or die. Hence, the ability of the brain cells to communicate with each other is damaged. This disconnect can result in a range of dysfunction; normally- behaviour, thinking, and feelings are affected.

It can also be caused as a symptom of some underlying diseases or neurological disorders such as Parkinson’s disease, Huntington’s disease, and some types of multiple sclerosis. These neurodegenerative disorders result in a progressive and irreversible loss of neurons and brain functioning is disturbed. For people with developmental disabilities, it’s important to consider a person’s current abilities and monitor for any changes over time that can be symptoms of dementia.

B. Types of Dementia:

Dementia is not a disease but it is an umbrella term that covers a wide range of medical conditions or disorders which cause abnormal brain changes which trigger cognitive abilities. The five most common forms of dementia are:

1. Alzheimer’s disease is the most common dementia diagnosis among older adults. It is caused by changes in the brain, including abnormal build-ups of proteins, known as amyloid plaques and tau tangles which form abnormal structures that cause nerve cells to die and loss of brain tissues. Its symptoms include memory loss, personality change, hallucinations, difficulty in making decisions and many more.
2. Frontotemporal dementia, also called Pick’s disease which generally refers to the frontal and temporal lobes of the brain. Its symptoms include problems with speech and language, personality changes, becoming distracted, to name a few.
3. Lewy bodies dementia is a form of dementia caused by abnormal deposits of the protein Alpha- Synuclein called Lewy bodies which appear in the nerve cells. It can cause disturbed sleep, fainting, unsteadiness, confusion, and issues with mental abilities.
4. Vascular dementia, a form of dementia caused by conditions that damage blood vessels in the brain or interrupt the flow of blood and oxygen to the brain. It may be the result of plaque build-up in arteries that feed blood to the brain or a stroke.
5. Mixed dementia, a combination of two or more types of dementia.

C. Stages of Dementia:

The symptoms of dementia worsen over time, although the rate at which the disease progresses varies. The activities a person is physically able to do changes as dementia progresses. The stages include symptoms that are particular to each stage. It is suggested on caring for someone based on their stage of dementia, including technology that can help and which types of assisted living homes are most appropriate.

The most commonly used scale is often referred to simply as GDS, “Global Deterioration Scale for Assessment of Primary Degenerative Dementia”. The GDS divides into seven stages based on the amount of cognitive decline.

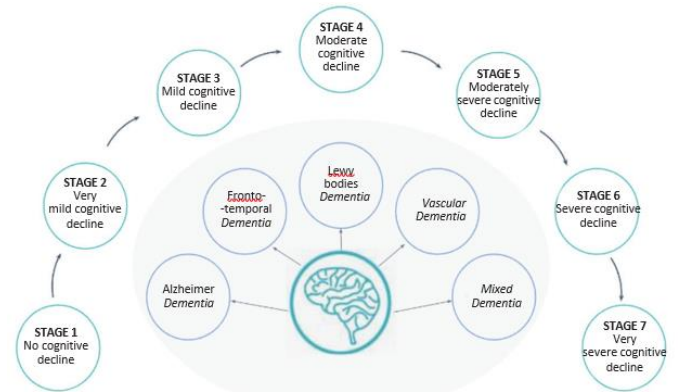


Fig. 2. Types and Stages of Dementia

D. Treatment of Dementia:

The treatment of dementia depends on its causes and its symptoms. In the most progressive types of dementia, no treatment or cure slows or stops its progression. But several symptoms of dementia can be treated with some drug or non-drug options. It becomes crucial to take preventative measures to decrease the risk for the symptoms of dementia to worsen over time so understanding available options can help individuals living with the disease and their caregivers cope with symptoms and improve their quality of life.



Fig. 3. Types of Treatments of Dementia

a) Medication:

There is some reversible dementia that can be treated by addressing the main cause, for example- vitamin B12 deficiency can cause pernicious anaemia which then leads to dementia and can be completely cured by certain medication and supplements like vitamin B12 supplements for pernicious anaemia, hormonal supplements for hyperthyroidism, hypothyroidism, or other imbalances, SSRIs or other antidepressants for depression symptoms that may mimic dementia, antibiotics or medications to treat brain infections like encephalitis or meningitis.

For the conditions of dementia that cannot be treated, slowed, or reserved the doctors or medical professionals focus on medications that can make living with dementia easier and more manageable. Medications are provided to decrease disorientation, confusion, memory problems, increased cell damage and more.

TABLE I. Seven Stages of Dementia

Diagnosis	Stage	Signs and Symptoms	Expected Duration of Stage
No Dementia	Stage 1: No Cognitive Decline	<ul style="list-style-type: none"> – No memory loss – People with NO dementia are considered in Stage 1 	– N/A
No Dementia	Stage 2: Very Mild Cognitive Decline	<ul style="list-style-type: none"> – Forgets names – Misplaces familiar objects 	– Unknown
No Dementia	Stage 3: Mild Cognitive Decline	<ul style="list-style-type: none"> – Increased forgetfulness – Slight difficulty concentrating – Decreased work performance – Gets lost more frequently – Difficulty finding right words – Loved ones begin to notice 	– The average duration of this stage is between 2 years and 7 years.
Early-Stage	Stage 4: Moderate Cognitive Decline	<ul style="list-style-type: none"> – Difficulty concentrating – Forgets recent events – Cannot manage finances – Cannot travel alone to new places – Difficulty completing tasks – In denial about symptoms – Socialization problems: Withdraw from friends or family – Physicians can detect cognitive problems 	– The average duration of this stage is 2 years
Mid-Stage	Stage 5: Moderately Severe Cognitive Decline	<ul style="list-style-type: none"> – Major memory deficiencies – Need assistance with ADLs (dressing, bathing, etc.) – Forgets details like address or phone number – Doesn't know the time or date 	– The average duration of this stage is 1.5 years
Mid-Stage	Stage 6: Severe Cognitive Decline (Middle Dementia)	<ul style="list-style-type: none"> – Cannot carry out ADLs without help – Forgets names of family members – Forgets recent events – Forgets major events in past – Difficulty counting down from 10 – Incontinence (loss of bladder control) – Difficulty speaking – Personality and emotional changes – Delusions – Compulsions – Anxiety 	– The average duration of this stage is 2.5 years
Late-Stage	Stage 7: Very Severe Cognitive Decline (Late Dementia)	<ul style="list-style-type: none"> – Cannot speak or communicate – Require help with most activities – Loss of motor skills – Cannot walk 	– The average duration of this stage is 1.5 to 2.5 years

Source- <https://www.dementiacarecentral.com/aboutdementia/facts/stages>

b) Therapy:

Several dementia symptoms and behaviour problems can be treated using therapies that help to improve their quality of life and don't make them feel frustrated or overwhelmed. These therapies are kind of a mental exercise that helps with memory and thinking skills or at least can brighten up their day. Some of these therapies are listed below:

- Reminiscence therapy includes talking with the patient about their hometown, school days, work-life, or favorite hobbies. It can be done one-on-one or in groups as part of an organized therapy. In the session, music can also be used from ones loved one's past, or things like photos or treasured items, to help them dig into the memories of the past.
- Cognitive stimulation therapy (CST) is a structured

program for groups of people with mild to moderate dementia. At meetings, the group does mentally engaging activities, like talking about current events, singing, playing word games, or cooking from a recipe. This orientation training goes over basic things like the person's name, and the date and time. and during this therapy, it is very important to make note of the patient's behavior as for some people this can be too much or patronizing.

- Occupational therapy is where an occupational therapist can show one how to make one's home safer and teach coping behaviors. It can involve daily activities to improve and help to restore the range of motion, strength, and endurance. Also, routines can be suggested according to the patient's habits which can be maintained to prolong

independence.

- The patient could take part in other therapies like music therapy-which involves listening to soothing music, pet therapy- which involves the use of animals, such as visits from dogs, to promote improved moods and behavior in people with dementia, aromatherapy, which uses fragrant plant oils, massage therapy, art therapy- which involves creating art, focusing on the process rather than the outcome.

c) Lifestyle Changes and Home Remedies:

Dementia symptoms and their progression can be decelerated by making some changes in daily routine like enhancing communication, exercise, engaging in activities, establishing a night-time routine, or by keeping a calendar that will help them in remembering the upcoming events and medication schedules. Some devices can also be included like alarms that remind patients to take medication, pictures, notes, message boards, or digital clocks which will help to reduce confusion and disorientation. For dementia patients being in a calming and peaceful environment can also help in reducing stress in patients. Factors like loud noises, bad lighting, glare-prone reflective surfaces, or clashing colours and patterns can cause anxiety, agitation, and disorientation in dementia patients so modifying the environment can help in coping up with dementia. It will also make things easier for the caregivers.

E. Types of Spaces or Facilities Designed for Dementia Patients:

As dementia progresses, it may be difficult to keep seniors with memory loss safe at home so there are spaces specially designed for taking care of such patients when it becomes increasingly overwhelming to manage dementia behaviours at home.

Other reasons include when sleep problems increase, medication and nutrition become unmanageable or the caregiver is burnt out, worried about the patient’s health, or concerned about the safety of their family. In such situations these centres are very helpful. The types of such health care facilities which provide care for dementia patients are:

a) Memory Care Centers:

Memory care centres are residential centres that cater to the specific needs of seniors with dementia. These care centres provide housing and 24- hours care to seniors with dementia. In memory care centres those spaces are designed to offer a safe environment that focuses on improving quality of life, reducing confusion, and preventing wandering. Memory care centres provide specialized staff, memory-enhancing therapies, medication management, unique layouts to reduce confusion, mobility assistance, memory enhancing activities and supervision. It also provides meals, housekeeping, and help with assistance.



Fig. 4. Services offered by Memory Care Centers

b) Day-Care Center or Respite Center:

Day-care centre provides maintenance day-care services to patients who have mild to severe dementia and also seeks to provide respite for caregivers of elderly persons diagnosed with dementia. These centres provide close supervision and a safe, enriching environment for seniors to go to during the day. Many dementia patients are unable to be left home alone due to wandering, forgetfulness, and other potentially dangerous behavioural symptoms. This puts family caregivers in a difficult position, especially if outside help is scarce and/or they’re still working. Dementia programs at adult day-care centres typically utilize security features to prevent wandering as well as improved staffing ratios.



Fig. 5. Services offered by Day-Care Centers

c) Nursing Home:

Nursing homes provide long-term housing for seniors suffering from any physical or mental health conditions. Seniors who require personal care but don’t require hospitalization or people who need rehabilitative care after a hospital discharge can be admitted to such nursing homes. These facilities help seniors to recover from illness or accident regain mobility, strength, and function until they can return to normal activities. They provide 24-hour care and supervision, assistance with daily living activities, rehabilitative services, skilled nursing care, care coordination, palliative, and hospice care.



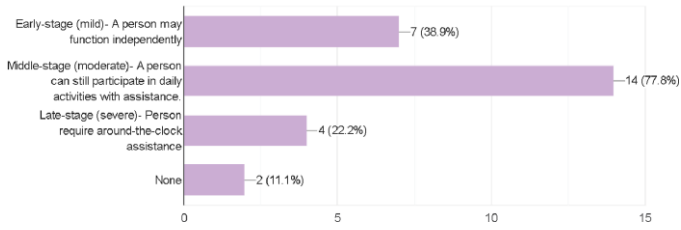
Fig. 6. Services offered by Nursing Homes

III. INTERVIEW AND SURVEY

The following bar graphs and pie charts are the result of a survey which was conducted for a better understanding on the subject. The survey was floated to neurologists, nurses, caregivers of dementia patients, and medical students. Interviews were conducted of the caregivers of dementia patients who were staying in an old age home with 24 hour personal caretakers who take care of the patients’ daily check-ups, medicines, and other needs. Patients’ behavioural patterns were observed, where it was noted that the patients, repeated tasks like reading the newspaper three to four times a day and sometimes the patients forget if they had food or not and asked to be served food even ten times a day. Also the patients seem to be fond of wandering in the corridor and outdoor garden areas. The following are the findings of the survey questioner:

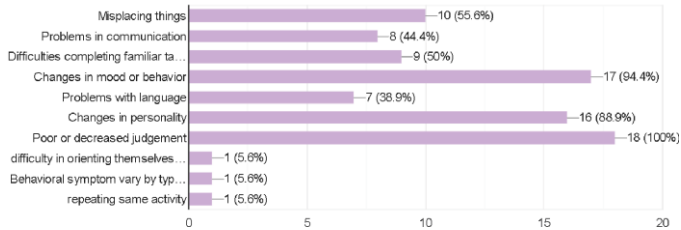
Which stage of dementia patients do you usually come across?

18 responses



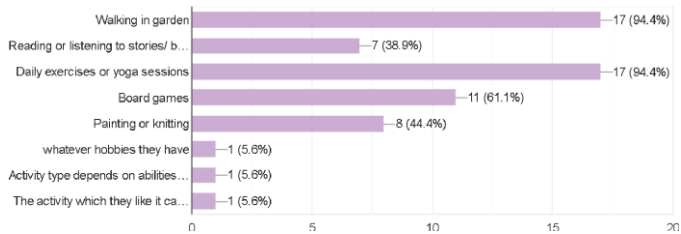
What are the most common symptoms seen in the patients?

18 responses



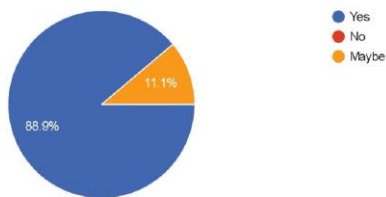
Which type of activities do you think will have a positive impact on the wellbeing of the patient?

18 responses



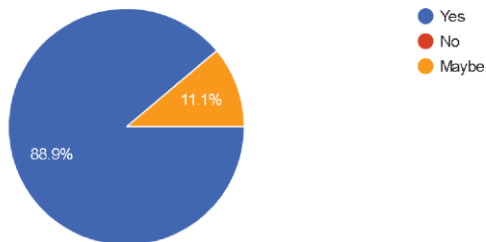
Does exposure to landscape views or spaces like garden improve relaxation and mood of the patients?

18 responses



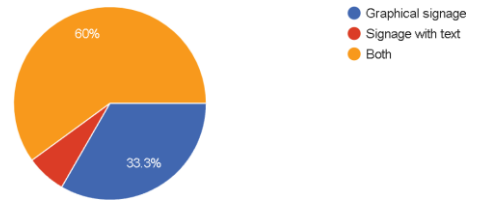
Do you think social interaction are helpful for dementia patients?

18 responses



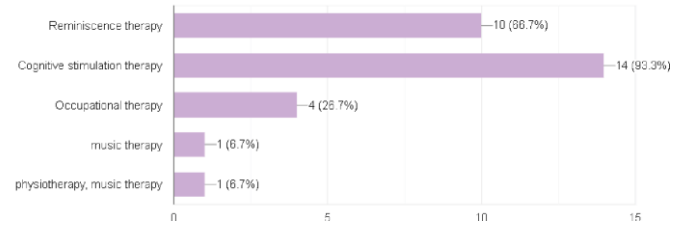
Which type of signages do people with dementia finds easier to read?

15 responses



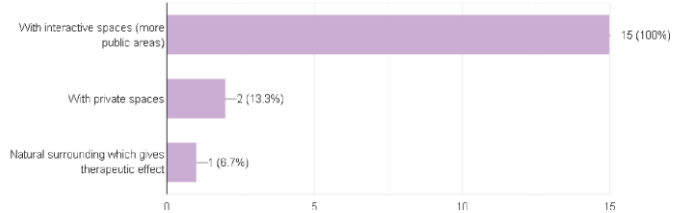
Which type of therapy is very beneficial for the patient?

15 responses



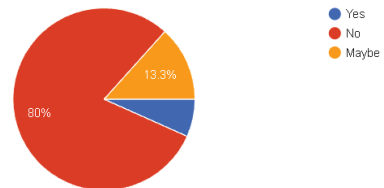
What type of environment does the health care centers for dementia should have?

15 responses

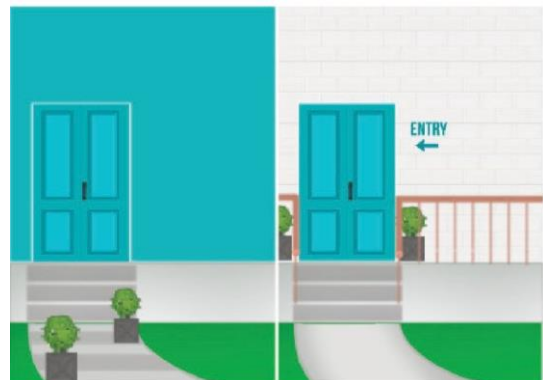


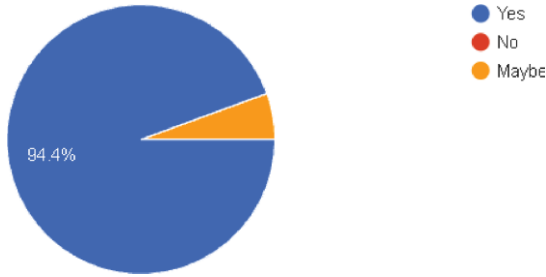
Are health care centers in India designed to decrease symptoms like confusion, agitation and distress in dementia patients?

15 responses



"In the image below are two differently designed main entry into a space the one on the right designed ensuring more safety by adding handrails and no obstruction in path. And by adding signage and having the entry door of different color then the wall reducing the confusion, unlike the image shown on the left which ensures no safety and can create more confusion and agitation to the dementia patient."- Do you think such changes in designed spaces can or have the potential to reduce the incidence of agitation and challenging behavior and also can encourage independence and social interactions in patients of dementia?





IV. CASE STUDIES

- a) Nikisa Dementia Village, Yelahanka, Bangalore, India
- FIRM- Etcetera Architects
- TYPE- Healthcare Service Pvt. Ltd.
- YEAR- 2019 (On going)
- SIZE- 3251m²



Fig. 7. Site Location



Fig. 8. Site Photograph

Nikisa dementia village is the only facility in India which provides dementia patients a safe and open environment to live freely and independently. It is designed on the concept of a village, a small habitation for dementia patients where they can live autonomously and receive care. The village premise includes shops, a temple, garden area, walking track, and other activities.

Unlike hospitals, patients here are allowed to lead a normal life within the secured premises of the village. The entry into the village is indirect. One can enter the open area in the village through the reception block. No outsider is allowed to enter beyond the reception. In the main building, the central block has bedrooms for the patients. The rooms are segregated

according to the stages of dementia. Some observation rooms are also provided in the building where the patients are kept under observation. Here, caretakers observe their behaviour and symptoms. According to the observations, the patients are then shifted in their rooms. One caretaker is appointed for each patient. On the left side of the main block, there is an ICU block and on the right, are all the activity areas. Patients are also engaged in different activities like physiotherapy, music therapy, and so on. The village has a post office, fruit stall, newspaper stall, a clinic, and a salon where people living in the village can visit. However, no exchange of money takes place.



Fig. 9. Site Plan

- Entrance Lobby
- Staff Area
- Common Spaces
- Primary Circulation
- Main Building

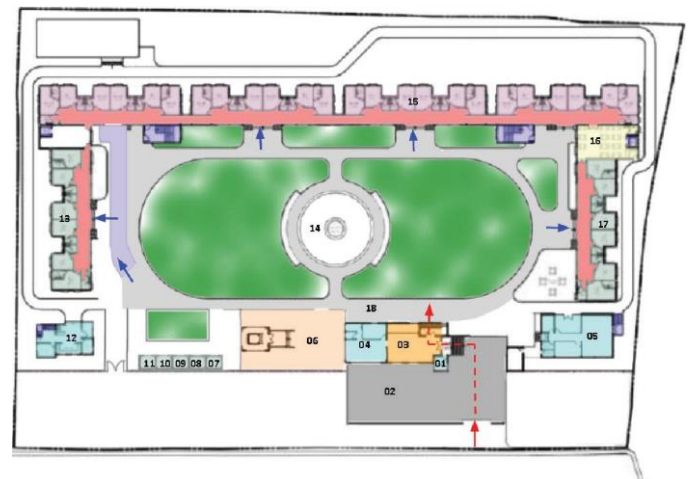


Fig. 10. Ground Floor Plan

- Entrance Lobby
- Staff Area
- Common Spaces
- Bedrooms
- Vertical Transportation
- Primary Circulation
- Main Entry
- Secondary Entry

TABLE II. Area Segregation Table for Case Study 1

Sr No.	Amenities	Area m ²	Occupancy	Function
1	Reception Area/Waiting Area	275	27- Visitor, 3- Receptionist	N/A
2	Security Cabin	24	2	N/A
3	Shops	80	4- Staff	Post Office, Fruit Stall, Newspaper Stall , Kamla Clinic
4	Common Or TV Room	78	30	Dining Table For 6
5	Minor OT	69	2	N/A
6	Physiotherapy	72	10	Different Equipment are provided
7	Salon	20	2	A Hairstyling Stations
8	Temple	109	N/A	Outside The Main Building
9	Dining Area	280	36	6 Seater Dining Tables
10	Living Area	110	18	3 Seater Sofas
11	Observation Rooms	584	24	N/A
12	Bedroom	800	16	N/A
13	Staff Residence	231	N/A	Different Block
14	Outdoor Sitting	N/A	33	Provided Near Temple
15	Kitchen And Storage	440	N/A	Different Block

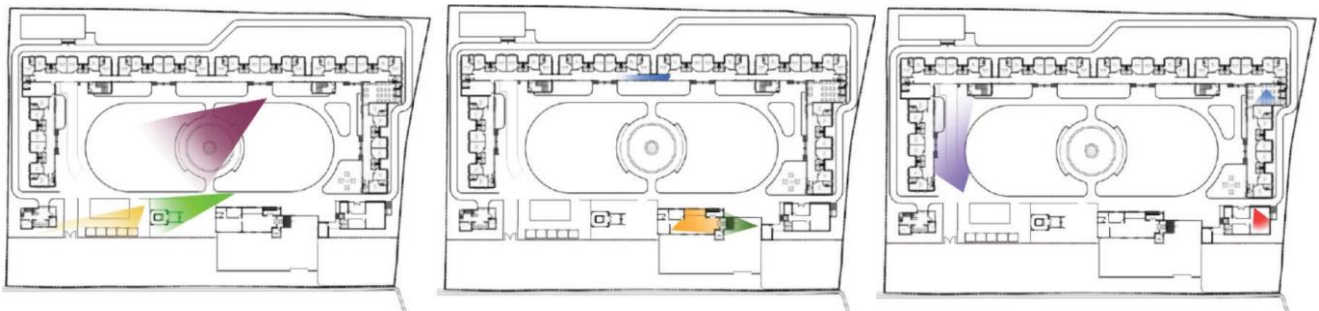


Fig. 11. Sight Line Plans



Fig. 12. Fountain Area



Fig. 13. Main Entrance



Fig. 14. Ramp



Fig. 15. Temple



Fig. 16. Reception



Fig. 17. Kitchen



Fig. 18. Shops

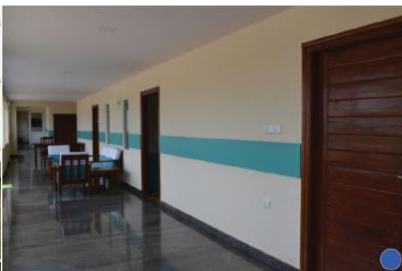
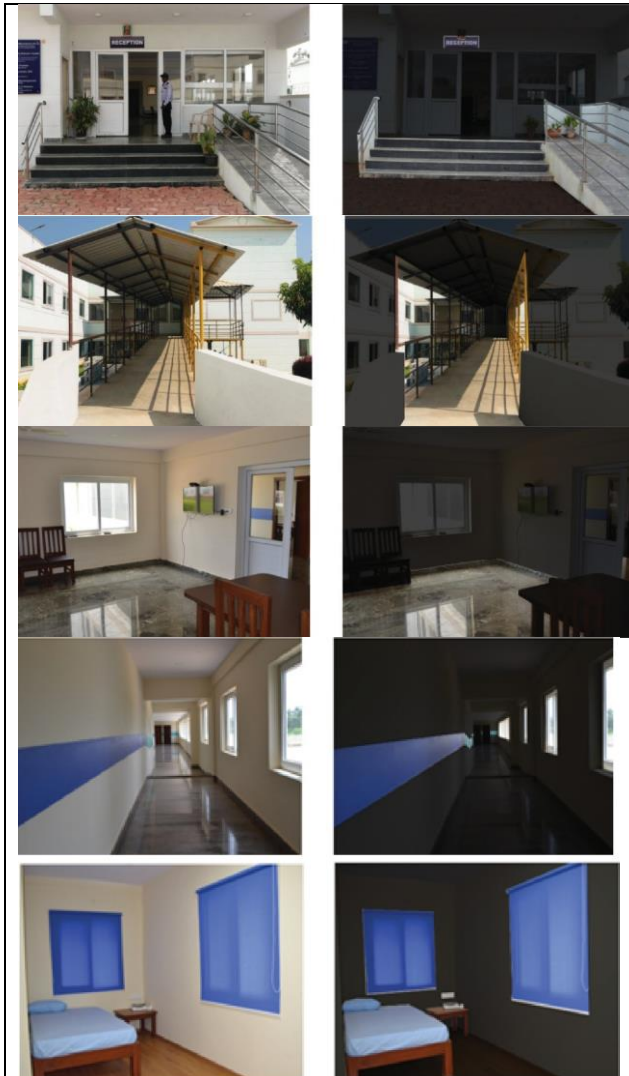


Fig. 19. Corridor



Fig. 20. Dining Area



Inferences:

- The entrance is made accessible with the addition of ramps but external help will be needed by the patients for using the ramps. Also at every entrance, visible signage, without any graphic is provided with a clear font. The addition of graphical signage would be more efficient in such spaces. The doors and windows have reflective glass which should be avoided as this could confuse the patients.
- In order to access the second-floor, a ramp was created after the construction of the building and during the day time due to the heat of the sun, the metal handrail can heat up and can cause problems to the users.
- At some places, doors are of different materials and colours which makes them easily distinguishable and also provides a visual connection into the space which makes it easier for the patient to know which space they are entering. The corridors and common spaces have glossy flooring which is highly reflective by which the patients can get confused. The windows don't have any safety bars which are very important for the patient's safety.
- Different blocks in the building have different coloured bands painted through the corridor which could lead the patients.
- Every furniture element stands out from the background which makes it easier for the patient to comprehend each space.
- Roller curtains are provided to control sunlight which would help in decreasing agitation.
- Matt flooring is provided in the bedrooms of the patients, to avoid any kind of glare.
- In the washroom, no rails are provided to assist people with mobility difficulties. Also, there are no colours used to create visual contrast between the walls, floor, and the WC. No mirror and shelf are provided to place sanitary goods.

– b) Alzheimer's Respite Centre, Dublin, UK
FIRM- Niall McLaughlin Architects
TYPE- Government + Health community centre
YEAR- 2009
SIZE- 100,000 sqft. - 300,000 sqft.



Fig. 22. Site Location



Fig. 23. Site Photograph

The design incorporates the use of colours, light, movement, materials, smell, and specialized standards. The facility houses up to 25 patients during the daytime and provides a bed facility for 11 patients. It also includes the national offices for the Alzheimer's Society of Ireland and is intended to serve as an exemplar for future respite centre design.



Fig. 24. Site Plan

- Site
- Nearby Buildings
- Parking Area
- Landscape Area
- Roads

Dining room	04
Activity room	05
Central space	06
Sitting rooms	07
Contemplation room	08
Bedroom	09
Meeting room	10
Staff office	11
Alzheimer's society offices	12
Therapeutic remedies	13
Morning terrace	14
Upper terrace	15
Afternoon terrace	16
Magnolia courtyard	17
Evening terrace	18
Herb and scent garden	19
Orchard	20
Staff Garden	21

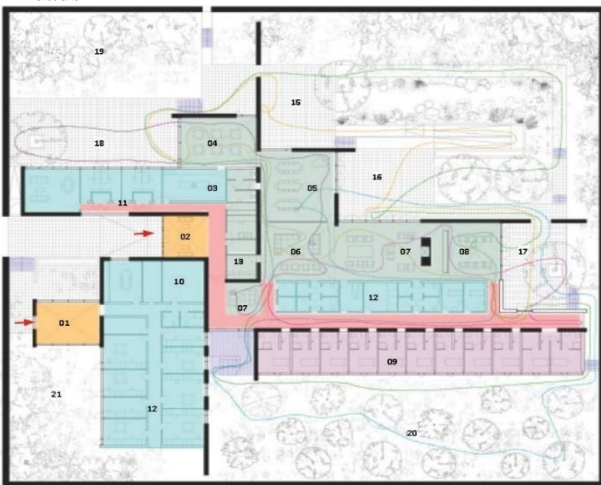


Fig. 25. Ground Floor Plan

- Entrance Lobby/ Reception
- Office and staff areas
- Common spaces
- Bedroom
- Vertical transportation
- Primary circulation
- ← Entrance

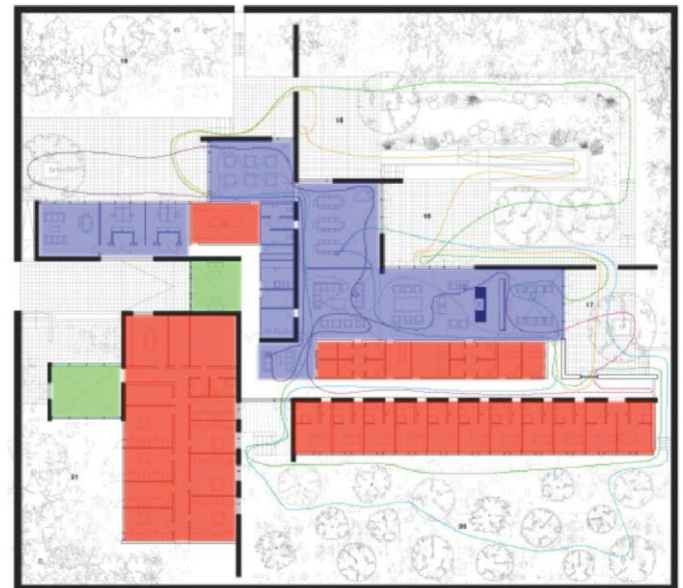


Fig. 27. Area Division Diagram

■ Public Area	67 m ²
■ Semi – Public Area	460 m ²
■ Private Area	763 m ²

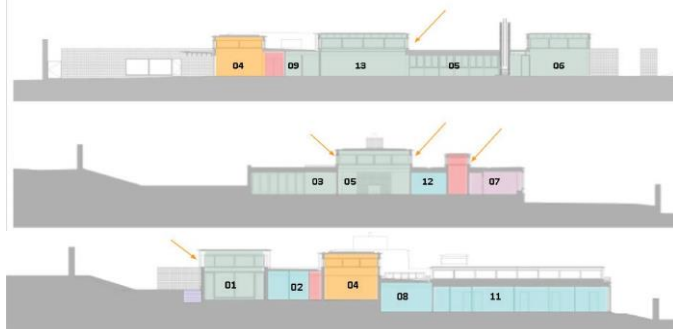


Fig. 26. Sections – AA', BB', CC'

Respite center entrance	02
Kitchen	03

Type of bedroom: Area- 19.63 m²

As this centre is a day-care centre 11 bedrooms are provided for the patients to take naps or rest during their time spent in the centre. The entrances of the rooms are color-coded with different colours for easy identification of the rooms. The wall with the window is clad with a wooden textured surface and the study desk is of the same material which makes it a bit difficult for some patients to make out that there is a study table. From the bed, the entrance door and WC are directly visible which provides a visual prompt to use them when required. No storage is provided. Each room has a single bed and a study desk with a view of the orchard. Keeping the weather of Dublin in mind each room has been provided with heaters and chain-operated curtains are provided to control the amount of daylight that enters the room.

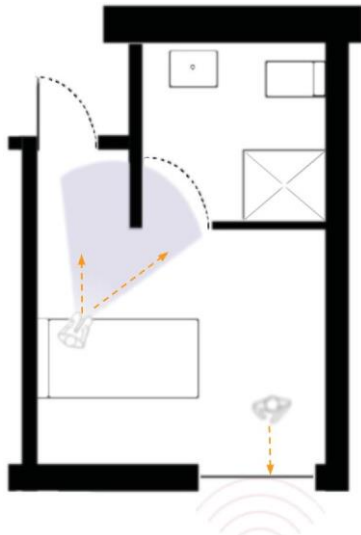


Fig. 28. Bedroom Plan

TABLE III. Area Segregation Table for Case Study 2

Sr No.	Amenities	Area - m ²	Occupancy	Function
1	Office Entrance	40	4- Visitor 1- Receptionist	-Informal sitting -Printer
2	Respite Center Entrance	27	4- Visitor 1- Receptionist	-Informal sitting
3	Kitchen	28	N/A	N/A
4	Dining Room	56	24	-Dining table for four
5	Activity Room	78	30- Patients 1- Pianist	-Table for ten people and a grand piano
6	Central Space	66	14	Informal sitting of 1, 4 and 7 seater sofas
7	Sitting Room	84	12	-Informal sitting of 1 and 2 seater sofas
8	Contemplation Room	61	8	-Informal sitting and full height windows and clearstory windows
9	Bedroom	216	11	Entries are painted with different colors
10	Meeting Room	62	16	Table for eight provided
11	Staff Office	205	40	-6 Cabins each with 2 workstations and a meeting table for 4 people -2 Cabins each with 2 workstations
12	Staff Common Area	35	12	-Informal sitting area -Dining table for 6 -2 Cabins with workstations and storage
13	Alzheimer's Society office	280	10- Staff 6- Visitors	-Three cabins each with 2 visitors -Locker area and Medical rooms
14	Therapeutic Remedies	10	2- Patients	N/A
15	Common Washrooms	30	6	-Provided four for staff near office areas -2 Provided for patients near activity area

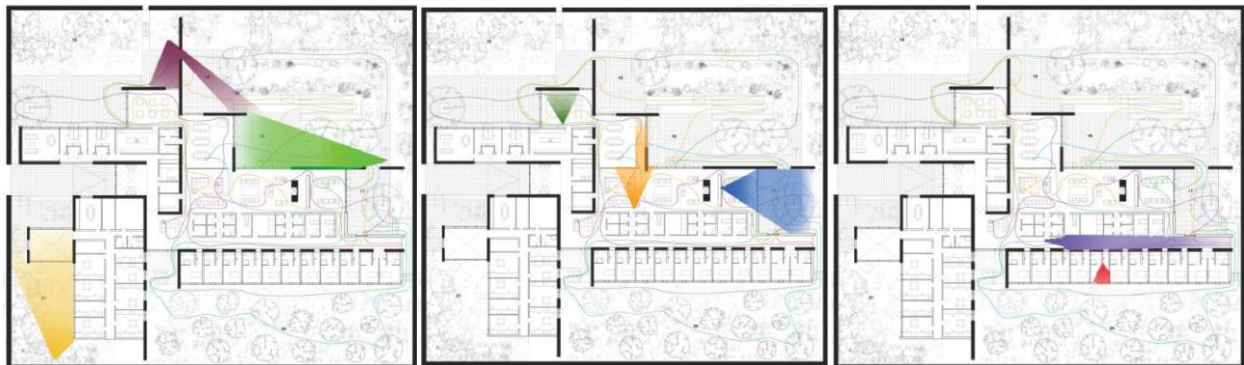


Fig. 29. Sight Line Plans



Fig. 30. Garden Area

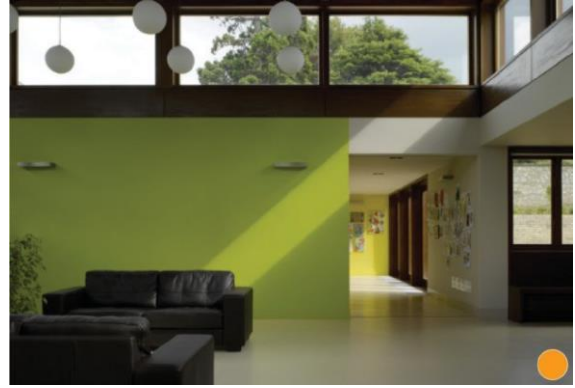


Fig. 34. Central Seating Area



Fig. 31. Outside Office Entry



Fig. 35. Contemplation Room



Fig. 32. Outdoor Seating



Fig. 36. Bedroom



Fig. 33. Dining Area



Fig. 37. Corridor

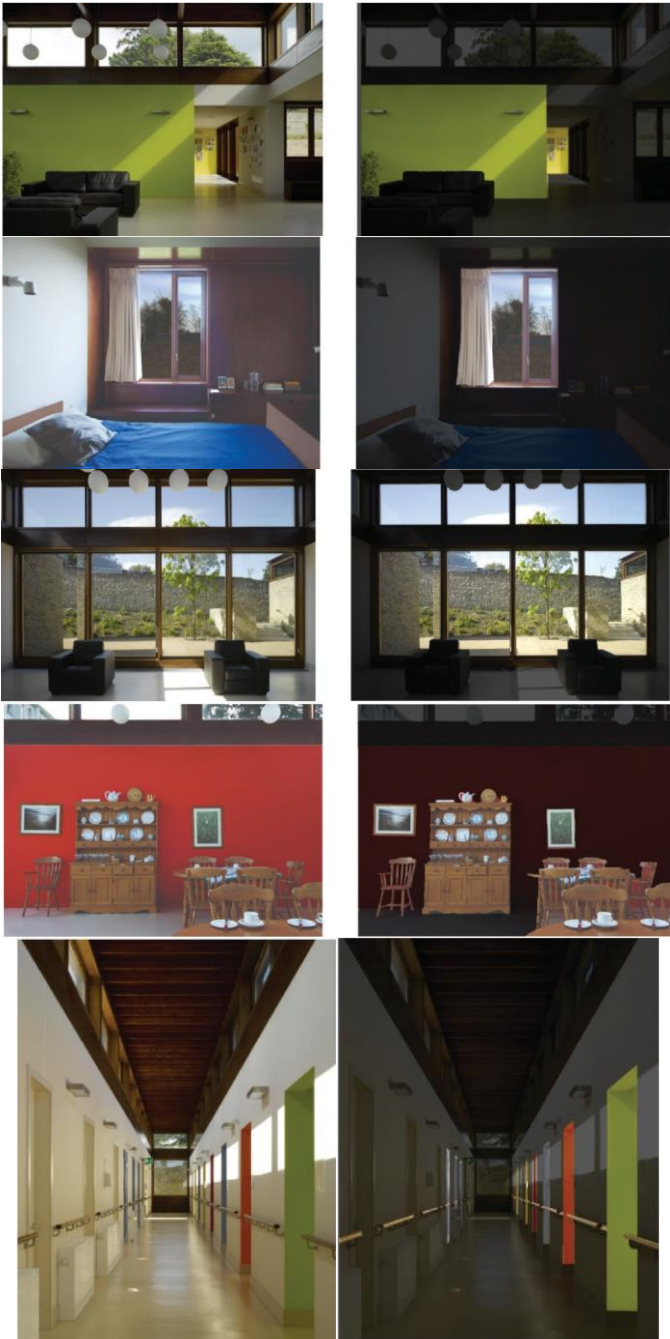


Fig. 38. Graphical Inferences

Inferences:

- This respite centre has color-coded distinct areas. The wall in the central space is painted mint green and a wall in the activity area is painted yellow, while the dining area is red, to help the patients remember each space and its function.
- All the furniture stands out from the background making the space more visually accessible.
- The full- height windows and clearstory windows facilitate visual access to the outside and allow natural light inside the spaces.
- Also, matt flooring is provided because of which there is no glare on the floor.

- From the bedrooms, windows provide a view of the orchard, and curtains are provided to control light.
- The window seating and wall are of the same material in the rooms which can create confusion in the mind of the dementia patient. Also, the heaters are hidden below the window seat.
- Recognizable features or personalization is done in the environment to create a sense of belonging in the space.
- Variable volumes are created in the spaces to make them recognizable.
- Each bedroom entrance wall is painted with a different colour which helps the patient to distinguish their bedroom.
- Areas in which patients are not allowed, their doors are merging with the colour of the wall to hide the entries and prevent the patient from entering such areas.
- Clearstory windows provide daylight inside a closed corridor. Handrails are provided and are visible and are stand out from the walls.

- c) Case Study 3 - Atlanta’s Premier Memory Care Community, Atlanta, United States
- FIRM- Uphealing
- TYPE- Memcare Community
- YEAR- 2017
- SIZE- 35,000 SQFT



Fig. 39. Site Location



Fig. 40. Site Photograph

At The Memory Centre Atlanta, they address the social, health, and mental needs of each individual’s unique demands. It is constructed around an innovative Town Centre concept that divides into four neighbourhoods of 12 suites, each with an

environment that includes a dining area and living room. It also includes a library, general store, bank, tavern, ice cream stand, salon, and a movie theatre along with icons that represent historical Atlanta. The town centre is designed exactly like one, with the use of different materials, road lamps, mezzanine floors, and balconies. They also provide a safe and accessible environment for the patients where they can move independently indoors and outdoors.

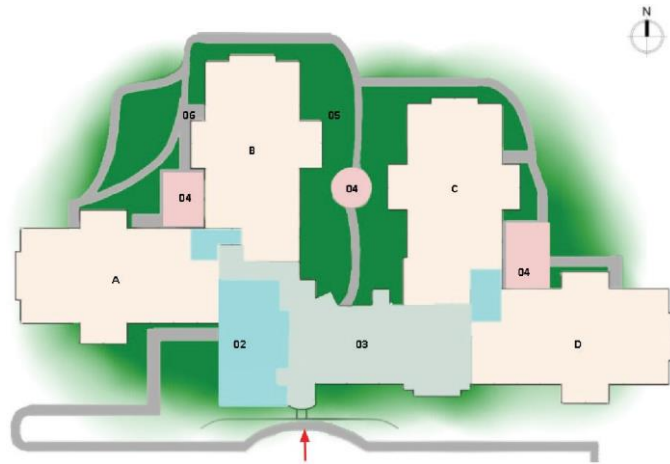


Fig. 41. Site Plan

- Residential Block
- Office & Staff Areas
- Common Area
- Outdoor Seating
- Landscape
- Walkway
- Main Entry



Fig. 42. Ground Floor Plan

- Entrance Lobby
- Office and staff areas
- Common spaces
- Bedroom
- Primary Circulation
- Entrance
- Entry from Garden

- 1 Restaurant
- 02 Library

- 03 Plaza
- 04 Tavern
- 05 Auditorium
- 06 General store
- 07 Cafe
- 08 Salon
- 09 Chapel
- 10 Kitchen
- 11 Dining area
- 12 Living area
- 13 Laundry



Fig. 43. Ground Floor Plan, Area Analysis

- Public Area 67 sq mts.
- Semi Public Area 460 sq mts.
- Private Area 763 sq mts.



Fig. 44. Residential Block Plan

TABLE IV. Area Segregation Table for Case Study 3

Sr. No.	Amenities	Area-m ²	Occupancy	Function
1	Reception Area	44	4- Visitor 1- Receptionist	N/A
2	General Store And Bank	46	6- Patient 1- Staff	-Printer -Barstool and Counter
3	Kid Room	15	N/A	N/A
4	Cafe	21	16- Patient 2- Staff	-Central area in town -Piano
5	Library	78	13	-One desktop

				-Four armchairs
6	Plaza	62	N/A	N/A
7	Tavern	72	16	-Different seating arrangements- bar chairs, armchairs and booth seating
8	Audio Visual Room	61	31	-Large projection screen -Popcorn station
9	Salon	28	4	A hairstyling stations and dryer chair
10	Chapel	15	3	Single and two seater sofa
11	Dining Area (Total No.- 4)	380	20	-Open kitchen area -Counter chairs, 4 seater dinner
12	Living Area (Total No.- 4)	108	12	-Different seating arrangements provided
13	Deluxe Studio (Total No.- 24)	984	2	N/A
14	Standard Studio(Total No.- 24)	840	1/2	N/A
15	Staff Areas	280	N/A	-Includes housekeeping, office, electrical room, it room, storage, staff break room, kitchen, laundry, medical office



Fig. 47. Standard Studio Room Sight Lines



Fig. 48. Deluxe Room Sight Lines

Types of Bedrooms:

In the facility two types of rooms are provided, Standard Studio of Area- 35 m². and Deluxe Studio of Area- 41 m². Both can be single or double sharing. In the room bed, two closets, a TV. cabinet, two-seater dining, and a bathroom is provided. From the bed, WC is seen which provides a visual prompt to use the toilet when required.



Fig. 49. Standard Studio Room



Fig. 45. Standard Studio Room Plans



Fig. 50. Standard Studio Room



Fig. 46 Deluxe Room Plans



Fig. 51. Deluxe Room



Fig. 52. Deluxe Room -Bathroom



Fig. 57. Entry to Audiovisual Room

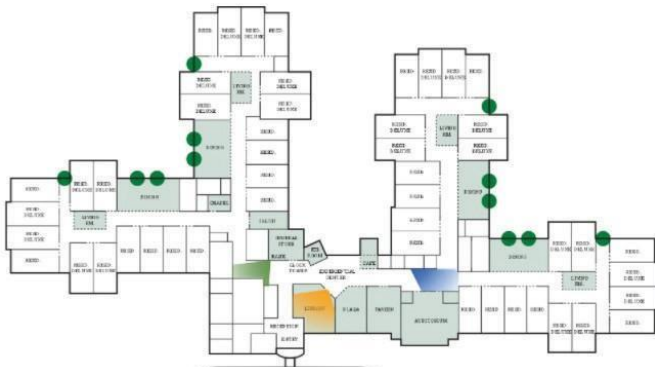


Fig. 53. Sight Lines Plan



Fig. 58. Salon



Fig. 54. Sight Lines Plan



Fig. 59. Corridor



Fig. 55. Library



Fig. 60. Residential Block Entrance Corridor



Fig. 56. Audiovisual Room



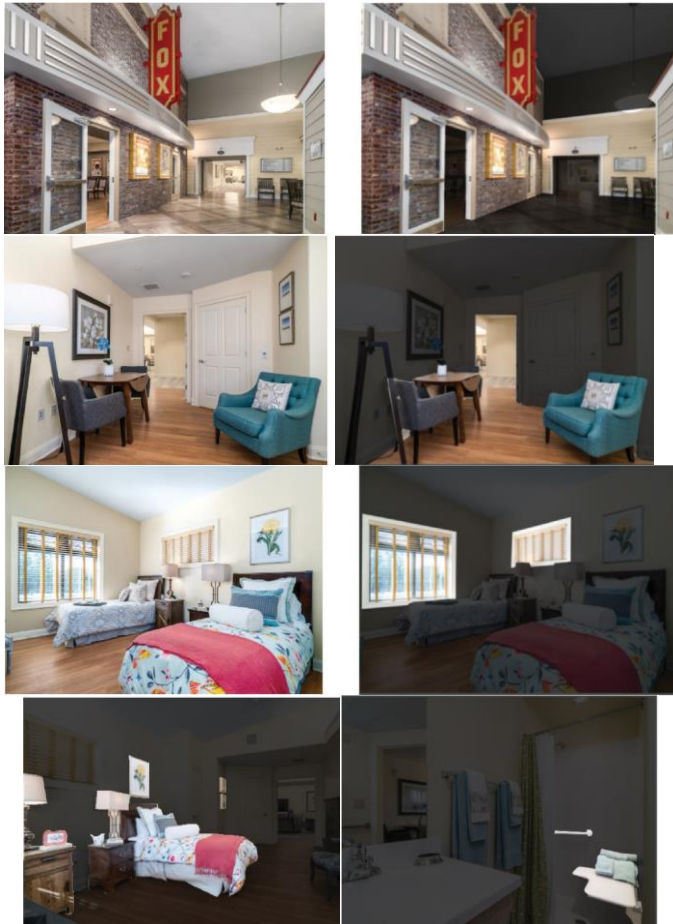


Fig. 61. Graphical Inferences

- TYPE- Senior Living Communities
- SIZE- 3251 m²

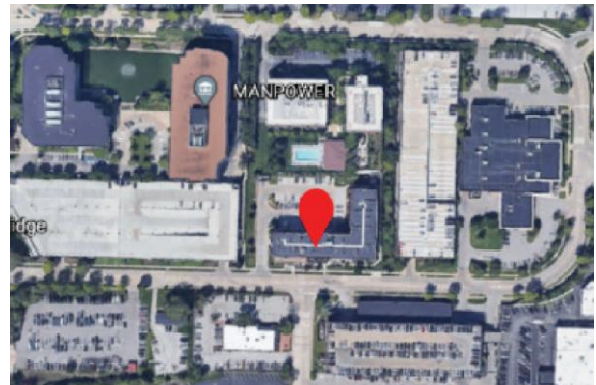


Fig. 62. Site Location



Fig. 63. Site Photograph

Inferences:

- Different materials are used to make spaces distinct from each other.
 - The outside of the audio visual room has life-size posters of movies.
 - Door handrails are clearly visible and doors have door stoppers.
 - The use of different materials, light fixtures for the facades of the shops make it appear like an actual town centre.
 - The doors and windows are visible and provide visual access in some of the staff areas too.
 - Spaces have been personalized by adding portraits, different lamps, and different finishes for furniture.
 - Adding a flower portrait above the bed can make it easier for the patient to identify his/ her bed.
 - All the furniture stands out from the wall and flooring.
 - Use of matt flooring helps avoid glare.
 - Windows facilitate visual access into the garden area and allow natural light inside the spaces.
 - Safety bars and handrails are provided for people with mobility disabilities.
 - The WC and WB stand out from the background.
- d) Case study 4- Crevecoeur Assisted Living and Memory Care, Missouri, U.S.A
- FIRM- Spectrum Retirement



Fig. 64. Site Context

■	Site	01
■	Nearby buildings	02
■	Parking area	03
■	Landscape	04
■	Roads	05

The Creve Coeur assisted living and memory care centre offers senior living accommodations and services. This centre is located in Missouri, in the centre of a commercial area. This centre has four floors from which the ground and second floor houses dementia patients and senior citizens both, but the third

and fourth floor is only for retired people. This space is designed to provide the patients with a personalized environment. The rooms are personalized, matt flooring is used, railings are provided, proper signage is provided in the spaces. It is designed to provide independence to the patient.

This memory care centre is similar to the centre designed as a town centre as it includes a grand parlour, bistro, wellness centre, library, restaurant, theatre, salon, open to sky dining, and other areas together. It has all the rooms lodged separately in a side block. The centre has different types of planned residential apartments to choose from. However, there are no ramps for better accessibility, even though the user group is majorly senior citizens. Also the main exit is directly attached to the other areas because of which the dementia patient could move out from the building.



Fig. 65. Site Plan & Ground Floor Plan

- Entrance Lobby/Reception
- Office & Staff Area
- Common Spaces
- Bedrooms
- Vertical Transportation
- Primary Circulation
- Common Washrooms
- ➔ Main Entry
- ➔ Secondary Entry



Fig. 66. First Floor Plan

- 01 Lobby
- 02 Grand parlor
- 03 Bistro
- 04 Wellness center
- 05 Library
- 06 Private dining
- 07 Restaurant
- 08 Community room
- 09 Theater
- 10 Salon
- 11 Elevator
- 12 Common washroom
- 13 Office
- 14 Caretakers room
- 15 Kitchen and store area
- 16 Activity room
- 17 Salon
- 18 Family room
- 19 Restaurant
- 20 Roof
- 21 Open to sky dining
- 22 Sun room

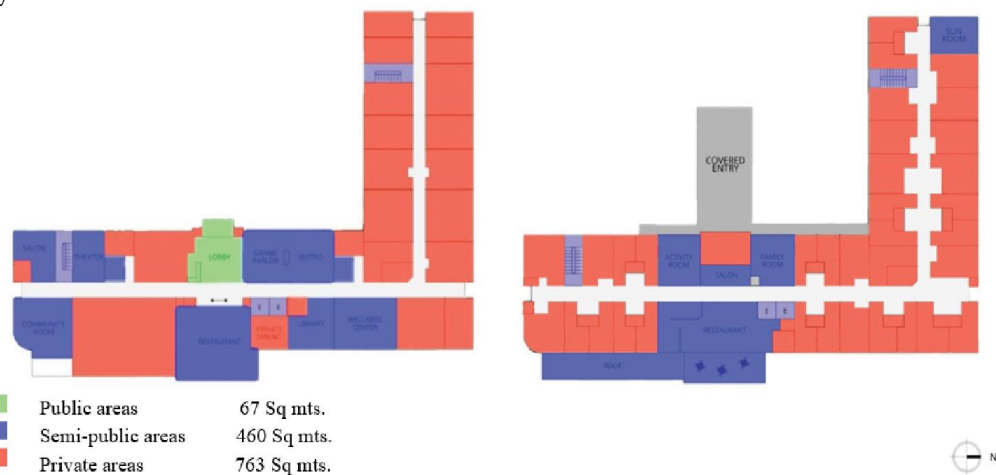


Fig. 67. Area analysis

Types of Bedrooms:

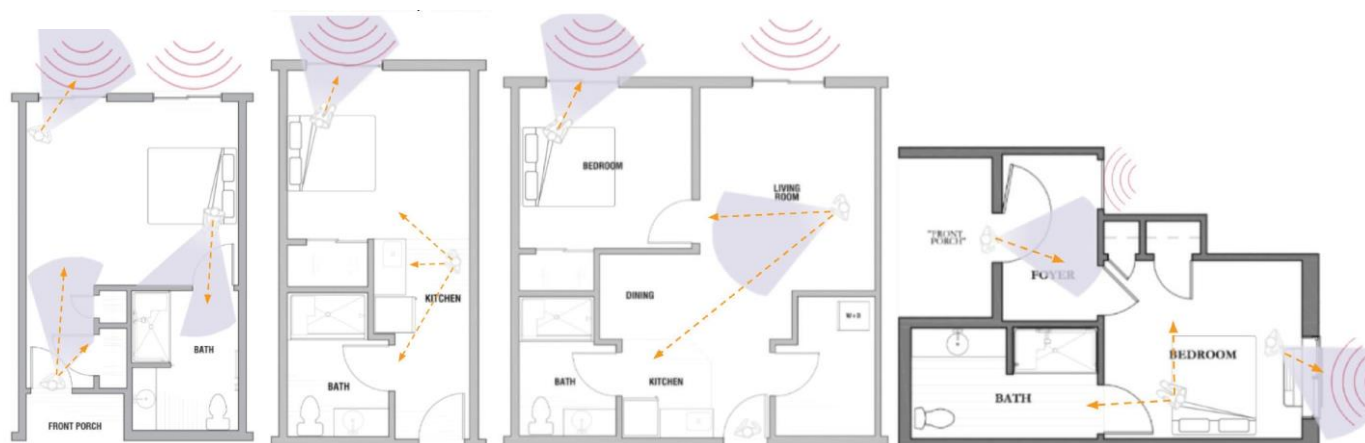


Fig. 68. Types of Bedrooms

There are four types of rooms are provided in this care facility:

- Type 1 with area- 51 sq m, has a bedroom, bathroom, and a closet.
- Type 2 with area- 32 sq m, has a bedroom, bathroom, kitchen, and a closet.
- Type 3 with area- 67 sq m, has a bedroom, bathroom,

- kitchen, laundry room, and a closet.
 - Type 4 with area- 43 sq m, has a bedroom, bathroom, foyer, and a closet.
- The center is located in a busy area and has a main road nearby because of which there could be some disturbance for the patients. Room types 2 and 3 don't provide an attached bathroom which could be a concern for the patients.

TABLE V. Area Segregation Table for Case Study 4

SR NO.	Amenities	AREA- m ²	Occupancy	Function
1	Reception Area/ Lobby	64	4- Visitor 1- Receptionist	-Visually Connected to The Restaurant and Grand Parlor -Single Seater Sofas
2	Grand Parlor	58	6	-Single Seater Sofas -Fireplace
3	Bistro	63	18- Visitors 1- Pianist 1- Staff	-Dining Table for 2 and 4 People Is -Provided -Piano
4	Wellness Center	84	10	-Pantry Area -Gym Equipment -Single Bed
5	Library	53	8	-Fire Place -2 Arm Chair and 1 Activity Table for 4 -People -2 Desktop
6	Private Dining	33	10	N/A
7	Restaurant - Ground Floor - First Floor	152 208	N/A N/A	-Dining Table for 1, 2, 3, 4, 5 And 6 -Grand Piano
8	Community Room	86	25	-Kitchen And Garden Area
9	Theater	40	15	-Pantry With Small Popcorn Station
10	Salon	44	9	-Waiting Area -Reception Desk -Two Hairstyling Stations and Dryer Chair
11	Common Washroom	26	N/A	N/A
12	Office	320	N/A	N/A
13	Caretakers Room	64	N/A	N/A
14	Kitchen And Store Area	212	N/A	N/A
15	Activity Room	79	N/A	-5 Seater Activity Table -Fireplace -3 And 1 Seater Sofas
17	Roof	141	N/A	N/A
18	Open To Sky Dining	94	12	-Outdoor 4 Seater Tables with Umbrella -No Balconies -Created Safe Environment
19	Sun Room	62	N/A	N/A
20	Vertical Transportation	86	N/A	N/A



Fig. 69. Sight Line Plans



Fig. 70. Reception



Fig. 73. Wellness Center



Fig. 76. Activity Room



Fig. 71. Bistro



Fig. 74. Grand Parlor



Fig. 77. Family Room



Fig. 72. Restaurant



Fig. 75. Bistro



Fig. 78. Open to Sky Dining

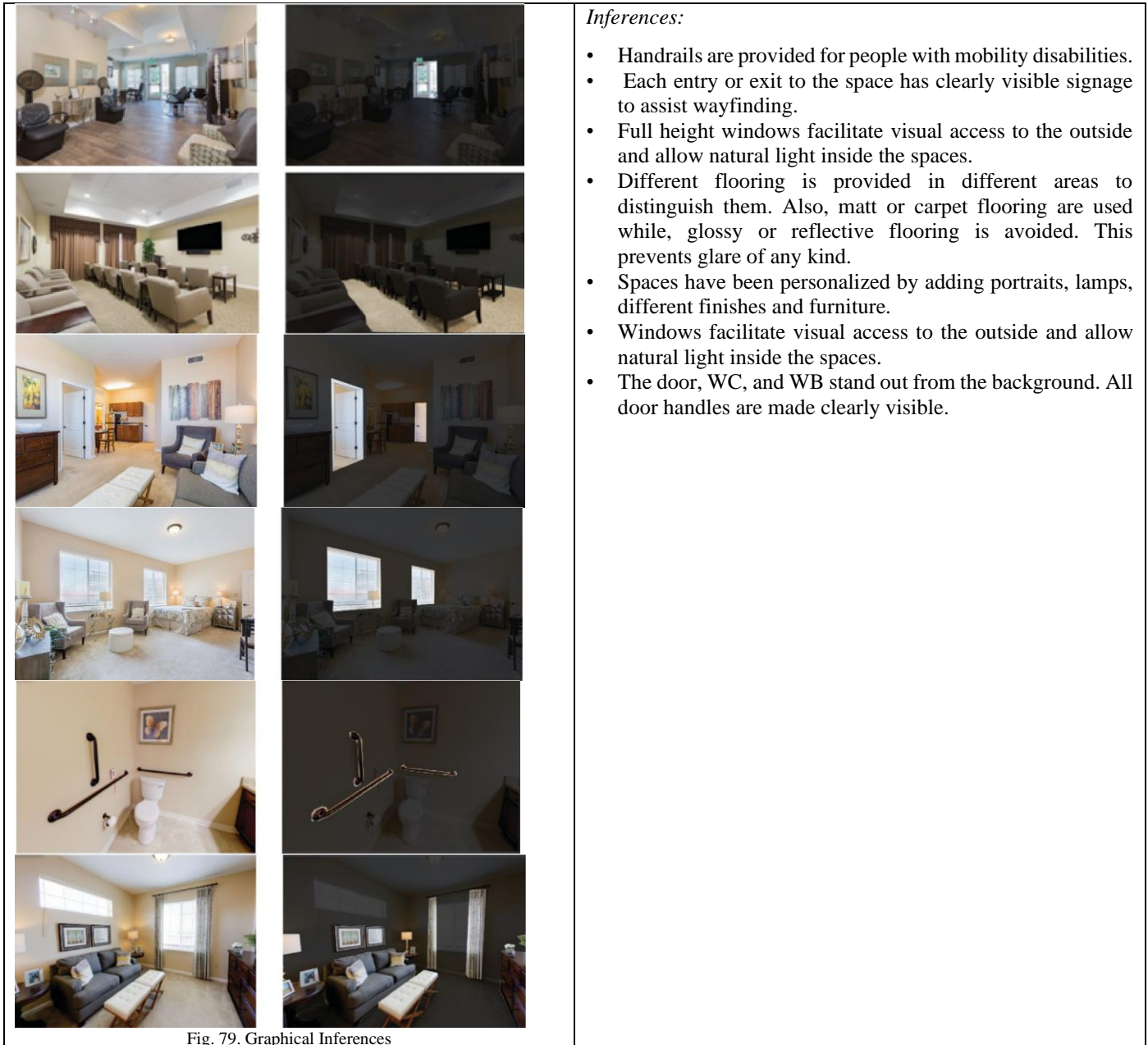





Fig. 79. Graphical Inferences

V. COMPARATIVE ANALYSIS OF CASE STUDIES

TABLE VI. Comparative Analysis Based on Design

	Nikisa Dementia Village	Alzheimer’s Respite Center	Atlanta Premier Memory Care	Creve Coeur Memory Care
Location	Yelahanka, Bangalore	Dublin, UK	Atlanta, US	Missouri, US
Type	Memory care center	Day care and memory care center	Memory care center	Memory care and assisted living
Concept	 <p>It is designed in such a way that it provides the patient a feeling of being in a community, improving their quality of life. It is designed like a village with temple,</p>	 <p>The center is designed to frame views of garden spaces so each garden is orientated in a different direction and intended to be experienced at different times of</p>	 <p>The center is designed with a concept of a town center. There are different shops inside the building and different materials are used for each shop/ area because of which the center is</p>	<p>The center is designed making the space familiar using recognizable features or personalization in the interior to enhance the feeling of belonging of</p>


	shop and garden area where the patients can move freely within the village.	the day. Users can move around rooms in the interior like a clock, experiencing change throughout their daily journey.	perceived as a town center.	 space.
Public Area	275 m ²	67 m ²	44 m ²	64 m ²
Semi- Pub- lic Area	821 m ²	460 m ²	814 m ²	1448 m ²
Private Area	2148 m ²	763 m ²	2104 m ²	3100 m ²
Signage	Properly identified signage	No proper signage	Properly identified signage	Properly identified signage
Accessible	Yes	Yes	Yes	No
Security Systems	Moderate	Excellent	Excellent	Excellent
Personalized	No	Yes	Yes	Yes
Visual	Moderate	Excellent	Moderate	Moderate
Safe	Yes	Yes	Yes	Yes
Color Coding	Only corridors has colored strip	Yes	No	No
Different Material	Yes	Yes	Yes	Yes
Handrails	No	Yes	No	No
Glossy Surface	Yes	No	No	No










TABLE VII. Comparative Analysis Based on Activities

	Nikisa Dementia Village	Alzheimer’s Respite Center	Atlanta Premier Memory Care	Creve Coeur Memory Care
Reception	275 m ²	40 m ²	44 m ²	64 m ²
Dining area	280 m ²	56 m ²	380 m ²	360 m ²
Private dining	Not provided	Not provided	Not provided	33 m ²
Rooftop dining	Not provided	Not provided	Not provided	94 m ²
Cafe/ bistro	Not provided	Not provided	21 m ²	63 m ²
Common area	78 m ²	66 m ²	108 m ²	86 m ²
Activity room	Not provided	78 m ²	Not provided	79 m ²
Wellness center	72 m ²	Not provided	Not provided	84 m ²
Chapel/ Temple	109 m ²	Not provided	15 m ²	Not provided
Salon	20 m ²	Not provided	28 m ²	44 m ²
Tv/ theater room	78 m ²	Not provided	61 m ²	40 m ²
Library	Not provided	Not provided	78 m ²	53 m ²
Therapeutic remedies	Not provided	10 m ²	Not provided	Not provided
Store	Not provided	Not provided	Provided	Not provided
Stalls	40 m ²	Not provided	Not provided	Not provided
Medical room	Not provided	Provided	Provided	Not provided
Outdoor sitting	Provided	Provided	Provided	Provided

TABLE VIII. Comparative Analysis Based on Staff Areas

	Nikisa Dementia Village	Alzheimer’s Respite Center	Atlanta Premier Memory Care	Creve Coeur Memory Care
Kitchen	Provided	Provided	Provided	Provided
Store Room	Provided	Not Specified	Provided	Not Specified
It Room	Not Specified	Not Specified	Not Provided	Provided
Laundry	Provided	Not Specified	Provided	Provided
Staff Bedroom	Different Block Provided	Provided	Provided	Not Specified
Cabin	Provided	Provided	Provided	Provided
Staff Dining	Provided	Provided	Not Specified	Not Specified
Staff Lockers	Provided	Provided	Not Specified	Provided
Meeting Room	Not Specified	Provided	Not Specified	Not Specified

TABLE IX. Comparative Analysis Based on Bedrooms

	Nikisa Dementia Village	Alzheimer's Respite Center	Atlanta Premier Memory Care	Creve Coeur Memory Care
B1 Area Sharing	 Patient and an assistant	 Single Occupancy	 Single Occupancy	 Single or double occupancy
B2 Area Sharing	 Patient and two assistants	Not Provided	 Double Occupancy	 Single or double occupancy
B3 Area Sharing	Not Provided	Not Provided	Not Provided	 Single occupancy
B4 Area Sharing	Not Provided	Not Provided	Not Provided	 Single or double occupancy

VI. DESIGNING FOR DEMENTIA

While designing for dementia some key points should be kept in mind -

- Environment that is calm and easy to interpret.
- Paying close attention on acoustic and visual disturbances in the space.
- Making the space familiar using recognizable features or personalization of environment to enhance steadiness of self.
- Provide good visual access to key areas or to important objects to remind the occupant when required.
- Good lighting is also important as most of the patients are seniors.
- Creating a distinct space for different activities.
- Encouraging a participatory design approach.
- Providing an un-obstructive, safe and accessible outdoor space which is perceptible from the interior spaces

Balcony, Openings and Ventilation:

A transitional/buffer space should be included in the design as the patients should not be exposed directly to a different environment. All windows must have curtains to ensure high levels of even, natural and artificial lighting within interior spaces to help those with visual difficulties. It is important to provide outside views to the patient while keeping all the safety measures in mind. A 1800mm high safety glazing or similar balcony balustrade or full height screening should be provided on the balconies.

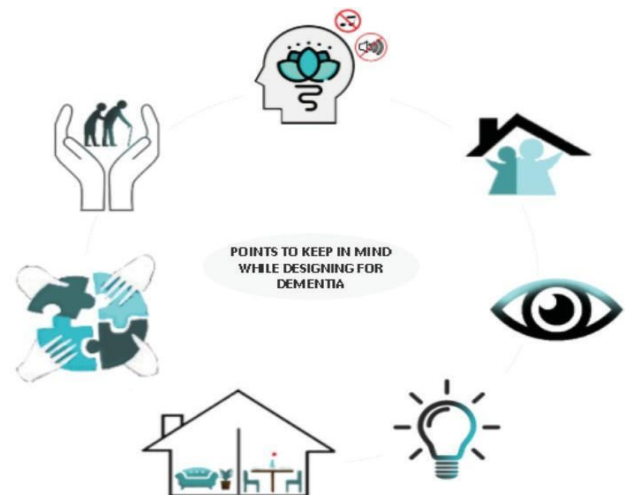


Fig. 80. Points to keep in mind while designing for dementia

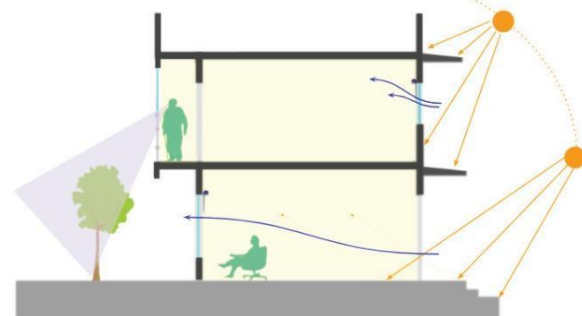


Fig. 81. Openings and Ventilation

– Space Planning:

The living space for a dementia patient should be designed to decrease any chances of confusion or mishaps. Every space should provide good visual access to other areas. Noise levels should be kept to the minimum, hence better acoustic solutions need to be provided. Providing an outside view and natural lighting in the interior space is extremely important. Every space should be made distinctive and its function should be made clear to avoid confusion. The caretaker’s room should be placed near the exits to have visual access on the patient’s activity.

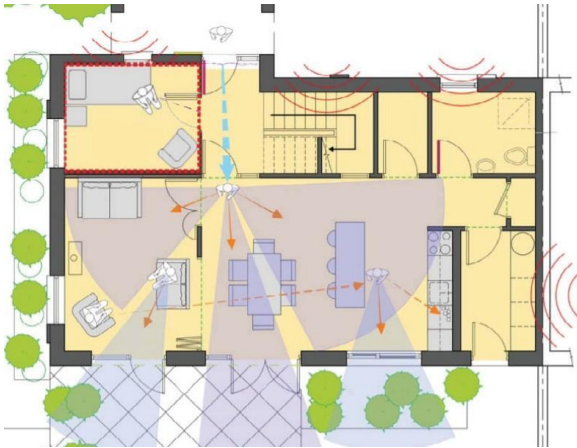


Fig. 82. An Apartment Plan for a Dementia Patient

Bedroom Planning:

The wardrobe should be visible from the bed to provide a prompt about getting dressed. The water closet (WC) should also be made visible from the bed to provide a visual prompt to use the toilet when required. The furniture design should be carefully worked out so as to make sure that no sharp edges are there which could harm the user. Also, the design of the doors should ensure that they can be fully opened for maximum visibility. The window location, window sill height, and window dressings, such as blinds or curtains, must be designed to facilitate visual access to the outside. Lastly, there should be good acoustic conditions to ensure reduced noise levels and privacy.



Fig. 83. A Bedroom Plan for a Dementia Patient

Entrance:

The entrance to every space should be seen or clearly identified. There should be no obstructions in the paths to

decrease the trip hazards. Any change in color or tone in the paving can cause difficulties for some people with dementia as it can appear to be a step or change in level. The doors must be visible and distinguished from the background. Every door must have signage that is visible and easy to read. Strong patterns should be avoided as these may cause confusion or disorientation. The entrance could be personalized by adding planting and garden objects and the use of colorful or fragrant planting in the grassed area to the front would create a more interesting and multisensory environment.



Fig. 84. Entrance Design

Corridor Spaces:

The corridors should be made more accessible by adding handrails and seats for the patient to pause at some points to take a rest. Use different materials, colors, or tones so that the handrail stands out clearly from its background. Material of the handrail should be chosen keeping the weather conditions in mind as any major temperature change could cause distress in patients’ minds. Avoid any strong patterns on floor finishes and provide a plain colored, matt finish which will help reduce glare or shine in brightly lit conditions. Also, ensure that the door handle and similar door or any locks furniture is finished in a color that stands out from the door. Door thresholds should not have any level difference and should avoid any color change at it. The design must ensure that the floor finish is continuous with adjacent spaces to eliminate anything that could be mistaken as a step.

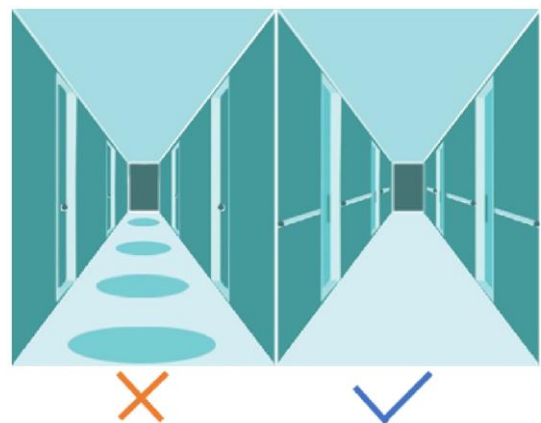


Fig. 85. Corridor Design for a Dementia Patient

Wayfinding:

Clear signage with bold graphics must be provided to enhance way-finding. The signage should be carefully located in obvious positions using non-reflective materials. Good lighting should be provided and the provision of low-level lighting can enhance way-finding during the night. Delineated paths should be there which would guide a patient into the space. Glazing could provide visual access into the space which would make it easier for the patient to identify spaces.



Fig. 86. Signage for Wayfinding

Vertical Transportation:

The access to stairs and lifts should be well lit and distinguishable from the background by using a different tone or colour. The staircase should be spacious with plenty of natural light. Clear glazed sections in external walls of the staircase could provide orientating views to the outside. There should be a continuous floor finish and colour from the corridor to the staircase or lift. In the staircase area for additional support, a handrail should be fitted to the wall. Lift controls should be in a logical position adjacent to the lift where their function and operation are obvious.

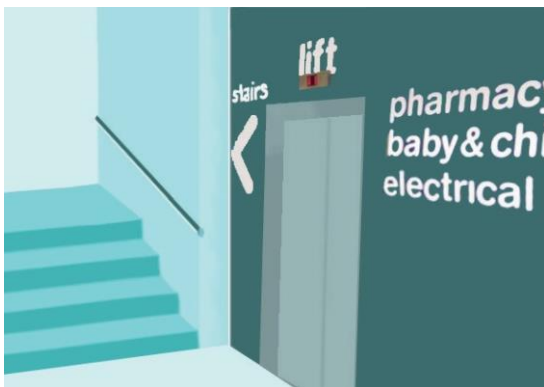


Fig. 87. Vertical Transportation

Kitchen Design:

The design should avoid any glossy floor, kitchen unit, or counter materials that may cause glare. One must use colour and tone to provide contrast between furniture and the floor, and to make floors, doors, walls, light switches, plug socket plates, and other important features more decipherable. One must avoid concealing any kitchen appliances behind kitchen unit doors to ensure maximum visibility. Use of familiar fittings with simple

controls could enhance usability. One must use wall-mounted units, open shelves, or units with clear glazed panels for maximum visibility to the regularly used grocery, crockery, or cooking utensils. Use of labels, images, or photos on kitchen unit doors or appliances could help remind the occupant about their use, or what each item contains. Smoke and heat sensors can be linked to an alarm system that will enhance safety.

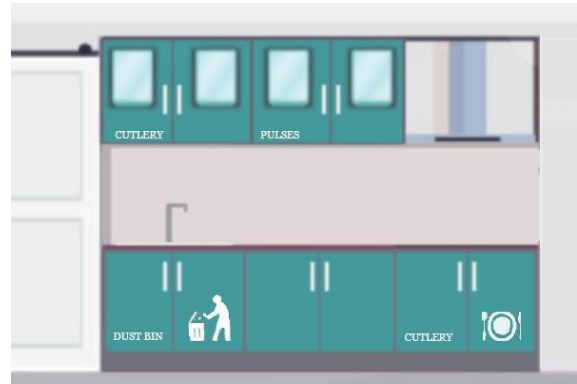


Fig. 88. Kitchen Design for Enhanced Usability

Bedroom Entrance:

The entrances could be personalized by use of ‘memory boxes’ which could have patients’ belongings or family photos which would help them to identify their room. Also, front doors can be painted in distinct colors to make them more recognizable. One can use a contrasting color on the skirting to provide a visual break between the walls and the floors to ensure greater visual contrast. Room numbers should also be clearly visible for all doors.

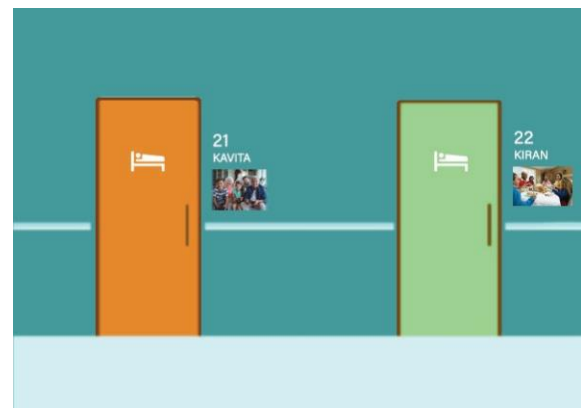


Fig. 89. Bedroom Entry

Wardrobe:

The use of the timber door to the wardrobe provides good colour contrast with the wall and therefore makes it more visible from within the bedroom. Wardrobes should be located so they are visible from within the room, especially the bed. This will provide a visual cue for getting dressed. Signage on doors, wardrobes, dressers, and drawers, or on certain controls or switches, can make key spaces and objects comprehensible. One can use clear glazed panels in certain sections of the wardrobe door which would allow a person to see their clothing as a visual prompt to get dressed. In some cases, a person’s

clothes for the day could be left out in this section the night before which would decrease the chances of confusion or agitation.



Fig. 90. Wardrobe Design

Bathroom Area:

The door to the bathroom should have clear signage to make it easily recognizable. The doormat can be recessed and its colour should match the colour of the flooring to ensure that the patient does not perceive it as a step. A greater colour contrast should be provided between the sanitary fittings and the walls to make this space more legible. Grab rails should be fitted to assist people with mobility difficulties. Also, the use of stainless steel grab rails may not be comfortable for some users. Use off-the-shelf sanitary goods and place them as per the regulations. Use of signage on the bathroom door can make it easily recognizable. It should be ensured that all mirrors can be easily moved, removed, or covered over as some patients could get disturbed with their own reflection.



Fig. 91. Bathroom Design for Safety

VII. CONCLUSION

Through the above surveys, interviews and case studies the paper develops certain thumb rules which could be incorporated in the space-making vocabulary to design dementia friendly spaces. There appear to be many ways in which the indoor environment can be designed to help older people with dementia to identify and understand where they are, to make appropriate behavioral and wayfinding decisions, to feel safe

and comfortable and to easily access and use their indoor spaces.

The ability of older people with dementia to enter and use the indoor environment is more likely to be supported in familiar, legible environments, with well-established, distinctive and clearly visible signage and identifiable cues. There is also a connection between successful orientation and wayfinding through simple space planning, by minimizing clutter and maximizing distinction of spaces through use of color, visual cues and personalization of spaces through use of personal belongings.

Most notably, however, it is the combination of the main design principles that together make an environment dementia-friendly. For example, for people also experiencing visual impairment the familiarity and legibility of their indoor environment will be of utmost importance, but for those with visual acuity the presence of suitable wayfinding cues will also be significant.

Our research focuses on the needs of a relatively small, but rapidly growing, section of the society. None the less, the design vocabulary developed here is also important for older people in general and for many other people with sensory, cognitive, or physical impairments. Furthermore, improving the clarity, legibility, and accessibility of the indoor environment will be of benefit to society as a whole.

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