

SESSION 5: Urban Mental Health/Supportive Environment

**Design
& Health**
International Academy for Design and Health

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Design & Health

13TH WORLD CONGRESS & EXHIBITION

REVITALIZING HEALTH BY SALUTOGENIC DESIGN

Healthy environment / Healthy people

ASSESSING THE QUALITY OF BUILT ENVIRONMENT FOR PEOPLE WITH DEMENTIA

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**POLITECNICO
MILANO 1863**

DIPARTIMENTO DI ARCHITETTURA,
INGEGNERIA DELLE COSTRUZIONI
E AMBIENTE COSTRUITO

MEDIA PARTNER

**Progettare
per la Sanità**
Organizzazione, tecnologia, architettura

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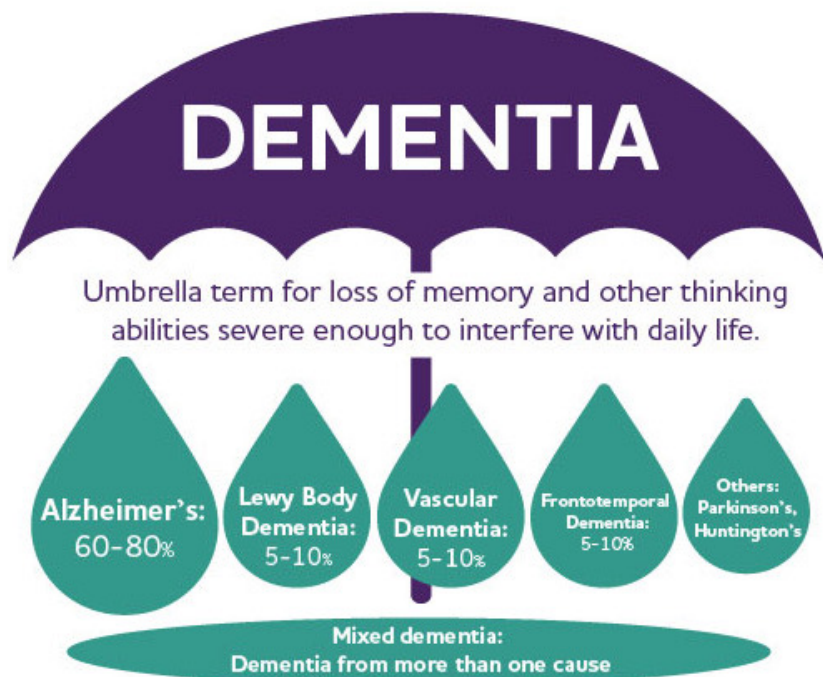
DEFINITION OF HEALTH

Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity

World Health Organization (1948)

Problem Statement

The term dementia is used to describe a group of symptoms affecting thinking, mood and behavior severe enough to interfere with daily life. (WORLD ALZHEIMER REPORT 2020)



DISEASES



Physical

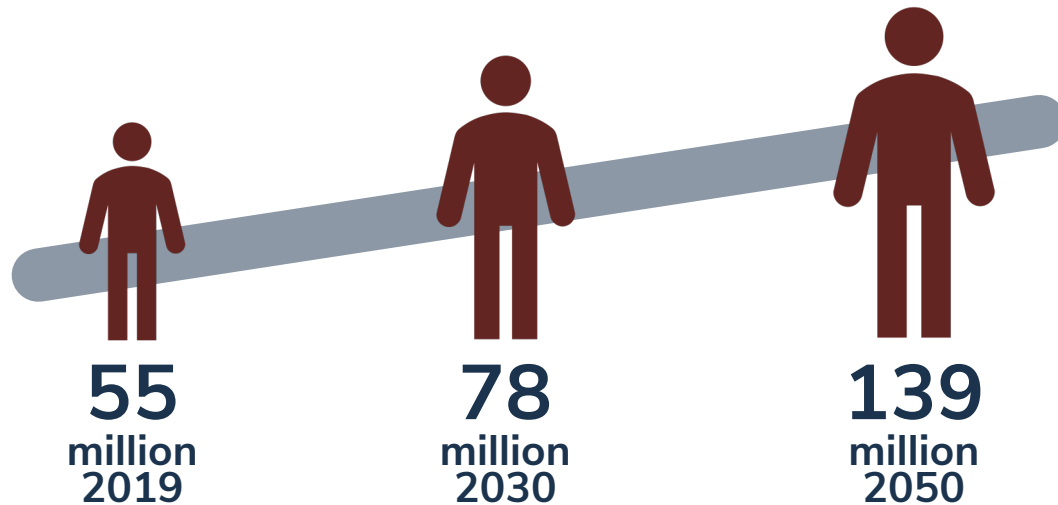


Mental



Social

Background



Dementia Numbers are rising worldwide

People with dementia are expected to double in next years across the world



16%
Home



17%
Hospital

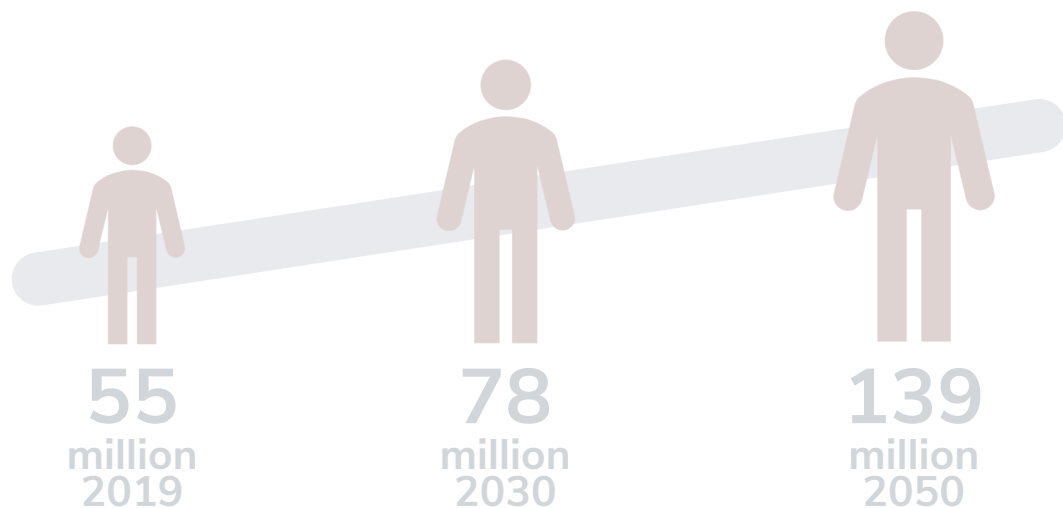


67%
LTC

People with dementia lives & dies in Long-term care facilities

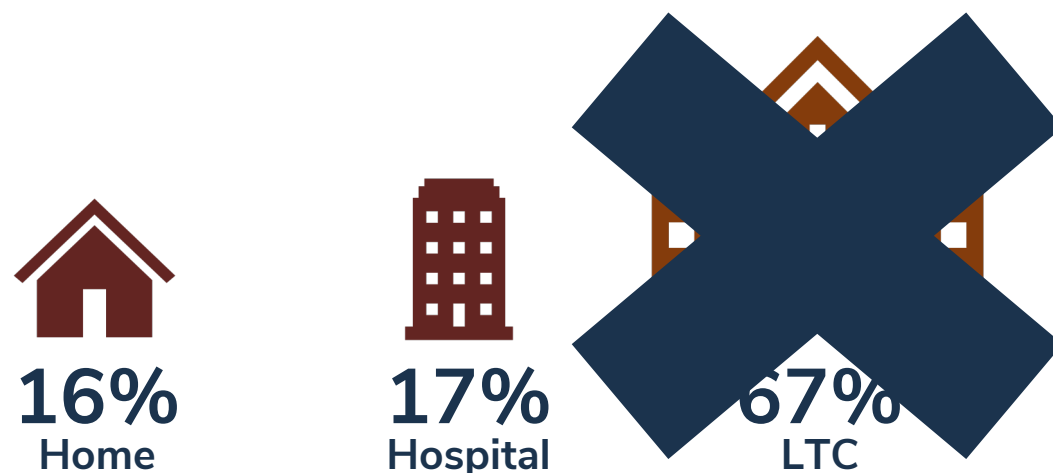
1/3 of people with dementia will transit in Nursing Homes or LTC during their lifetime

Background



Dementia Numbers are rising worldwide

People with dementia are expected to double in next years across the world



Most of these facilities are not suitable for people with dementia

In Italy they are based on outdated regulations (1989/91) and are not designed for the welfare of its users

01

Italian Gaps

- Patients with dementia are the **main guests** of nursing homes
- Structures are based on **old regulations**
- No mandatory **design guidelines**
- **Covid-19** highlighted the lacks
- Most of the Italian facilities are **old and inadequate**
- No funds from **PNRR (ITALIAN FUNDS)**
- Lack of **Experienced Based Assessment**

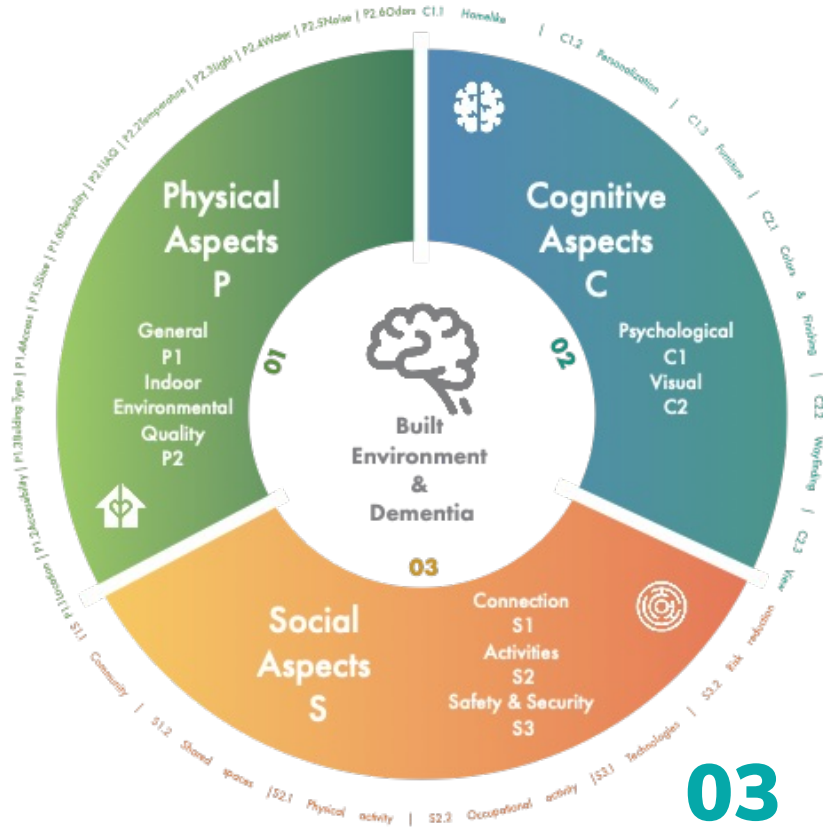
Nursing Home is a place where people and environment influence each other. Social, cognitive, and perceptive aspects should be considered in the design as main priorities.



Is there a relationship between the built environment and the health of patients with dementia?

02

Framework



03 Macro areas

07 Criteria

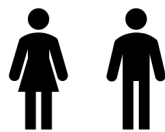
25 Sub Criteria

MACROAREAS	CRITERIA	SUB CRITERIA
PHYSICAL ASPECTS P	GENERAL ASPECTS P1	P1.1 LOCATION OF THE STRUCTURE (REACHABILITY)
		P1.2 ACCESSIBILITY
		P1.3 BUILDING TYPOLOGY
		P1.4 TYPE & CONTROL OF ACCESS
		P1.5 SMALL SCALE
		P1.6 SPACES FLEXIBILITY
	INDOOR ENVIRONMENTAL QUALITY P2	P2.1 INDOOR AIR QUALITY
		P2.2 THERMAL COMFORT
		P2.3.1 NATURAL LIGHT
		P2.3.2 ARTIFICIAL LIGHT
		P2.4 WATER CONTROL
		P2.5 ACOUSTICS (MANAGE LEVEL STIMULATION)
	P2.6 ODORS	
COGNITIVE ASPECTS C	PSYCHOLOGICAL C1	C1.1 PROVIDE A HOMELIKE ENVIRONMENT
		C1.2 PERSONALIZATION
		C1.3 FAMILIAR AND USABLE FURNITURE
	VISUAL C2	C2.1 COLORS AND FINISHING
		C2.2 SIGNAGE
		C2.3 PLEASANT VIEW TO OUTSIDE/INSIDE
SOCIAL ASPECTS S	CONNECTION S1	S1.1 SUPPORT CONNECTION WITH COMMUNITY
		S1.2 PROVIDE SPACES TO BE ALONE AND WITH OTHERS
	ACTIVITIES S2	S2.1 PROMOTE PHYSICAL ACTIVITY
		S2.2 PROVIDE SPACES FOR ACTIVITIES (OCCUPATIONAL)
SAFETY/SECURITY S3	S3.1 PROVISION OF TECHNOLOGIES	
	S3.2 RISK REDUCTION	

02 Outcomes



PATIENTS



STAFF



CAREGIVERS

- The outcomes have been investigated to find **assessment tools** to analyze them
- The patients' outcomes will be useful in **testing whether the environment actually has impacts on well-being & health of PwD** with a case-control analysis on two structures

	OUTCOMES	TYPE	ASSESSMENT
PATIENTS	O.01 FALLS	Event	Report, Tinetti
	O.02 SLEEP QUALITY	Clinical data	Report
	O.03 GENERAL COGNITIVE STATE	Clinical data	MMSE
	O.04 DEPRESSIONE/ANSIA	Functional	GAD7, GDS
	O.05 BPSD (Behavioral and Psychological Symptoms of Dementia)	Clinical data	Report
	O.06 DELIRIUM	Clinical data	4AT, mRASS, CAM
	O.07 WANDERING	Clinical data	Report
	O.08 SOCIAL RELATIONSHIP	Subjective	Observational
	O.09 PSYCHOLOGICAL HEALTH	Subjective	Observational
	O.10 PHYSICAL HEALTH	Clinical data	Charlson Comorbidity Index, CIRS-G
	O.11 ADL - MOTILITY	Functional	ADL
	O.12 ADL - FOOD	Functional	ADL
	O.13 ADL - TOILETTE	Functional	ADL
	O.14 ADL - WASH	Functional	ADL
	O.15 ADL - INCONTINENCE	Functional	ADL
	O.16 ADL - DRESS UP	Functional	ADL
	O.17 PRIVACY	Subjective	Observational

Methodology



Experts' involvement

A **matrix**, that emerged from the literature review showing the **relationships between architectural aspects and outcomes**, have been fulfilled by **medical experts, therapists, and architects** to better understand the correlations, investigate the gaps, and weigh the most impactful architectural features

RELATION TYPE & IMPACT				
-1	0	1	2	N/C
Negative impact	Neither negative nor positive	Positive impact	Very positive impact	Not able to answer

Doctors, Architects & Engineers and Therapists

Framework of Architectural Features

FRAMEWORK OUTCOMES	PHYSICAL ASPECTS										COGNITIVE ASPECTS			SOCIAL ASPECTS												
	GENERAL					COMFORT					WELLBEING	WAYFINDING	CONNECTION	ACTIVITIES	SAFETY/SECURITY											
	P.01.1 LOCATION OF THE STRUCTURE (REACHABILITY)	P.01.2 ACCESSIBILITY	P.01.3 BUILDING TYPOLOGY	P.01.4 TYPE & CONTROL OF ACCESS	P.01.5 SMALL SCALE	P.01.6 SPACES FLEXIBILITY	P.02.1 INDOOR AIR QUALITY	P.02.2 THERMAL COMFORT	P.02.3 NATURAL LIGHT	P.02.4 ARTIFICIAL LIGHT	P.02.5 WATER CONTROL	P.02.6 ACOUSTICS (NOISE MANAGEMENT LEVEL STIMULATION)	P.02.7 COLORS	C.01.1 PROVIDE A HOME LIKE ENVIRONMENT	C.01.2 PERSONALIZATION	C.01.3 FAMILIAR AND USABLE FURNITURE	C.02.1 COLORS AND FINISHING	C.02.2 STORAGE	C.02.3 PLANT VIEW TO OUTSIDE	S.01.1 SUPPORT CONNECTION WITH COMMUNITY	S.01.2 PROVIDE SPACES TO BE ALONE AND WITH OTHERS	S.02.1 PROMOTE PHYSICAL ACTIVITY	S.02.2 PROVIDE SPACES FOR ACTIVITIES (OCCUPATIONAL)	S.03.1 PROVISION OF TECHNICAL CORES	S.03.2 RISK MANAGEMENT	
PATIENTS O.00 QUALITY OF LIFE O.01 FALLS O.02 SLEEP QUALITY O.03 GENERAL COGNITIVE STATUS O.04 STRESS/AGITATION O.05 BPSD (Behavioral and Psychological Symptoms of Dementia) O.06 DELIRIUM O.07 WANDERING O.08 SOCIAL RELATIONSHIP O.09 PSYCHOLOGICAL HEALTH O.10 PHYSICAL HEALTH O.11 ADL - MOTILITY O.12 ADL - FOOD O.13 ADL - TOILETTE O.14 ADL - WASH O.15 ADL - INCONTINENCE O.16 ADL - DRESS UP O.17 PRIVACY WORKERS/STAFF W.01 STRESS/BURNOUT W.02 SATISFACTION W.03 PATIENT CONTROL RELATIVES/CAREGIVERS R.01 CONNECTION R.02 SATISFACTION R.03 OVERALL EMOTION																										

Outcome in Patients, Staff & Caregivers

Patients Involvement

Collect the main users' point of view

WHO?

Patients with a 21 to 30 MMSE score

WHAT?

Fill a research gap (few studies available)

Confirm criteria

HOW?

Focus group



FOCUS GROUP SESSIONS	M	F	MMSE	OVERALL	METHOD	LOCATION	RESULTS	
1 to 1	1		29	POSITIVE	Direct with a psychologist	Office	Too much formal environment, only positive answers about the structure	⊖
4 table	1		29	POSITIVE	Table, with an introduction from the Director and support of two therapists and a psychologist	Gym	Better results in terms of engagement of patients, low number of criticalities	⊕
		1	23	POSITIVE				
		1	21	POSITIVE				
		1	25	POSITIVE				
3 table + site visit	1		23	NEGATIVE	Table, introduction from the researcher, site visit after round table	Garden + indoor	Best results, in comparison with other sessions, the higher number of criticalities have been found while conducting the site visit	✓
	1		21	POSITIVE				
		1	26	POSITIVE				
1 to 1	1		29	POSITIVE	Site visit	Indoor	Site visit results as the best way to collect informations and opinions from patients	⊕
	5	4	25					

"I would like to be able to open my window and go to my room when I want"

MMSE 23

"I would like to go to the garden more times during the week"

MMSE 25

"I like my room, it's perfect like this. I like to be with another guest."

MMSE 26

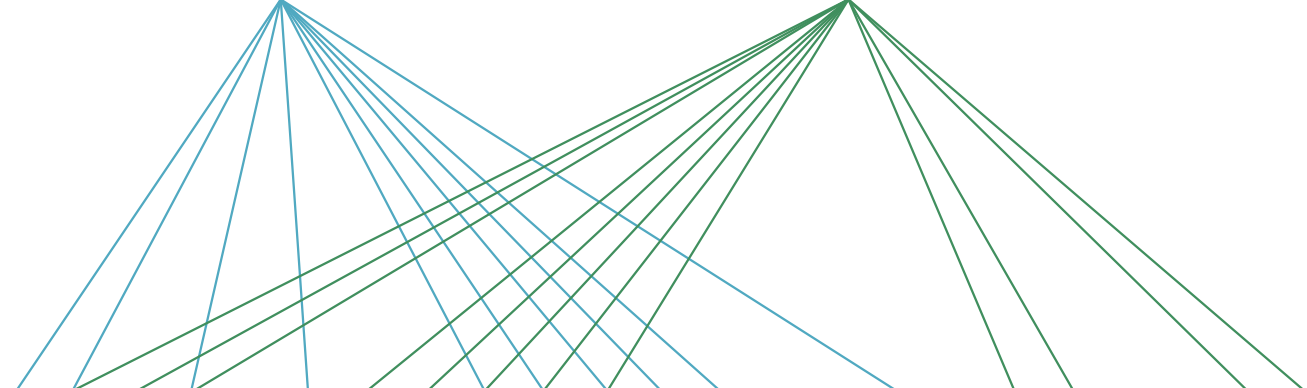
Patients Involvement



Impacts of design on health

PHYSICAL ASPECTS											COGNITIVE ASPECTS				SOCIAL ASPECTS															
General Aspects			Indoor Environmental Quality				Areas				Psychological		Visual		Connection		Activity	Safety/Security												
P.01.1 LOCATION	P.01.2 ACCESSIBILITY	P.01.3 BUILDING TYPE	P.01.4 ACCESS	P.01.5 SIZE	P.01.6 FLEXIBILITY	P.02.1 IAQ	P.02.2 TEMPERATURE	P.02.3 LIGHT	P.02.4 WATER	C.02.5 NOISE	C.02.6 ODORS	P.03.1 BEDROOMS	P.03.2 LIVING/DINING ROOM	P.03.3 BATHROOM	P.03.4 VERTICAL CONNECTION	P.03.5 HORIZONTAL CONNECTION	P.03.6 ACTIVITIES SPACES	P.03.7 OUTDOOR SPACES	C.01.1 HOMELIKE	C.01.2 PERSONALIZATION	C.01.3 FURNITURE	C.02.1 COLORS AND FINISHING	C.02.2 WAYFINDING	C.03.3 VIEW	S.01.1 COMMUNITY	S.01.2 SHARED SPACES	S.02.1 PHYSICAL ACTIVITY	S.02.2 ACTIVITIES (OCCUPATIONAL)	S.03.1 TECHNOLOGIES	S.03.2 SAFETY

O.01 FALLS	O.02 SLEEP QUALITY	O.03 GENERAL COGNITIVE STATE	O.04 STRESS/AGITATION	O.05 BPSD (Behavioral and Psychological Symptoms of Dementia)	O.06 DELIRIUM	O.07 WANDERING	O.08 SOCIAL RELATIONSHIP	O.09 PSYCHOLOGICAL HEALTH	O.10 PHYSICAL HEALTH	O.11 ADL - MOTILITY	O.12 ADL - FOOD	O.13 ADL - TOILETTE	O.14 ADL - WASH	O.15 ADL - INCONTINENCE	O.16 ADL - DRESS UP	O.17 PRIVACY	W.01 STRESS/BURNOUT	W.02 SATISFACTION	W.03 PATIENT CONTROL	R.01 CONNECTION	R.02 SATISFACTION	R.03 BURDEN
PATIENTS OUTCOME																STAFF			CAREGIVERS			



Results

What architectural features most influence health and well-being?

Literature review

- **Small size**
- **Light**
- Noise
- **Homelike**
- **Colors and finishes**
- Shared spaces



Small size



Light



Homelike

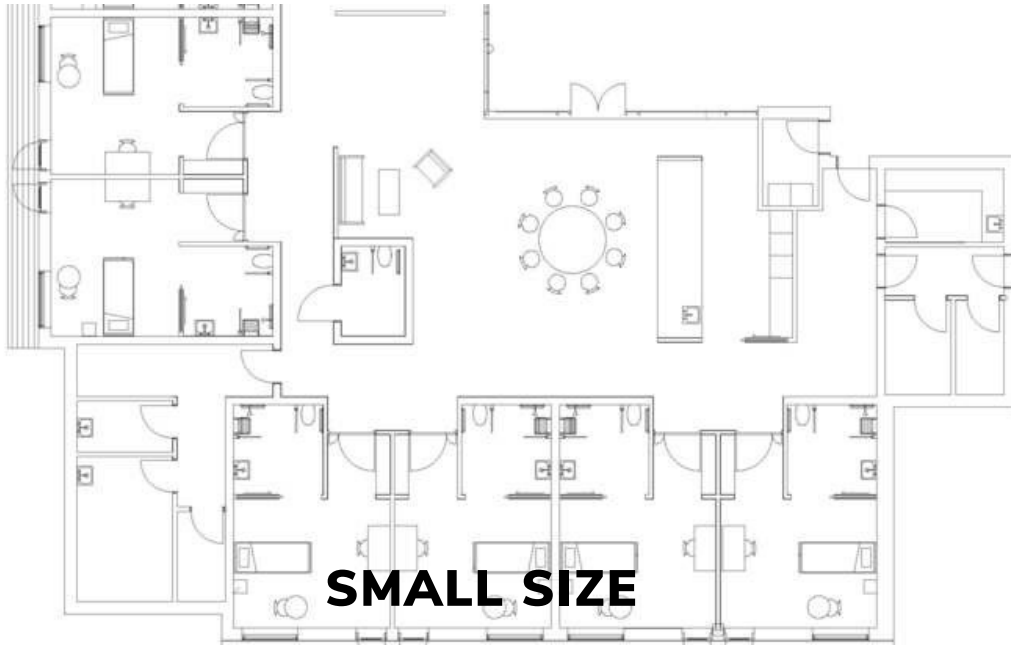


Colors & finishing

Stakeholder analysis

- **Small size**
- **Light**
- **Homelike**
- Personalization of spaces
- Familiar and comfortable furnishings
- **Colors and finishes**
- Promotion of physical activity

03 Impacts



Small structures are correlated with **significantly less cognitive decline** three months after transfer. Other improvements, such as **visual memory, image recognition, and global cognitive functioning**, can also be associated. Increased **ADL-related abilities** and **improvements in QOL** of residents in facilities with a low number of residents (**6-8 per unit**) can also be found..



Light management, both natural and artificial, was found to be relevant in terms of **reducing various forms of physical agitation/aggression, yelling, decreasing the average duration of wandering episodes, and increasing psychological health and social relations** among users.

03 Impacts



Access to a home-like environment was associated with **reduced anxiety and increased interest in surroundings** compared to levels found in residents of traditional facilities. Behaviors such as **aggression, noisiness, and wandering emerged as decreasing**. The familiar environment also correlated with **positive effects on ADLs, increased engagement in activities, and independence**.



The use of colored walls or panels to highlight or hide doors has led to a **reduction in undesirable behavior**. Color can also be used by residents as a **clue to locate their room, common areas, and improve orientation**.



Conclusions & future development

- The built environment **has an impact** on some factors of health and well-being of the user with dementia
- It's needed to pay attention to the **quality of architectural space** and its influence on user well-being from the earliest design stages
- Need for **Experience and Evidence-based tools** to measure the **effectiveness** of architectural solutions and the real **impacts** on users

Thank you.

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Mangili S, Brambilla A, Trabucchi M, Capolongo S. Built environment impact on people with dementia (PwD) health and well-being outcomes: a systematic review of the literature. Acta Biomed [Internet]. 2023 Aug. 30