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THE ECONOMICS OF SINGAPORE NURSING HOME CARE

Prepared for
Lien Foundation and Khoo Chwee Neo Foundation

HEALTH & LIFE SCIENCES

MARSH & McLENNAN COMPANIES

Contents

1 Executive Summary

Executive Summary (1/3)
Increasing demand for elderly care and planned supply of new nursing homes makes it timely to review the options for nursing home care models

Review of Long-term Care

- Singapore is facing **rapid societal aging** with consequent **challenges in providing for long term care** for Singaporeans requiring constant medical/nursing supervision
- Balancing the costs and quality of care (along the dimensions of not just physical health, but also mental health and well-being, dignity etc) **needs constant review** given the **dynamic social environment, changing expectations and cost constraints**
- Lien Foundation and Khoo Chwee Neo Foundation engaged Oliver Wyman to conduct a **study on different models of long term care** and to **evaluate the economic impact** of Singapore adopting different models

Nursing Home Models

- The prevalent nursing home model in Singapore is that of **medicalised, dormitory-style Nursing Homes (NHs)** which came to prominence due to real estate constraints and government's push towards standardisation and cost efficiencies
  - The government is increasing supply through 'Build-Own-Lease' (BOL) model, however the **dormitory-style structure** is expected to be the prevalent model for the new NHs
- In developed countries, there has been an evolutionary shift **away from the medicalised model** of care (focusing only on medical and nursing needs) **towards a habilitative model** with greater emphasis on:
  - **Developmental view of ageing** with dignity, respect and self-reliance
  - Fostering small **intentional communities** (with common ownership in groups of 6-10 residents)
  - **Home-like environment** with single rooms allowing for personalisation
- Habilitative models of care, such as the Green House model, have shown positive outcomes, such as:
  - **Improvements** in **quality of life**
  - **Improved quality of care** and care outcomes
  - **Increased family satisfaction** and staff satisfaction

Executive Summary (2/3)
‘Silver Hope’ model emphasises habilitative model of care with single/double room households and dedicated staffing catering for psycho-social needs as well as enhanced dementia needs

Silver Hope Model

- We worked closely with experts – NH leaders, architects and clinicians, to develop the **‘Silver Hope’** model encompassing the habilitative model features with the following:
  - **Layout** –
    - Silver Hope’s layout, with smart space planning, is based on a **mix of single and double rooms**[1]**, mirroring HDB bedrooms**, to allow for **home-like environment** as well as developing a **self-contained ‘household’** of up to 10 residents
    - Single/double rooms allow privacy, dignity and personalisation of care as well as minimise any potential conflicts between residents, especially in dementia cases
    - The ‘household’ layout includes a living and dining area which brings it closer to a home-like feel as well as allows for greater bonding between the 8-10 residents, thus encouraging them to help out and enable each other for various activities
  - **Staffing** –
    - Staffing for ‘Silver Hope’ is structured to personalise care with a **focus on the nursing, social and emotional needs** of a ‘household’
    - There will be dedicated Senior Care Associate per household coordinating all household activities
    - The nursing officer and nursing aide will be part of a roving team between different households and will focus on the medical aspects of care
    - Staffing is not differentiated by RAF category but has greater emphasis on **dementia care** with higher staffing ratios to allow for more direct contact time and better communication with residents

1. Single rooms to double rooms in 20:80 ratio

Executive Summary (3/3)
New model of care requires higher capital funding and staffing costs but feasible with 8-12% additional cost per resident per day

Cost Modelling and Projections

- We collaborated with 5 NHs in Singapore to collect operational data to develop the cost projections of Silver Hope
- Our analysis shows that Silver Hope will need higher capital investment and will incur additional costs. The key drivers of the higher cost will be:
  - **Real estate[1], construction and depreciation** –
    - Silver Hope will require **18% larger floor plate area** and **incur 20% higher unit construction costs** primarily due to an increase in the number of walls and en-suite bathrooms and toilets
    - Capital layout for construction and associated FFE (furniture, fittings and equipment) increases by 66%, however taking into account depreciation (30-years for building and 5-years for FFE), the increase in per resident per day cost is ~**$4-5**
  - **Staffing** –
    - Nursing staff costs increase by **4%** and **20%** respectively for non-dementia and dementia residents respectively due to dedicated staffing by 1 Senior Care Associate per household of 10 residents, and 25% more staff for dementia patients
  - **Other costs[1]** –
    - We assume increase in housekeeping and utilities by 50% and 10%
    - Other costs are considered to be similar or have minimal changes on a per resident per day basis
- Overall, Silver Hope has an **incremental cost of 8-12%**; on a cost base of $106 (average per resident per day cost), this translates to **~$8 and ~$13 for non-dementia and dementia** residents (simulation for 100% single rooms shows that corresponding costs will increase by ~$12 and ~$17 respectively[2])
- Assuming that the construction of 5000 new NHs to meet the 2020 demand-supply gap follows the Silver Hope model (with 50% beds for dementia), we estimate the total incremental costs to be ~$19 million per year[3] (~0.2% of MOH's 2016 healthcare expenditure of $11 billion)

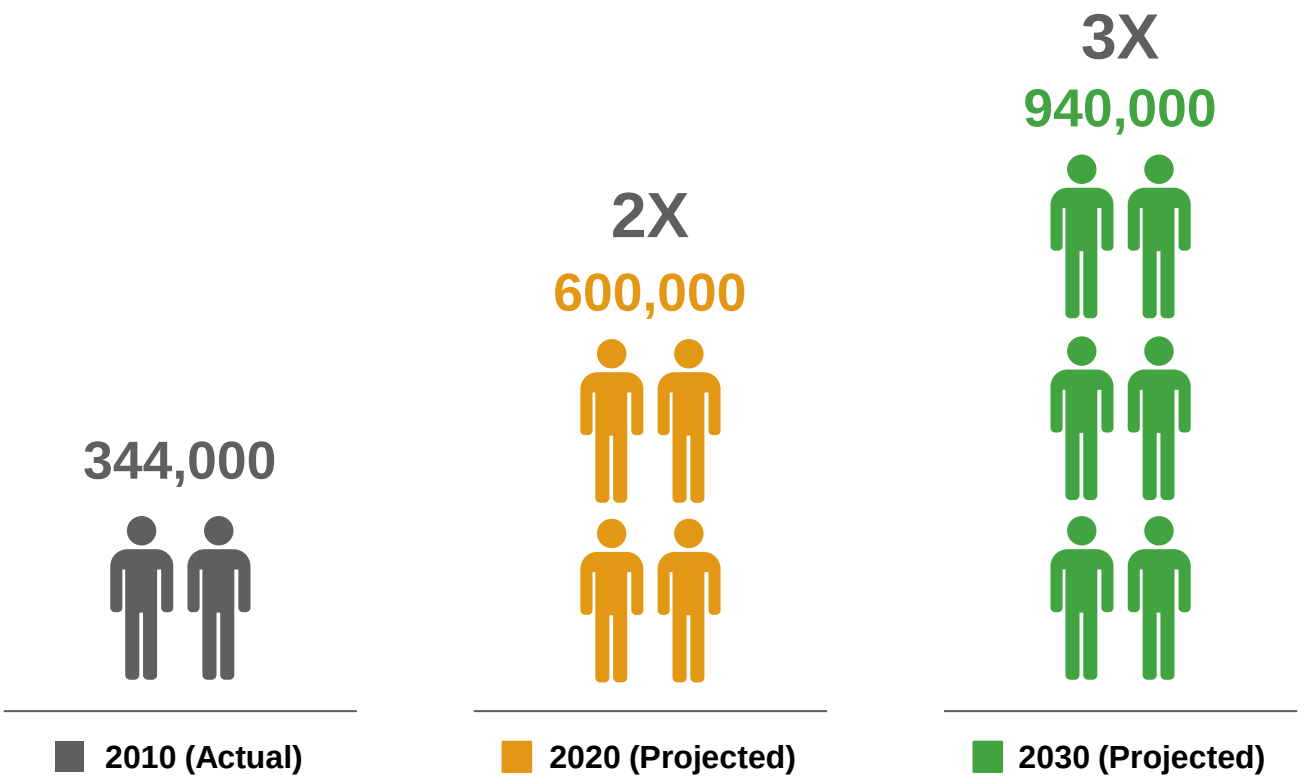
1. Rental/lease costs will increase due to requirement of larger area. The NHs in the study incurred rental costs in the range of $0.9-1.2 M, most of which was subvented by the government. Given the high variability in real estate costs based on the location, any incremental costs are not considered in the calculations
2. 11-16%on percentage basis
3. Excluding incremental rental costs

2 Current State Assessment

Rapidly Aging Population

Singapore is facing rapid societal aging with the number of seniors aged over 65 years doubling from 430,000 today to over 900,000 in 2030

Singapore Senior Population (>65 years)
2010–2030E



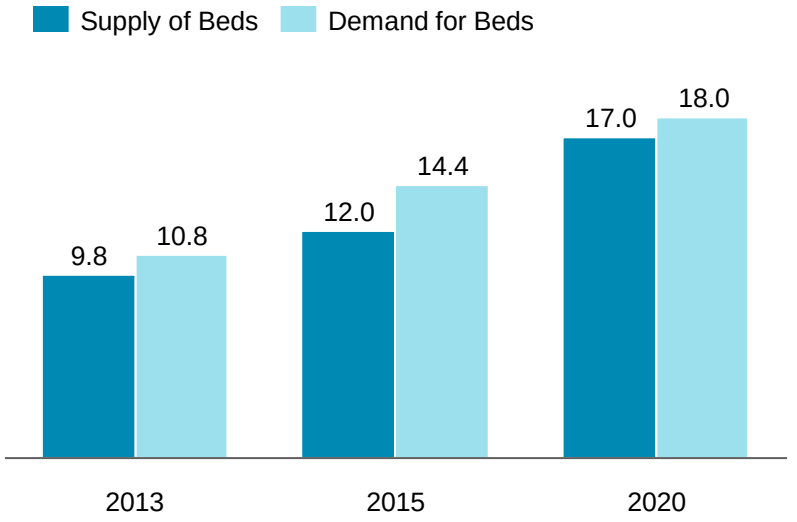
Source: Scenarios of future population growth and change in Singapore, Yap Mui Teng, Kang Soon Hock and Chua Chun Ser, IPS update, March 2011

Nursing Home Care

Increasing demand poses challenges in providing for long-term care for Singaporeans especially those with dementia

Supply and Demand for # Nursing Home Beds

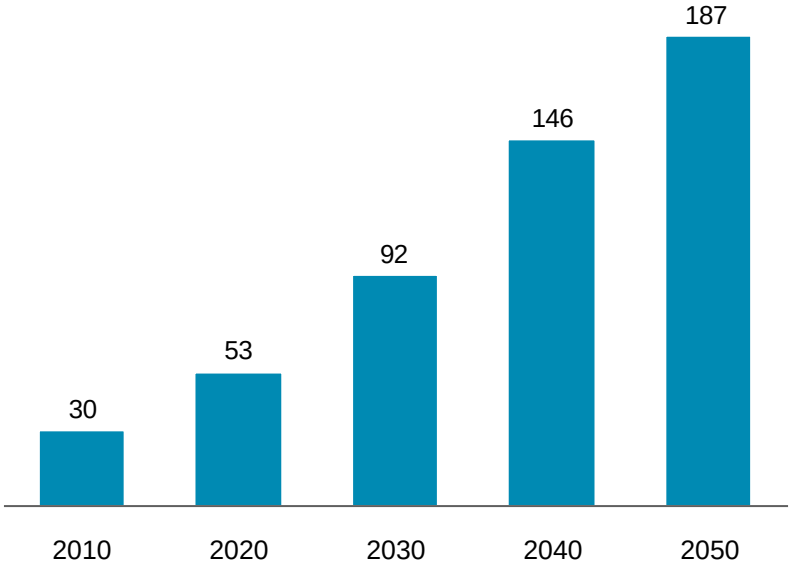
'000



- Current supply of >12K NH beds, majority (60-70%) found in VWO sector
- By 2020, expected total supply of 17K NH beds, driven by adding of new BoL NH beds
- Increase in beds aligned with development of broader services (e.g. day-care, home-care, integration with hospitals, etc.)

Prevalence of Dementia Cases in the Population

'000



- Dementia patients already constitute a significant share of nursing home residents
  - Proportion of residents with dementia increased from 25%-35% in 2006 to 50-60% in 2016
- Family/home care becomes increasingly difficult with dementia due to significant behavioural changes

Source: Singapore Ministry of Health, WHO, Alzheimer's Disease Association, Oliver Wyman analysis

Care Delivery Model

Medicalised, dormitory-style NHs came to prominence due to real estate constraints and govt's push towards standardisation and cost efficiencies

"Medicalised, Dormitory-style"

Pros of Current Model

- Efficient real estate footprint in land scarce Singapore
- Asian culture values togetherness and group living
- Lack of manpower and high cost of staff expenses favour current model
- Since most NH residents are subsidised, current standardised and cost efficient model stands up to public scrutiny

Cons of Current Model

- Elderly receive institutionalised care instead of personalised and home-like
- May not be suitable for residents with special needs, e.g. dementia
- Lack of autonomy, independence and empowerment of residents
- Lack of other choices in marketplace, as affluent society rapidly ages

Care services and infrastructure have been evolving, however, existing dormitory-style model continues to be adopted with enhancements in newer BOL homes

Image sources: www.channelnewsasia.com, www.straitstimes.com

Care Delivery Model – Need for Review

Given the dynamic socio-economic environment and changing expectations, balancing the costs and quality of care needs constant review

> *Policies may struggle to remain relevant to changing times. Current regulations emphasise financial accountability, building safety measure and hygiene. While they remain a basic standard, Singapore prospers socio-economically and evolves culturally,* ***standards have to improve to keep pace with rising expectations of quality care in an increasingly affluent society….. ..a "Plan by Cohort" system is essential for care to evolve with the changing requirements****. (T)he current cohort, having been through war and poverty, may accommodate dormitory-style living conditions, future generations born to affluence may not*

> *Nursing homes must look beyond the medical model and institution-based care and toward a holistic and humanistic approach grounded in residents' emotional and socio-psychological needs…****Such needs are mostly not adequately met by Singapore's nursing homes presently***

– Gabriel H.Z Wong, Weng Sun Pang, Philip Yap[1]
Department of Geriatric Medicine, Khoo Teck Puat Hospital

With a generational transformation, the expectation from nursing homes will not be limited to physical health but also include psychosocial well-being and dignity of living

1. Wong et al, 'A Paradigm Shift in Regulating and Running Nursing Homes in Singapore', 2014, Journal of American Medical Directors Association

3 Global Models and Case Studies

Elements of Nursing Home

We reviewed care models and found emphasis on habilitative care models, with single/ twin rooms and focus on social well-being in addition to attending to medical needs

Key Elements	Components	Global Best Practices
1 Infrastructure	Emulating a real home	• Private bedrooms and bathrooms • Open access to all areas in home • Shared common spaces for small groups
	Aging friendly infrastructure	• Small units for ease of monitoring • Ease of navigation around compound • Evidence-based aging design elements
2 Resident Dignity	Autonomy and control	• Self-directed daily schedule • Informed choices and involvement in care
	Purpose in life	• Participation in unit decisions • Programs for access to broader community • Family involvement in care
3 Individualised Care	Resident-centric systems and processes	• Regular resident-centred feedback to staff • Technology supporting aging care
	Consistent staffing	• Cross-trained caregivers involved in daily activities • Same caregiver providing individualised long-term care

Infrastructure – Room Standards and Sizes

Single or double occupancy rooms are the norm in developed countries, to allow for adequate privacy and dignity for elderly residents

Country	Maximum # person in a room	Minimum Size of room
Japan	2	10.65 m^2 per bed
UK	2	12 m^2 (Single) / 16 m^2 (Double)
Australia	2	14 m^2 (Single) / 27 m^2 (Double)
US	2	14 m^2 (Single) / 23 m^2 (Double)
Singapore	5	6 m^2 per bed

60-80% of rooms are single occupancy with double occupancy rooms used by couples

As compared to other developing countries, Singapore has the lowest thresholds for room size and houses most number of people in a room

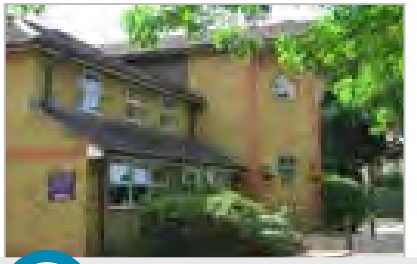
Sources: Australian Cost of Residential Aged Care Research, Service Costs in Modern Residential Aged Care Facilities, January 2012; US Nursing home care requirements, Code of Federal Regulations; UK DoH's Care Homes for Older People, Minimum National Standards, Care Home Standards, 3rd Edition; Japan: Regulating Long-Term Care Quality: An International Comparison 2014; Singapore: A Guidebook on Nursing Homes, MOH, 2002

Case Study – UK NH Evolution

Nursing home infrastructure has progressively evolved with new homes having larger single rooms with en-suites

1 Pre 1990 Original model

- Mainly conversions
- Mix of single and twin rooms
- Few en-suites



2 1990s 1st generation homes

- Purpose built
- Mostly en-suite WC and wash hand basin
- 10m² room sizes
- Mainly single

3 Post 2000s 2nd generation homes

- Purpose built
- Mostly en-suite WC and wash hand basin
- 10m² room sizes
- Mainly single

4 Post 2010 New generation homes

- Often 18-20m² + rooms with full en-suite wet rooms
- All single accommodation
- Wide variety of lounges, dining rooms and other communal areas
- Specialist therapy suites, sensory rooms and clinic areas
- Cinema rooms, cafés and shops

Today's home

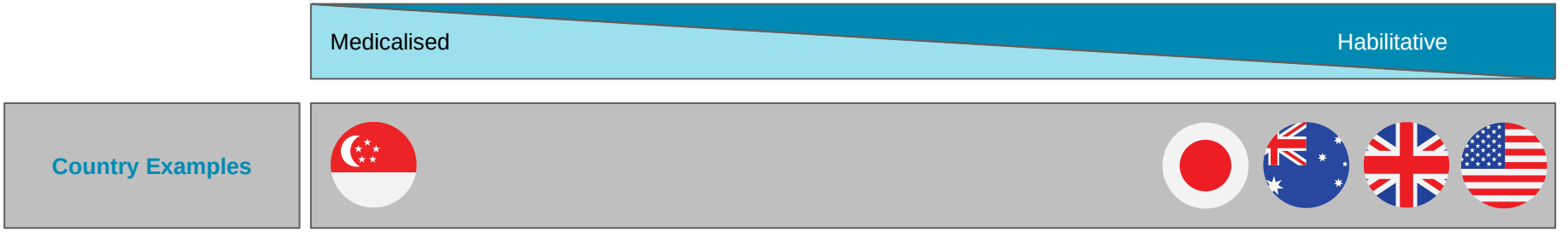
Source: Grant Thornton

Philosophy of Care

Nursing home models are seen at two ends of the spectrum, medicalised vs habilitative, with developed countries trending towards latter

Medicalised vs Habilitative Models of Care

	Traditional Medicalised	Habilitative
Size	Usually 120+ beds divided into 10-20 units or larger	7–10 elders
Philosophy	Medical model emphasising provision of clinical services to residents	Habilitative model emphasising intentional communities and a developmental view of aging
Organisation	Hierarchy – nurses control unit activity	Flattened bureaucracy – empowerment of direct care staff; nurses visit the house to provide skilled services
Privacy	Typically shared bedrooms and bathrooms	Private bedrooms and bathrooms
Outdoor space	Often challenging to access, particularly without assistance or supervision	Easy access; fenced, shaded, and in full view of the hearth and kitchen to allow observation by staff



Case Study – US Green House Project (1/3)

Green House Project is a de–institutionalization effort that restores individuals to a home in the community and is prime example of “habilitation”

“The Green House home is a self–contained residence, designed like a private home, housing 7–10 elders (12 with a financial hardship exception), each with his/her own bedroom and full bathroom. The physical space is not meant to be “homelike,” but to be a home.”

Essence of a Green House Home

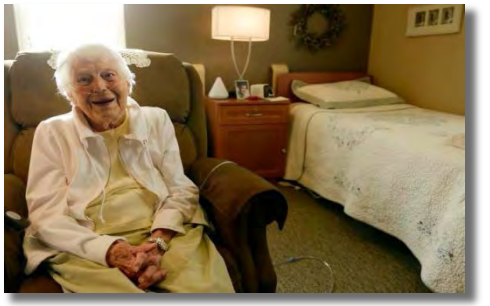
1	**Care Philosophy**	• Combines small homes with the full range of personal care and clinical services expected in high–quality nursing homes
2	**Financial Viability**	• Moves hours from segregated roles and department structures typically found in traditional nursing homes to a versatile Shahbaz role and self-managed work teams. • Its aggregate costs are also equal to or less than costs in conventional nursing homes.
3	**Self-Managed Work Team**	• Staffed by a self–managed work team of Shahbazim. The team shares all care and household responsibilities
4	**Architecture**	• Designed to be similar to homes in which elders would have lived in their community.
5	**Technology Enablement**	• Technology and special design features are used to enhance privacy, independence and safety as follows: medical records, communications systems, kitchen safety

Source: Sharkey S., Hudak S., Horn S. “Analysis of Staff Workflow in Traditional Nursing Homes & THE GREEN HOUSE® Project Sites” 2009.

Case Study – US Green House Project (2/3)

The Green House model, adopted by various nursing homes, enables a thriving and interactive life for the elderly

Bedrooms enabling privacy and personalisation



Household areas fostering small communities

Small kitchenettes / dining areas enabling semi-independent daily activities

Source: Green House Project reports

Case Study – US Green House Project (3/3)

Evaluations across numerous measures of quality of life quality of care and satisfaction have shown positive outcomes relative to the standard model

Green House Outcomes

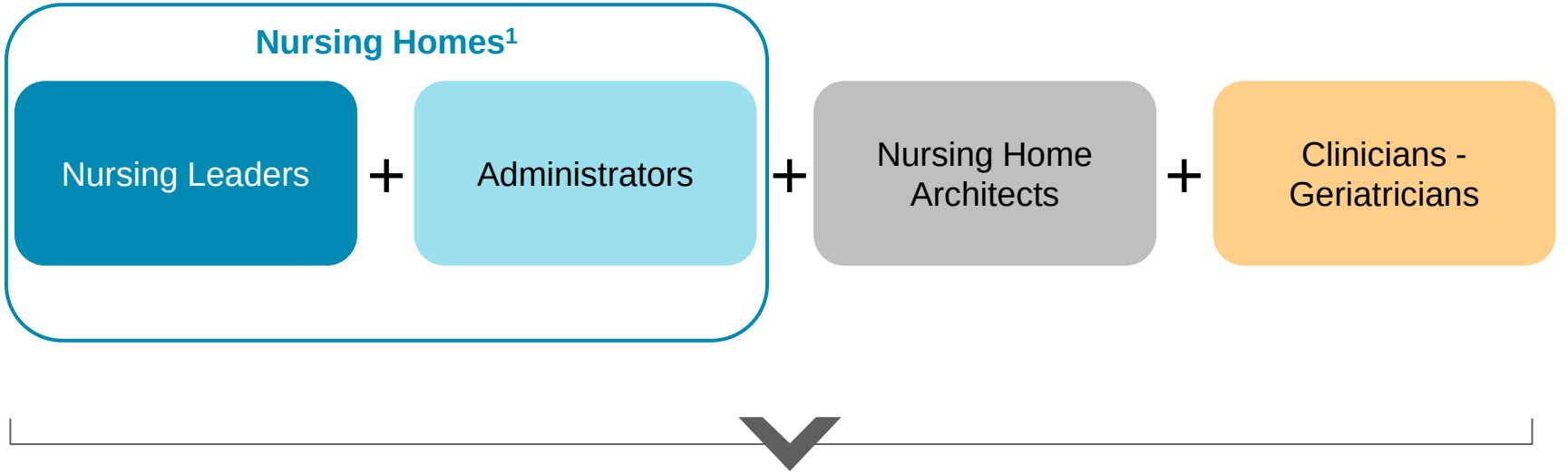
✓ Elders reported **improvement in seven domains of quality of life** (privacy, dignity, meaningful activity, relationship, autonomy, food enjoyment and individuality) and emotional well-being	**Improved Quality of Life**
✓ Elders **maintained self-care abilities longer** with **fewer experiencing decline** **in late-loss Activities of Daily Living** ✓ Among elders **fewer experienced depression**, being bedfast and having little or no activity ✓ 23–31 minutes **more in staff time spent on direct care activities** per resident day without increasing overall staff time ✓ **4x increase in staff time spent engaging with elders** (outside of direct care activities) in Green House settings ✓ **High level of direct care worker familiarity with elders** led to very early identification of changes in condition, facilitating timely intervention ✓ **Fewer in-house acquired pressure ulcers** in Green House homes	**Improved Quality of Care**
✓ Families were **more satisfied** with general amenities, meals, housekeeping, physical environment, privacy, autonomy and health care ✓ Staff reported **higher job satisfaction** and increased likelihood of remaining in their jobs	**Improved Satisfaction**

Source: Green House Project review reports

4 Model ‘Silver Hope’

Model ‘Silver Hope’

In evaluating the economic impact of transitioning, we worked with 5 nursing homes and engaged with experts in nursing home operations, architecture and geriatricians



1. 5 Nursing Homes in Singapore

Silver Hope – Overview

Nursing home and clinical experts recommend a ‘de-medicalised’ model enabling elderly to lead functional and enabling lifestyle in nursing homes

	Key Principles of ‘Silver Hope’
1	Recognising and valuing **individuality** of elders and staff
2	Honouring **autonomy** and choice
3	Supporting elders’ **dignity**
4	Offering opportunities for **reciprocal relationship between elders and staff**
5	Providing supporting environment for **meaningful activities amongst the elderly**
6	Promoting maximum **functional independence**
7	Facilitating not only physical but also **psychosocial comfort**
8	Creating small ‘households’ where residents share greater **bonding** and actively help each other
9	Providing opportunities to develop ‘**personal living environment’** as experienced in a home
10	Offering **comprehensive care**

Sources: Interviews with local and international nursing home leaders, nursing leaders, geriatricians

Silver Hope – Philosophy of Care (1/2)

The model 'Silver Hope' is built on the habilitative care framework focusing on homely, personalised care with dignity

	Standard, medicalised, dormitory-style	Model 'Silver Hope'
Environment	• Institutional, hospital ward setting	• Residential, homely environment and small group setting
Nursing Care	• Emphasis on the provision of nursing care and assistance in ADL	• Emphasis on person-centred care and aging with dignity
Types of Wards/Rooms	• Typically open wards or 8-15 bedded wards • Wards are segregated by gender	• Single / twin-sharing, for added privacy • Twin-sharing rooms may be used by couples or siblings
Size of Rooms	• Follows MOH's proposed minimum space of 6m^2 per patient bed	• Single Room: 12-16 m^2 • Twin-sharing Room: 21-24 m^2
Independence / Autonomy / Personalisation	• Activities, including waking, sleeping, eating and bathing are scheduled • Limited space for personal items	• More autonomy in choice of activities, including waking, sleeping and bathing • Ample place for personal items/effects

Sources: MOH Guidebook on Nursing Homes, Interviews with nursing home leaders, nursing leaders and geriatricians

Silver Hope – Philosophy of Care (2/2)

Habilitative, personalised type of care provides home-like living and encourages autonomy and independence of residents

	Standard, medicalised, dormitory-style	Model 'Silver Hope'
Care Structure / Staff	• Nurses provide direct care to the residents and act as case managers	• Care teams manage the day-to-day care of small groups of residents in partnership with HCPs
Kitchen	• Central kitchen, off limits to residents and visitors	• Residents and visitors have access and may participate in meal preparation • One pantry and dining area per cluster
Dining	• Residents have their food served individually. Some are assigned their own table and lapboard.	• Dining room encourages interaction between residents/family/friends
Facilities	• Activity rooms, therapy rooms and rehabilitation centre	• Activity rooms, therapy rooms, fitness gym, outdoor exercise corner, Dementia Day Care, garden, cafe with al-fresco dining, grocery store, hair salon
Bathrooms	• Typically shared bathrooms • 1 WC, 1 shower, 2 wash basins to 16 beds[1]	• Ensuite bathrooms for better privacy • 1 WC, 1 shower, 1 wash basin to 1 or 2 beds

Sources: MOH Guidebook on Nursing Homes, Interviews with nursing home leaders, nursing leaders and geriatricians

Silver Hope – Staffing Approach

Person-directed care and enablement are to be at the core in developing staffing norms and roles in Silver Hope

Traditional Nursing Home Model

'Silver Hope' Nursing Home Model

Provider Directed

- Administration makes most decisions
- Focus on managing resources and costs
- Little consideration of impact on residents

- Staff focus on residents' compliance with nursing homes rules and schedules

Staff Centred

- Staff consult residents when making decisions
- However, focus on optimising staffing schedules and costs

- Staff offer residents some choice within existing routines and options

Resident Centred

- Resident preferences form basis of decision making about some routines

- Staff begin to organise to accommodate residents' preferences

Resident Directed

- Residents make decisions about individual routines
- When not capable of articulation, staff honour lifelong habits and preferences

- Staff organise hours, patterns and assignments to meet residents' needs

Sources: With inputs from Singapore nursing homes and US-based Jewish Home

Silver Hope – Staffing Model (2/2)

Single point of contact and staff empowerment change the paradigm of care with greater responsiveness to non-clinical needs of patients

Staffing Model

Nursing Roving Team

Ancillary Support Roving Team

Key Features

- The clinical staff become the **clinical roving support** team
- Nursing officers and nursing aides visit the household on a scheduled basis and meet the clinical needs of the elders as required

- Each household of 8-10 residents functions semi-independently with **consistent and dedicated staffing by a trained Senior Care Associate (SCA)**
- By virtue of being the **single point of contact** for the household, the SCA and residents develop **greater bonding** and have **better communication**
- The SCA assumes a **multi-functional role** and supports eldercare, housekeeping, etc. providing the majority of direct contact with the resident
- The SCA **partners with the roving teams** for clinical and ancillary support to ensure care planning is done in timely manner and there is compliance from the elderly
- The SCA also **actively engages** the residents for daily activities, and supports them towards greater enablement

- Ancillary support stays similar, on an as needed basis
- However, it is **coordinated by the SCA** in alignment with residents' preferences

"With SCA being the pivot of all care needs, residents are expected to have greater commitment as they see someone responsible for them and they don't want to let him/her down"

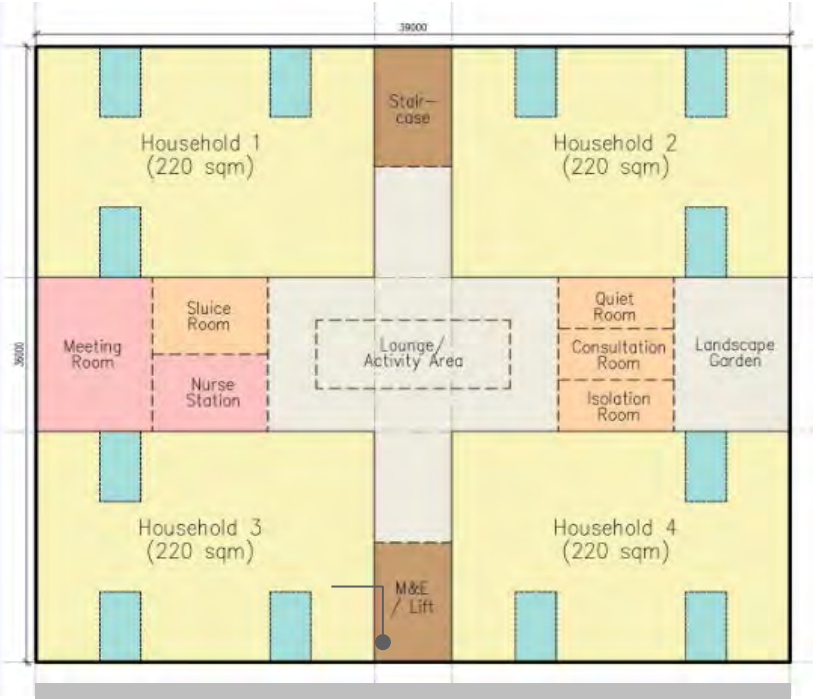
Silver Hope – Layout

With smart space planning, Silver Hope creates self-contained households of 10 residents in single /double rooms mirroring HDB master bed rooms

1x Household (of no more than 10 residents)

- Only single/double beds (in 20:80 ratio) within home-like setting.
- En-suite bedrooms modelled after typical HDB's master bedrooms, for elders to have familiarity
- Self-contained units with dining and living facilities, encouraging independence, autonomy and personalisation

1x floorplate



- **Size of household: ~220m²**
- **Total number of beds: 40 (4x10)**
- **Total floor plate area: ~1,400m²**

(compared to ~1200 m² for BoL standard floor plate)

~20% increase in space requirement due to more space per resident and fewer residents per floor

Notes: Proposed single rooms sizes (21 m²) are smaller than single room sizes generally seen in private single hospital rooms (~30-40 m²)); BoL NH sizes are estimates by expert architects
Source: Prominent NH advisor/operator and architect

5 Cost Analysis and Comparison

Overall Cost Structure

We categorised all costs in 4 main categories – Healthcare, living, accommodation and administration

	Cost Category	Description	Components (including staff and supplies)
1	**Healthcare**	Costs pertaining to direct nursing and medical care of patients	• Staff involved in Patient Care • Nursing and Medical Incidentals • Rehab • Others
2	**Living**	Costs pertaining to overall operational support services	• Catering • Housekeeping and Cleaning • Laundry • Others
3	**Administration**	Costs pertaining to general administration	• Administrative Staff and Supplies • IT • Any other overheads
4	**Accommodation**	Costs pertaining to infrastructure construction, utilisation and maintenance	• Property Acquisition – Real estate and construction, depreciation/rental • Property Maintenance • Fittings, Furniture and Equipment (FFE) Acquisition – Depreciation / Rental • FFE Maintenance • Utilities

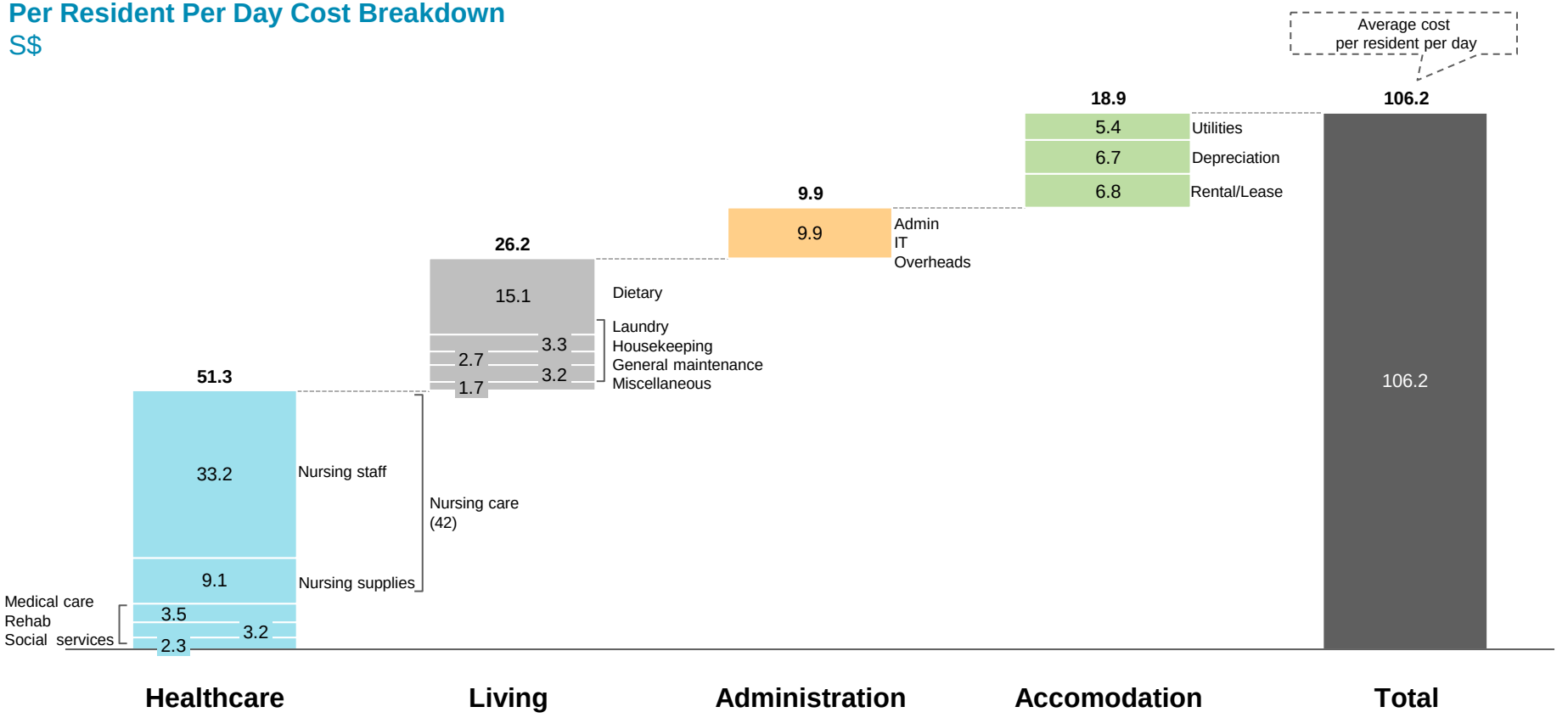
Note: For the purposes of analyses, the staffing and supplies components have been taken together as some NHs provide select services in-house whereas some NHs outsource them

Current Cost Structure – Deep Dive

Direct care provision accounts for almost half of the costs with nursing staffing contributing to a third of total costs

Per Resident Per Day Cost Breakdown

S$



Notes

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2. Costs indicated are incurred costs without taking any subsidies or grants into consideration
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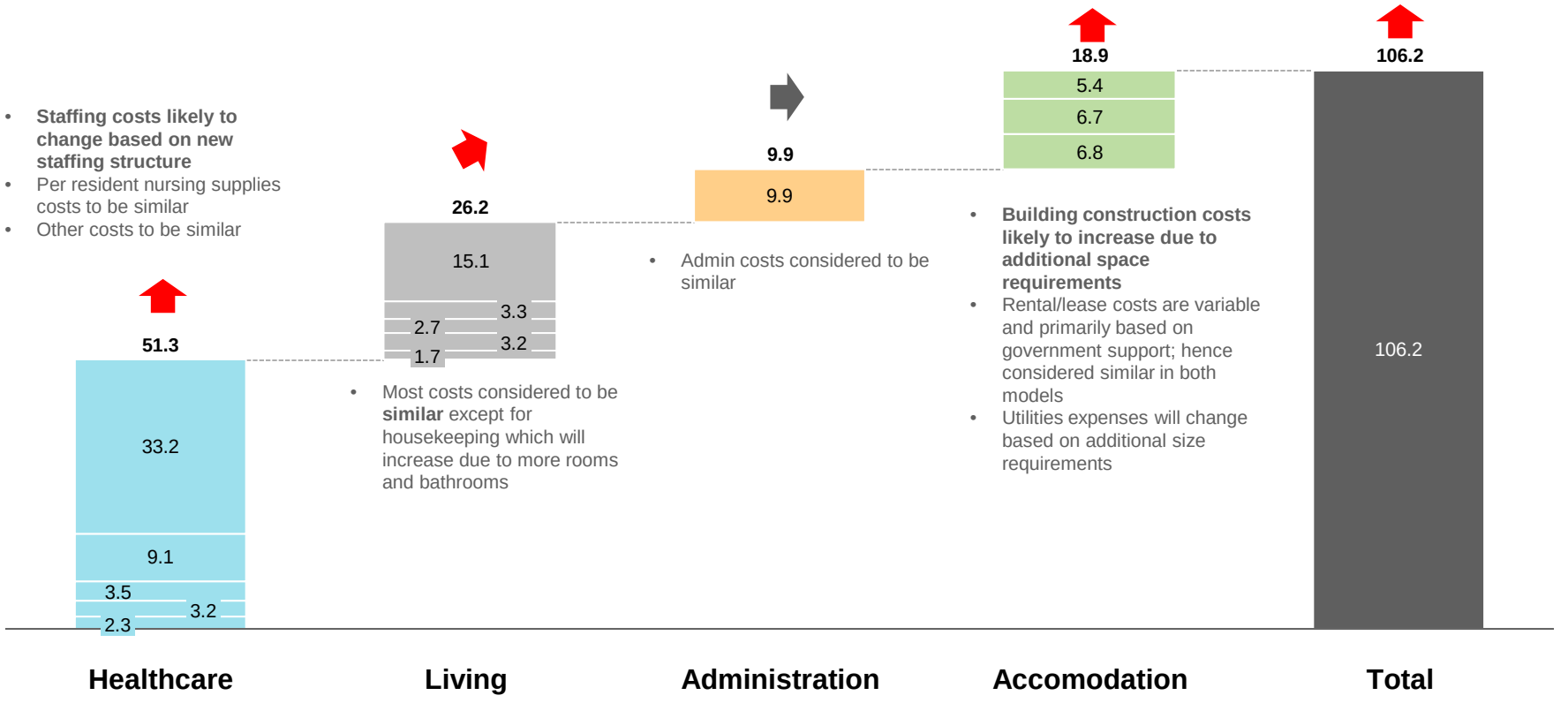
4. Depreciation costs here include the furniture, fittings and equipment; and estimated building costs (based on current construction benchmarks)
5. Rental/lease arrangements with parent group. Other nursing homes in the study had rental subventions in the range of $0.9-1.2M
6. Across the 5 nursing homes, average per resident per day costs are in range of $90-120

Silver Hope Cost Structure – Hypothesis

Changes in staffing structure, greater requirement of space and higher construction costs will be the major cost drivers for the new model

Per Resident Per Day Cost Breakdown

S$



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Silver Hope – Nursing Staffing Costs

Nursing costs will increase by $1-2 for non-dementia patients and $6-7 for dementia patients, with staff experience and skills as key cost drivers

Silver Hope Staffing Model

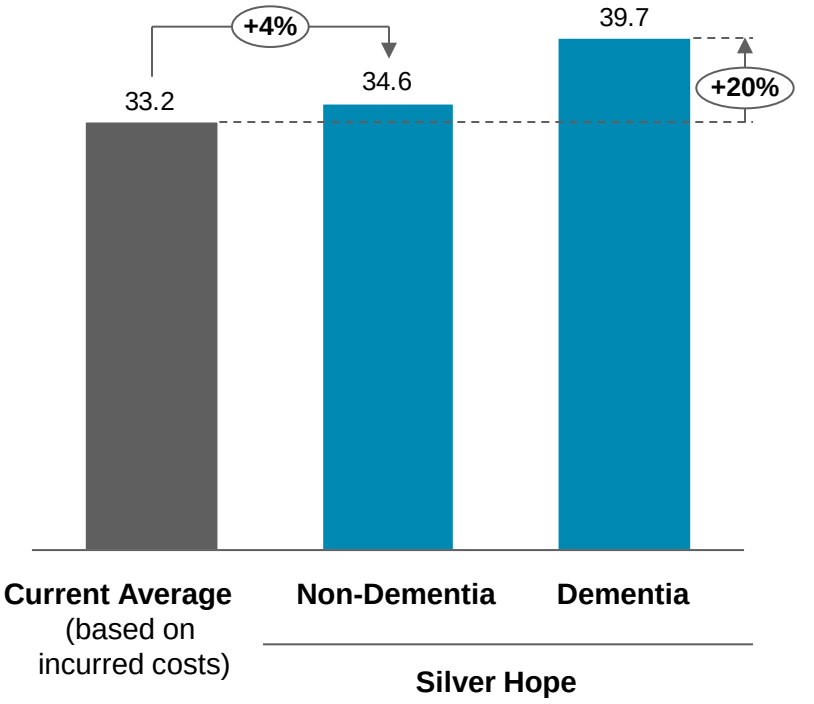
- Silver Hope proposes to use **similar staff to resident ratio across all RAF categories**
  - Similar to staffing practices internationally
  - NHs have given feedback that a uniform staffing ratio is more pragmatic
- Dementia households **allocated 25% more Senior Care Associates and Nursing Aides** as they require more staff contact time for communication and supervision

Proposed staffing based on household of 10 residents[1]

1 x Senior Care Associate	: 1 household
1 x Nursing Aide	: 1 household
1 x Nursing Officer	: 3 households

Per Resident Per Day Nursing Staff Costs

S$



Note: Actual salary costs will vary based on experience of staff

Notes:
1. As recommended by experienced nursing home administrators

Silver Hope – Construction Costs

~45% higher capital outlay is expected due to increased floor area and construction cost; depreciated over 30-years, absolute cost differential with new standard nursing homes on per resident per day basis is $2-3

For construction costs, we compared the Silver Hope model:

- **With newer NHs** as existing NHs were constructed many years prior, and hence costs are not directly comparable
- On the basis of **residential floor-plate area** only as non-residential areas (rehab, kitchen, office etc) are considered similar in both cases

Model	Floorplate area (sqm)	# Residents on 1 floorplate	Floorplate area per resident (sqm)	Construction rate ($/sqm)	Floorplate construction cost ($ million)	Cost per resident day ($)	Increase from standard layout (%)
New Nursing Homes (Standard layout)	1200	42	28.6	$1800[1,3]	$2.16 M	**$4.70**	
Silver Hope	1400	40	35	$2160[2,3]	$3.02 M	**$6.90**	**46%[4]**

Assumptions

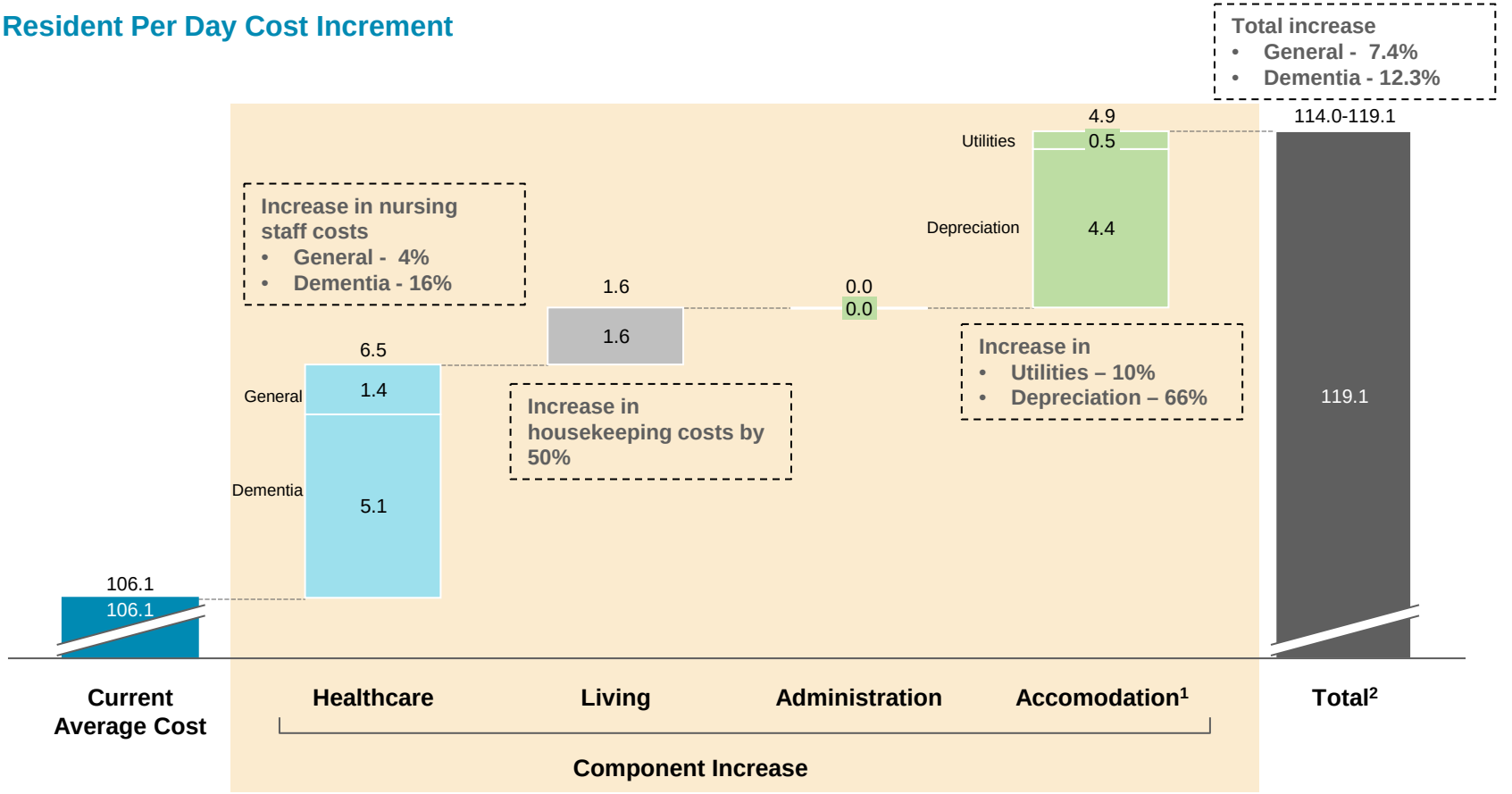
1. Nursing home benchmark construction costs are an average of low and high QS benchmarks; Source: Langdon and Seah (Arcadis) Construction Cost Handbook Singapore 2016
2. Consensus of 3 expert architects that additional features such as walls and en-suite toilets will increase construction costs by 20%
3. Stated costs are guides for preliminary cost appraisals and budgeting. Stated costs are based on construction floor areas measured to the outside face of the external walls. Actual cost of a building will depend upon the design and many other factors such as structural system, project complexity, site encumbrances, need for special structures, types of temporary works required, method of construction, selection of contractor, shape of existing site, level of green-mark rating etc. Stated costs exclude professional fees, authorities' charges, land cost, financing charges, site inspectorate, admin expenses, legal costs, preparation of site including demolition of existing building, external works, prefabricated construction and GST
4. Assuming 10% additional costs for design and build and FFE, the increment is estimated at 66% ($4.4)

Silver Hope – Cost Increment

Silver Hope is expected to cost $8-13 more than the average current cost, on a per resident per day basis; with the higher differential for dementia cases

Per Resident Per Day Cost Increment

S$



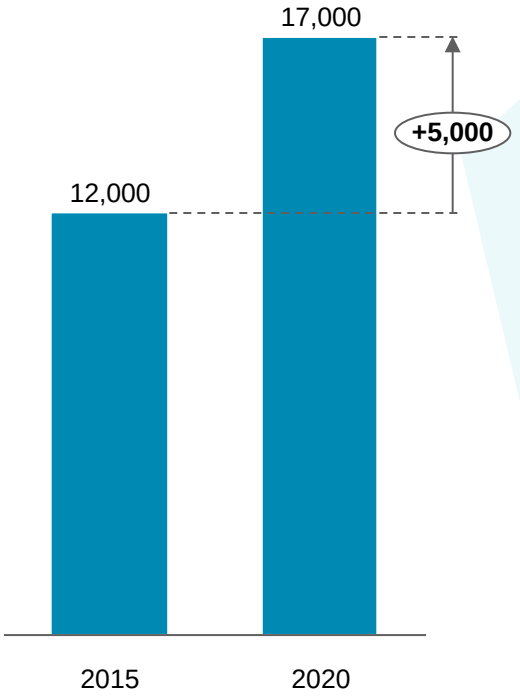
Notes

1. Real estate rental/lease costs will increase due to requirement of larger area. The NHs in the study incurred rental costs in the range of $0.9-1.2 M, most of which was subvented by the government. Given the high variability in real estate costs based on the location, any incremental costs are not considered in the calculations
2. Excluding incremental real estate rental/lease costs

Silver Hope – Implications for National Spending

Assuming that projected supply of 5K new beds is built on Silver Hope model, the annual costs would increase by $19M

Projected Increase in Supply
beds, 2015-2020



Assumptions

- All new 5000 beds are built on Silver Hope model
- Mixed single and double rooms in 20:80 ratio
- 50% of the beds are for dementia patients
- Incremental per resident per day costs for:
  - Non-dementia $8
  - Dementia $13

Impact

Annual Incremental Cost

~$19 M

which equates to

0.2%

of MOH Budget (~$11 Billion)

Source: OW analysis, Singapore 2016 Budget

6 Appendices

6.1 Single vs Shared Rooms

Single vs Shared Rooms – Patient and Staff Perspectives

While there are certain benefits to both single and shared rooms, studies have shown that elderly prefer single rooms for 'home-like' comfort

Feature	Single Room	Shared Room
Patient experiences	• **Control** – enhanced privacy and freedom- 'at home' • **Comfort** – en-suite convenience, rest and sleep • Absence of negative 'community' dynamics – confused or disruptive patients	• **Security** – visibility and staff proximity • **Community** – patient camaraderie
Staff experiences	• Privacy, dignity and confidentiality: **more personalised patient care** • Improved room design - **improved care delivery** • Improved ward layout and design – **more efficient and safe** • Reduced risk of infection	• **Visibility** – enhanced surveillance and monitoring • **Teamwork** and communication • Facilitation of **social contact** between patients

International survey shows, as a cohort, older adults, prefer private over shared rooms by ratio of

20:1

Newer models, as shown in subsequent pages, have shown that the softer advantages of shared rooms can be replicated in single rooms through:

- **Better designs and layouts** of the rooms as well as the wards
- **Redesigned care processes** and nursing movements
- **Adoption of technology** for monitoring and surveillance

Source: Maben et al, One Size Fits all? Mixed methods evaluation of the impact of 100% single room accommodation on staff and patient experience, safety and costs , 2015, BMJ Quality and Safety; Margaret Calkins, Private Bedrooms in Nursing Homes: Benefits, Disadvantages and Costs

Single vs Shared Rooms – Clinician Perspectives

While the dorm model delivers adequate medical care, it is considered inadequate to ensure quality of life and respectful living for the elderly

> *Imagine being someone who is cognitively intact but you're in the nursing home for some physical disabilities. Just as you are about to read your book you realize that the people surrounding you, some are bedbound with nasogastric tubes sticking out, others are trashing around wildly.* ***The experience can actually be very traumatic for the mind.*** *Even if you put two people who are cognitively intact, they are more likely to end up fighting as well*

– Geriatrician, Singapore Restructured Hospital

> ***People with dementia need an environment*** *in which they can explore and find their* ***own personal space****. Environments that are* ***restrictive can cause challenging behaviour*** *because conflict arises from people getting in each other's way*

– Krishnamoorthy and Anderson

Source: Interviews with geriatricians, Krishnamoorthy and Anderson, 'Managing challenging behaviour in older adults with dementia, 2011, Progress in Neurology and Psychiatry

Single Rooms – Clinical Outcomes (1/2)

Evidence suggests that single rooms facilitate better outcomes, particularly in nosocomial infections, potentially lowering clinical costs

1 Cross-infection of airborne diseases

- Studies have shown that placing patients in single-rooms safer than housing them in multi-bed spaces
- Ability to isolate cases in pandemics

2 Risk of infections acquired by contact

- Multi-bed rooms far difficult to decontaminate than single rooms
- Different staff members touching the same contaminated surfaces increases risk of staff unknowingly getting contaminated in a multi-bed room

3 Mental health and well-being

- Negative impact on sleep in shared rooms due to noise (from other patients and staff)
- Conflict with room-mates in shared rooms risk escalation of mental health issues

4 Falls

- Rate likely to be the same in private and multi-bed rooms
- Suggestions that room-mates may alert and hence prevent falls, but no empirical evidence

3.07x
Higher risk of acquiring pneumonia in multi-bed rooms

3.5%
Excess mortality with Influenza A in multi-bed rooms

5x
Higher risk of developing acute non-bacterial gastroenteritis in multi-bed room during an outbreak

Source: Private Bedrooms in Nursing Homes: Benefits, Disadvantages, and Costs - Margaret P. Calkins

Single Rooms – Clinical Outcomes (2/2)

Greater enablement of residents and cultural change in staff, facilitated by single rooms, shows positive clinical outcomes across multiple measures

The Sarah Neuman Center is the Westchester campus of Jewish Home which is pioneering the 'Small House' concept for long-term nursing care. In addition to a highly trained staff, Sarah Neuman features an abundance of private rooms, dining options, beautiful gardens and lounge to enhance the stay of the elderly

Clinical Measures and Outcomes	Skilled Nursing Facility Average	Sarah Neuman Center	
% high risk residents who have pressure ulcers	5.7%	4%	↓
% of residents with urinary infection	1.7%	2.3%	
% of residents with excessive weight loss	7.9%	7.8%	
% of residents whose need for help with daily activities has increased	10.8	7.0	↓
% of residents with loss of bowel/bladder control	41.5%	15.5%	↓
% of residents self reporting moderate to severe pain	0.7%	0%	
% of residents with falls leading to major injury	4.6%	3.0%	↓
% of long-stay residents using anti-psychotics	19.8%	11.3%	↓
% of hospitalisation	1.1%	1%	
% of residents with nosocomial pressure ulcers (Stagell or greater)	0.2%	0%	
% of residents with falls	4.2%	4.4%	

Source: Data provided by Sarah Neuman Center

Single vs Shared Rooms – Operational Costs

International studies suggest that there is only a small difference in operational costs between single and shared rooms

Opex Impact – Findings from US-based study

Cost Item	Single/Private Room NH (vs Traditional NH)	Remarks
Nursing Staff FTE		Increased by 3%
Nursing Staff Cost		Increased by 2.7%
Opportunity Cost		Associated with increased time spent by nurses in walking in a private room configuration
Maintenance Cost		No evidence of difference
Meals Prep Cost		No evidence of difference
Cleaning Cost		53% higher in single bedroom

Single rooms can have additional **advantages in indirect costs related conflict resolution**.

It is estimated that **staff spent 2-25 hrs/week on managing room-mate conflicts** with further domino effects related to explanation to families and relocation of residents

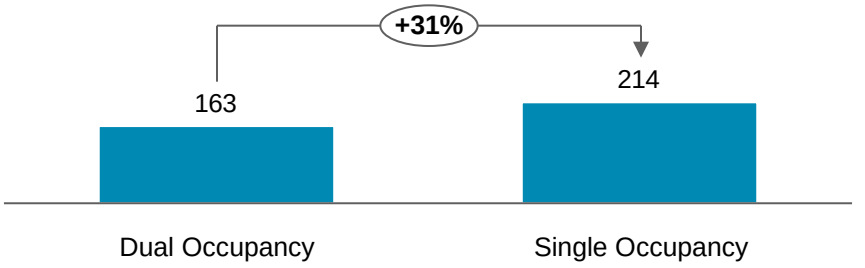
Source: Private Bedrooms in Nursing Homes: Benefits, Disadvantages, and Costs - Margaret P. Calkins (IDEAS Institute, Kirtland OH); OW interviews

Single vs Shared Rooms – Capital Costs

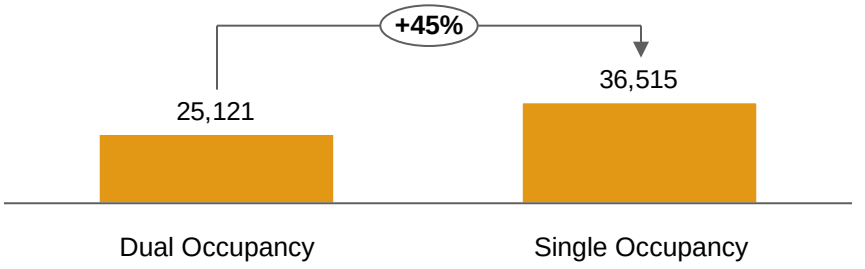
Studies show that construction costs of single rooms are ~45% higher but can be recouped within 2-yrs with only US$23 higher per person-day charges

Findings from US-based study of 189 bedrooms to compare construction costs of different bedroom configurations

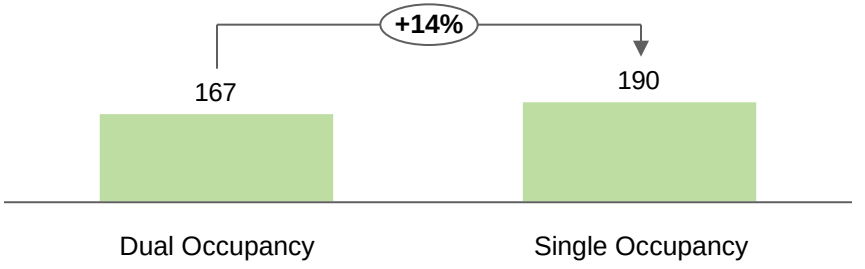
Average Space per Person (sq ft)



Average Construction (+ Debt) Cost Per Person ($)



Average Rate Per Person Per Day ($)



<2 years to recoup construction costs for single bedrooms

Source: Private Bedrooms in Nursing Homes: Benefits, Disadvantages, and Costs - Margaret P. Calkins (IDEAS Institute)

6.2 Case Study – US Green House Project

Case Study – US Green House Project (1/6)
De–institutionalization effort that restores individuals to a home in the community and is prime example of “habilitation”

“The Green House home is a self–contained residence, designed like a private home, housing 7–10 elders (12 with a financial hardship exception), each with his/her own bedroom and full bathroom. The physical space is not meant to be “homelike,” but to be a home.”

Essence of a Green House Home

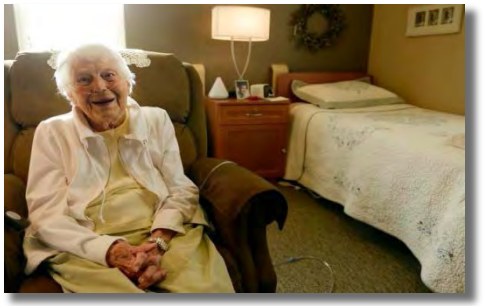
1	**Care Philosophy**	• Combines small homes with the full range of personal care and clinical services expected in high–quality nursing homes
2	**Financial Viability**	• Moves hours from segregated roles and department structures typically found in traditional nursing homes to a versatile Shahbaz role and self-managed work teams. • Its aggregate costs are also equal to or less than costs in conventional nursing homes.
3	**Self-Managed Work Team**	• Staffed by a self–managed work team of Shahbazim. The team shares all care and household responsibilities
4	**Architecture**	• Designed to be similar to homes in which elders would have lived in their community.
5	**Technology Enablement**	• Technology and special design features are used to enhance privacy, independence and safety as follows: medical records, communications systems, kitchen safety

Source: Sharkey S., Hudak S., Horn S. “Analysis of Staff Workflow in Traditional Nursing Homes & THE GREEN HOUSE® Project Sites” 2009.

Case Study – US Green House Project (2/6)

The Green House model, adopted by various nursing homes, enables a thriving and interactive life for the elderly

Bedrooms enabling privacy and personalisation



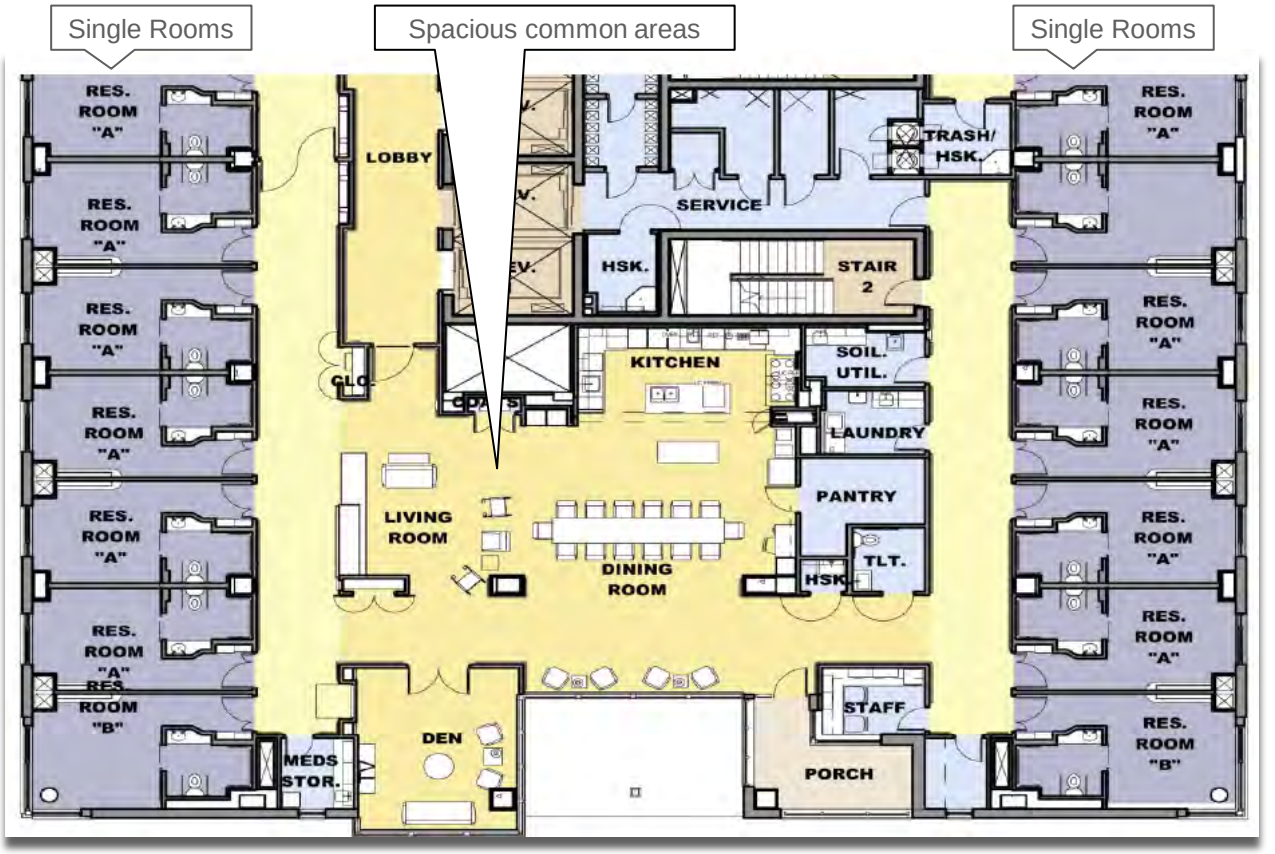
Household areas fostering small communities

Small kitchenettes / dining areas enabling semi-independent daily activities

Source: Green House Project reports

Case Study – US Green House Project (3/6)
Illustration of space layout with single bedrooms and common spaces

Space Layout



Floor Size of 12-resident Green House (1/2 floor)

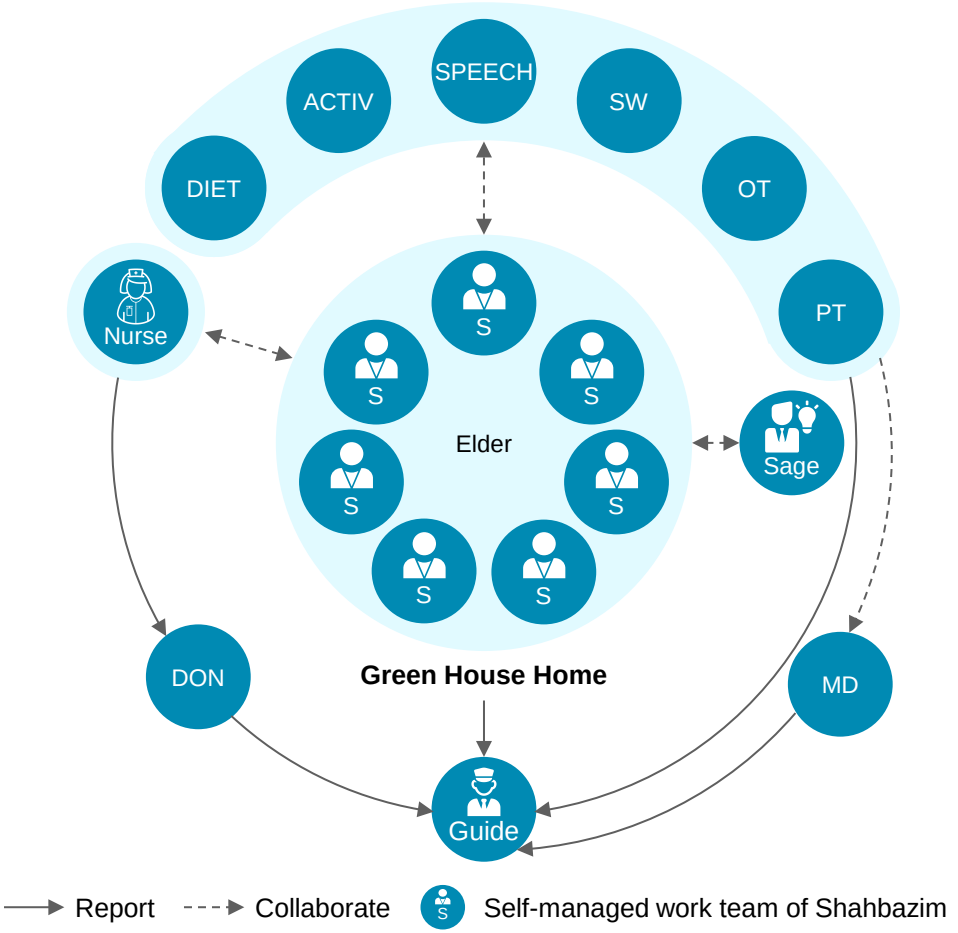
Room	sq.ft.
• Bedrooms	242
• Den	294
• Dining room	409
• Kitchen	355
• Living Room	384
Total	**7,760**

The Green House Project provides the conceptual framework for space layout and allows for flexibility in design and customisation in individual nursing homes

Case Study – US Green House Project (4/6)

Self–managed work team structure is in place, with the Shahbazim at the heart of providing habilitative care to the elders

Organisation Structure and Design of The Green House Model



Source: "Guide Book for Transforming Long-term Care" (The Green House Project, 2010)

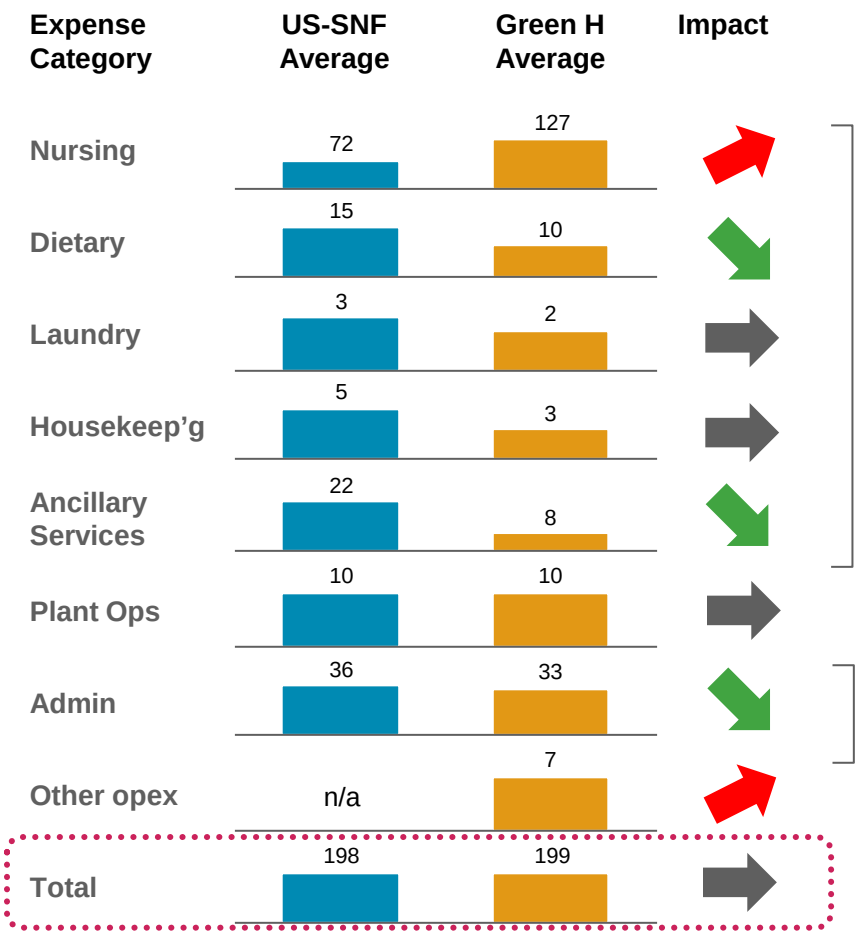
Remarks

- Typical staffing (10 elder home)
  - Day and evening shifts: 2 Shahbazim per house and 1 nurse per 2 houses
  - Night shift: 1 Shahbaz per house and 1 nurse to 2–3 houses
- Specially trained certified nursing assistants, Shahbazim staff each residence and provide a wide range of assistance, including: personal care, activities, meal preparation and service, light housekeeping, and laundry
- Supported by a clinical support team (nurses, social workers, activities experts, therapists, nutritionists, a medical director, and a pharmacist)
- The Guide is responsible for the overall operations and quality of services
- The Sage, a local community elder who volunteers as a trusted advisor to the Shahbazim and elders
- Nurses meet the clinical needs of the elders (~1.2 hours per elder per day) in partnership with the Shahbazim (4 hours per elder per day)

Case Study – US Green House Project (5/6)

Greenhouse model provides evidence that with changes in nursing practices and culture, costs can be comparable to traditional nursing homes

Operational Costs – Per Resident Day
USD, 2009



- Increase in direct care FTE in terms of nurses and nursing aides
- Utilisation of Shahbazim impacts cost distribution across cost centres
  - Shahbazim costs are captured in nursing cost centre
  - However, in addition to fulfilling the role of Nursing Aide, the Shahbazim also performs functions traditionally categorised in
    - Dietary
    - Laundry
    - Housekeeping
    - Ancillary services

Decrease in admin FTE because of increased role of direct care staff in coordinating care and maintaining records

<1% increase in operating cost difference

Case Study – US Green House Project (6/6)

Evaluations across numerous measures of quality of life quality of care and satisfaction have shown positive outcomes relative to the standard model

Green House Outcomes

✓ Elders reported **improvement in seven domains of quality of life** (privacy, dignity, meaningful activity, relationship, autonomy, food enjoyment and individuality) and emotional well-being	**Improved Quality of Life**
✓ Elders **maintained self-care abilities longer** with **fewer experiencing decline** **in late-loss Activities of Daily Living** ✓ Among elders **fewer experienced depression**, being bedfast and having little or no activity ✓ 23–31 minutes **more in staff time spent on direct care activities** per resident day without increasing overall staff time ✓ **4x increase in staff time spent engaging with elders** (outside of direct care activities) in Green House settings ✓ **High level of direct care worker familiarity with elders** led to very early identification of changes in condition, facilitating timely intervention ✓ **Fewer in-house acquired pressure ulcers** in Green House homes	**Improved Quality of Care**
✓ Families were **more satisfied** with general amenities, meals, housekeeping, physical environment, privacy, autonomy and health care ✓ Staff reported **higher job satisfaction** and increased likelihood of remaining in their jobs	**Improved Satisfaction**

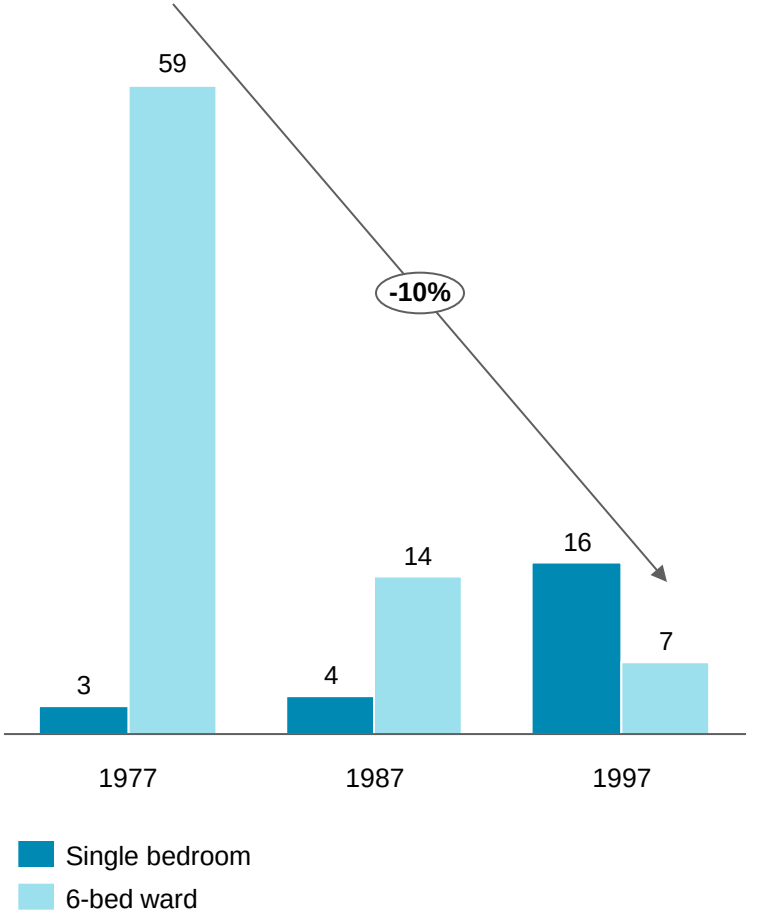
Source: Green House Project review reports

6.3 Case Study – Japan’s Experience with Single Rooms

Single Bedrooms in Nursing Homes

Japan started with 6-bed wards in the 70s and has evolved towards the single bedrooms since late 90s

Single bedrooms vs 6-bed wards
% of total long-term care beds



Evolution of long-term care bedroom configurations

Decade	Mainstream Trend
1970s	6-bedder wards
1980s	4-bedroom wards
1990s	4-bedroom wards but strong emergence of single bedrooms
2000 -	**Single bedrooms**

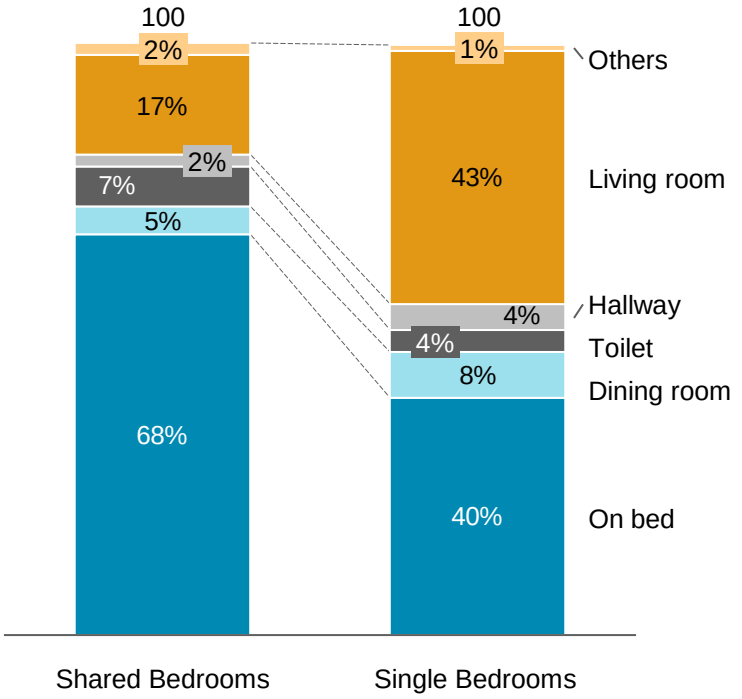
Source: Dr Tadashi Toyama, A Study on the Introduction of Private Rooms and Small Scale Units at Long Term Care Insurance Facilities.

Resident Autonomy

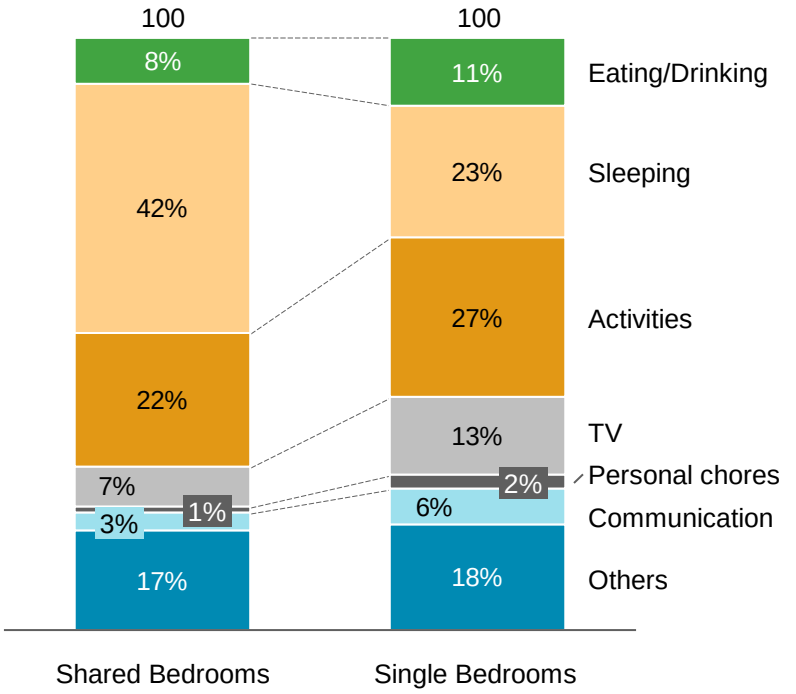
Japanese experience shows that transition to single bedrooms was accompanied with greater degree of active living by residents

Time Spent by Residents by Location

%



Time Spent by Residents by Activity



Contrary to concerns of isolation, residents living in single rooms spend more time in active areas

Source: Dr Tadashi Toyama, A Study on the Introduction of Private Rooms and Small Scale Units at Long Term Care Insurance Facilities.

6.4 Case Study – Dementia

Dementia – Living Space Recommendations

US Alzheimer's Foundation endorses the following six key features of design of living spaces for patients, mirroring the Green House model

1	**Living Clusters**		Create small-sized groups of people, forming clusters or "households" of 10 to 14 residents.
2	**Home-like Living**		Provide small group spaces that are distinctive, like in a home, e.g. designated zones for pastimes, dining, cooking, watching television, etc.
3	**Communal Spaces**		Provide small private or semi-private group gathering spaces so residents can spend time with visitors outside of their bedrooms. These spaces can also be used for family conferences, holiday parties, staff meetings/training, community support groups, etc.
4	**Personalisation**		To promote personalization of the residents' bedrooms – provide each resident with a private bedroom where the person can be alone and keep personal belongings, helping the resident to feel secure and express a degree of territoriality.
5	**Private Bathrooms**		In each bedroom, include an attached private bathroom which are much less institutional than shared or group bathrooms.
6	**Personal Space**		Just as it is important for facilities to include areas that support resident activity and engagement, it is also necessary to provide quiet, peaceful spaces – allowing for focused and appropriate stimulation.

Source: "Excellence in Design: Optimal Living Space for People with Alzheimer's Disease and Related Dementias, June 2014"

Case Study – PEARL Dementia Programme

Specialised dementia programmes with enhancements in living spaces have shown significant improvements in residents' outcomes

Four Seasons HEALTH CARE

PEARL SPECIALISED DEMENTIA SERVICE

One of the largest independent nursing home providers in UK
- 400 NHs; with specialised dementia services in 190 NHs
- 15,000 residents
- 21,000 staff

New approach to dementia care combines high levels of support and training to teams with technology support and **environment enhancement,** such as

- Maximising opportunities to sustain optimal levels of **independent living**
- **Themed areas** for orientation and sensory stimulation
- Engaging residents in **personalising their surroundings**
- Adapting some areas of a **home adapted** to be like a café where residents can share time together and even cook

> *PEARL recognises everyone who lives here to be an individual who is **entitled to respect , dignity, privacy or company**, love, fun and laughter but at the same time all are safe and secure*

– PEARL Nursing Home Manager

Analysis of data from 16 homes on the outcomes of specialised dementia care programme

Medication		
Anti-psychotics	↓	48%
Anti-anxiety	↓	40%
Hypnotic	↓	44%
Pain	↑	10%
Wellbeing	↑	46%
Depression scores	↓	30%
Weight gain	↑	42%
Falls	↓	32%

% indicative of positive / negative outcomes seen in the proportion of patients

Source: Four Seasons Health Care; Kingsfund UK

Case Study – Netherlands' De Hogeweyk Dementia Village

Netherlands has developed townships offering dementia-focused living which is self-contained and bearing resemblance to normal life as much as possible

Background

- Gated model village in Weesp, Netherlands with 152 people living with severe dementia cared for by 250 staff and volunteers. Set out like a village with 23 houses, a town square, supermarket, hairdressing salon, theatre, pub and café-restaurant

Safe, Familiar Habilitative Environment

- Relieve the anxiety, confusion and anger by making them feel at home
- Surrounded by objects that are familiar and loved by the residents who are, in turn, grouped with similar people
  - Residents shop at the supermarket and assist with preparing and cooking as they would at home.
  - Carers wear normal daytime clothing rather than clinical clothing
  - Residents have own large bedroom
  - Each house reflects a different style that is common to, and familiar for, the 6–7 people who live in that house

Active Living

- Although the people living in the village cannot leave the site, they are free to move around in the outside area of the residence and through the village
- All-day reminiscence therapy, compared to traditional nursing homes, results in more active residents which require less medication
- No locks on the doors and residents are free to walk or cycle around within the village

Source: hogeweyk.dementiavillage.com, The Guardian, The Atlantic

6.5 Current Structure in Singapore

Resident Assessment Status

Assessment Status of physical, psychological, emotional and social needs of NH residents forms the basis for MOH subvention and staff ratios

Need-based Care Categories

Category	Description	Staff to Patient Ratio	MOH Funding Rate[1]	Intended for NH Facility
I	Physically and mentally independent, may or may not use walking aids, do not need or need only minimal assistance in activities of daily living (ADL)	NA	$28/day	✗
II	Semi-ambulant and/or mildly senile, requires some physical assistance and supervision in ADL	1:8	$39/day	(✓) Dementia patients only
III	Wheel-chair bound and/or suffering from dementia, need help in ADL and supervision most of the time	1:4	$60/day	✓
IV	Bedridden and require total assistance and supervision for every aspect of ADL	1:2	$71/day	✓

General limitations

1. MOH funding only applicable for dormitory-style layout for all categories
2. No additional funding or manpower norms for residents with dementia

1. Information as of April 2016

Source: MOH

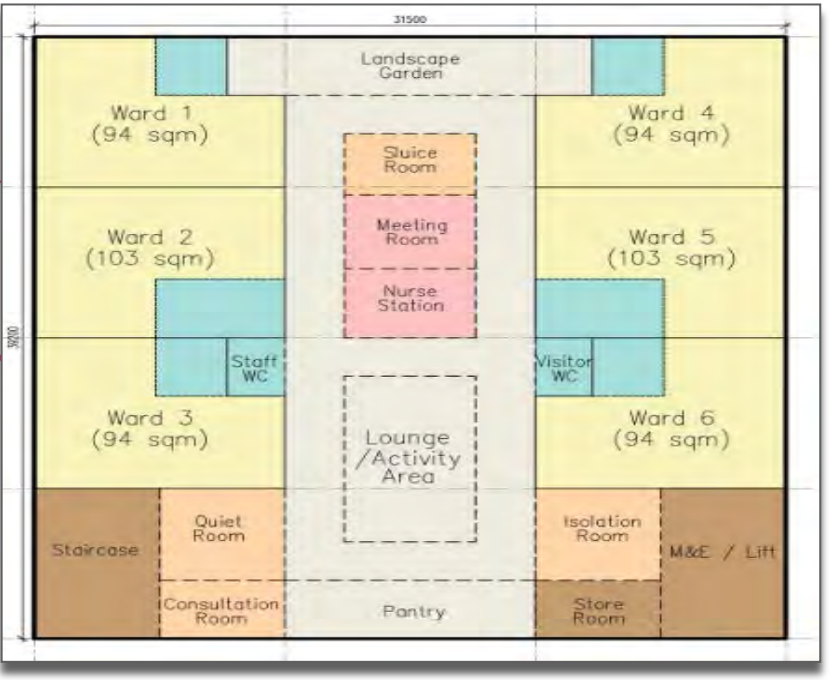
Sample Layout of BoL Model

The BoL models continue with the current dorm structure with 7 to 10 patients per ward

1x dorm of 7 beds

- Open ward (no physical wall) concept, bed area in accordance with MOH's guide of 6m^2.
- Approximately 6 clusters within a single floorplate
- As generally seen in newly built BoL nursing homes

1x floorplate



Total floor plate area: ~1,200m^2

Size of cluster: ~100m^2

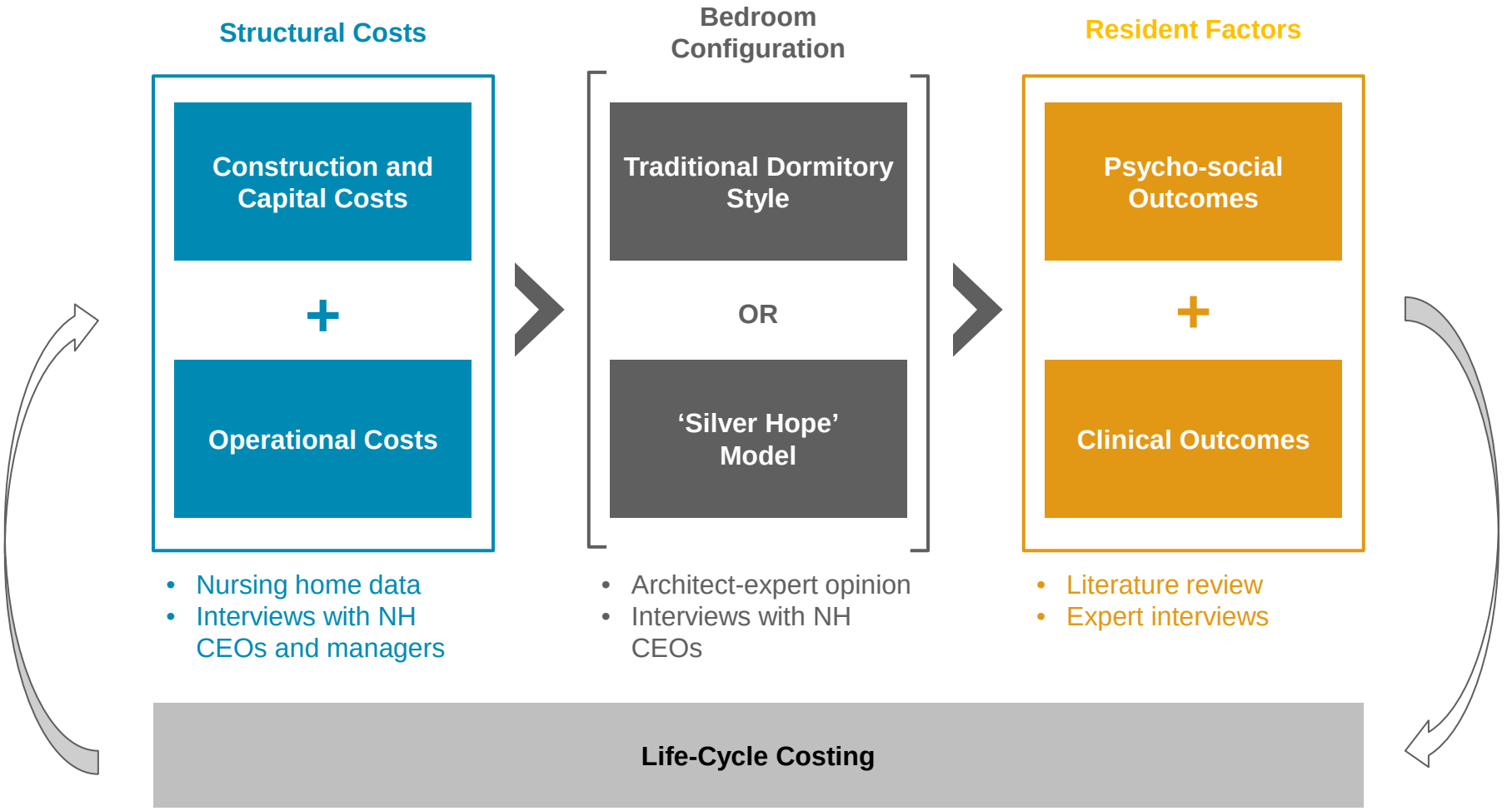
Total number of beds: 42 (6x7)

Source: Estimation by architects; actual sizes vary between different nursing homes

6.6 Cost Analysis

Our Approach

We have used a life-cycle costing approach which links cost of care, quality of care and quality of life outcomes into analysis of operational and construction costs



Source: Framework adapted from Calkins and Casella

Cost Structure

We categorised all costs in 4 main categories – healthcare, living, accommodation and administration

	Expense Category	Description	Components (including staff and supplies)
1	**Healthcare**	Costs pertaining to direct nursing and medical care of patients	• Staff involved in Patient Care • Nursing and Medical Incidentals • Rehab • Others
2	**Living**	Costs pertaining to overall operational support services	• Catering • Housekeeping and Cleaning • Laundry • Others
3	**Administration**	Costs pertaining to general administration	• Administrative Staff and Supplies • IT • Any other overheads
4	**Accommodation**	Costs pertaining to infrastructure construction, utilisation and maintenance	• Property Acquisition – Depreciation/Rental • Property Maintenance • Fittings, Furniture and Equipment (FFE) Acquisition – Depreciation / Rental • FFE Maintenance • Utilities • Others

Note: For the purposes of analyses, the staffing and supplies components have been taken together as some NHs provide select services in-house whereas some NHs outsource them

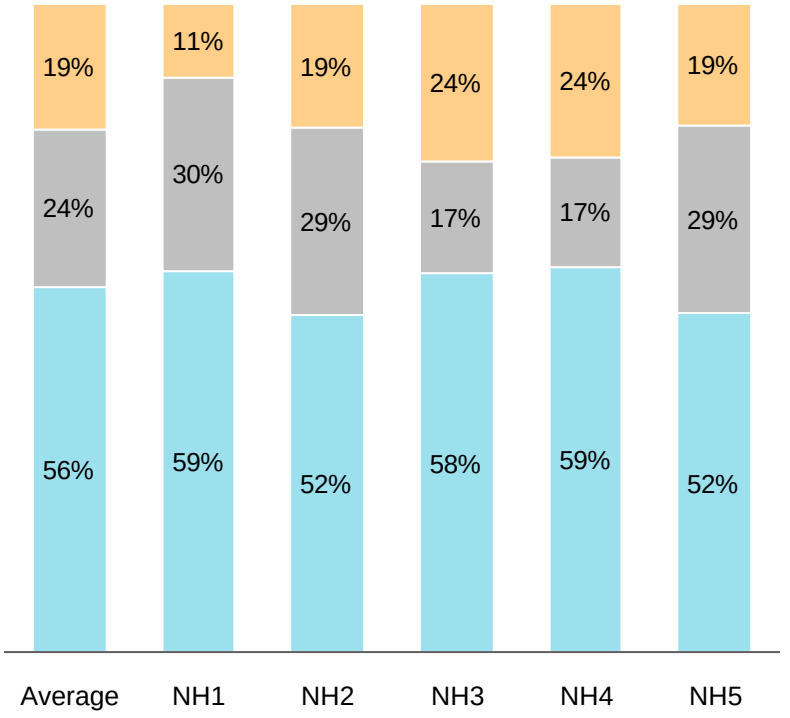
Cost Structure Assumptions – Current Model and Silver Hope

	Assumptions	Comments
1	**Cost estimates**	Actual incurred costs, as provided by the nursing homes, is used for analysis without any adjustment for subsidies, grants, funding, charity contributions etc
2	**Cost comparison between nursing homes**	Cost structure is compared for operational costs only as nursing homes in the study had different capex outlays based on year of construction, lease and rental arrangements, whether purpose-built facility or not etc
3	**Detailed cost analysis**	Having established similar opex cost structures for the 5 collaborating nursing homes, extensive deep-dive was done for 1 representative nursing home
4	**Nursing staff costs**	Costs vary between nursing homes based on staff experience and mix of local and foreign staff. For this analysis – • Current costs - Actual incurred costs at facility level are used • Projected costs – Average salary per staff category is used to even out the differences between different levels of experience and nationality of staff
5	**Medical, rehab, ancillary services costs**	These are kept constant at per resident level as the provision of these services is on an 'as-needed' basis and considered optimal currently
6	**Staff and supplies costs**	Provision of services, such as laundry, housekeeping, kitchen etc, in nursing homes can be with in-house services or outsourced; hence staff, supply and outsourcing cost (if any) are considered together as one component
7	**Admin costs**	Incurred admin costs are taken into account and kept constant in the projections . Actual allocation of costs per resident will depend on the bed complement of the facility
8	**Utilities costs**	Incurred costs are taken into account. Utilities cost will depend on bed complement and size of facility. ~10% increase in utilities costs is considered for the increased space layout with similar bed complement
9	**Capital Expenditure**	Capital outlay for construction is considered on an incremental level for residential areas i.e. the wards and bedrooms. Other areas such as common areas, offices, rehab, etc is considered similar in both models
10	**Depreciation**	In line with nursing home accounting norms, buildings are depreciated at 30-years and others at 5 years (except for IT which is depreciated at 3 years)

Current Cost Structure – Comparison between Nursing Homes

While nursing homes differ in their operations, the overall cost breakdown of operating expenses is within comparable range

Opex Cost Breakdown
%



Comments

Administration

Costs vary based on
- Bed complement
- Organisational structure
- Compensation policy

Living

Costs vary based on
- In-house vs outsourced services
- Volunteer contributions (for food and supplies)

Healthcare

- Costs typically aligned due to MOH nursing standards
- Variation largely due to
  - Seniority of staff
  - Local vs foreign staff composition
  - Provision of in-house medical and ancillary services

For deep-dive into the cost structure, subsequent analysis is based on the data of a representative NH

Note: Accommodation capex costs are not considered for comparison here as these differ based on location of property, different periods of construction, historical contracts for rent negotiation etc

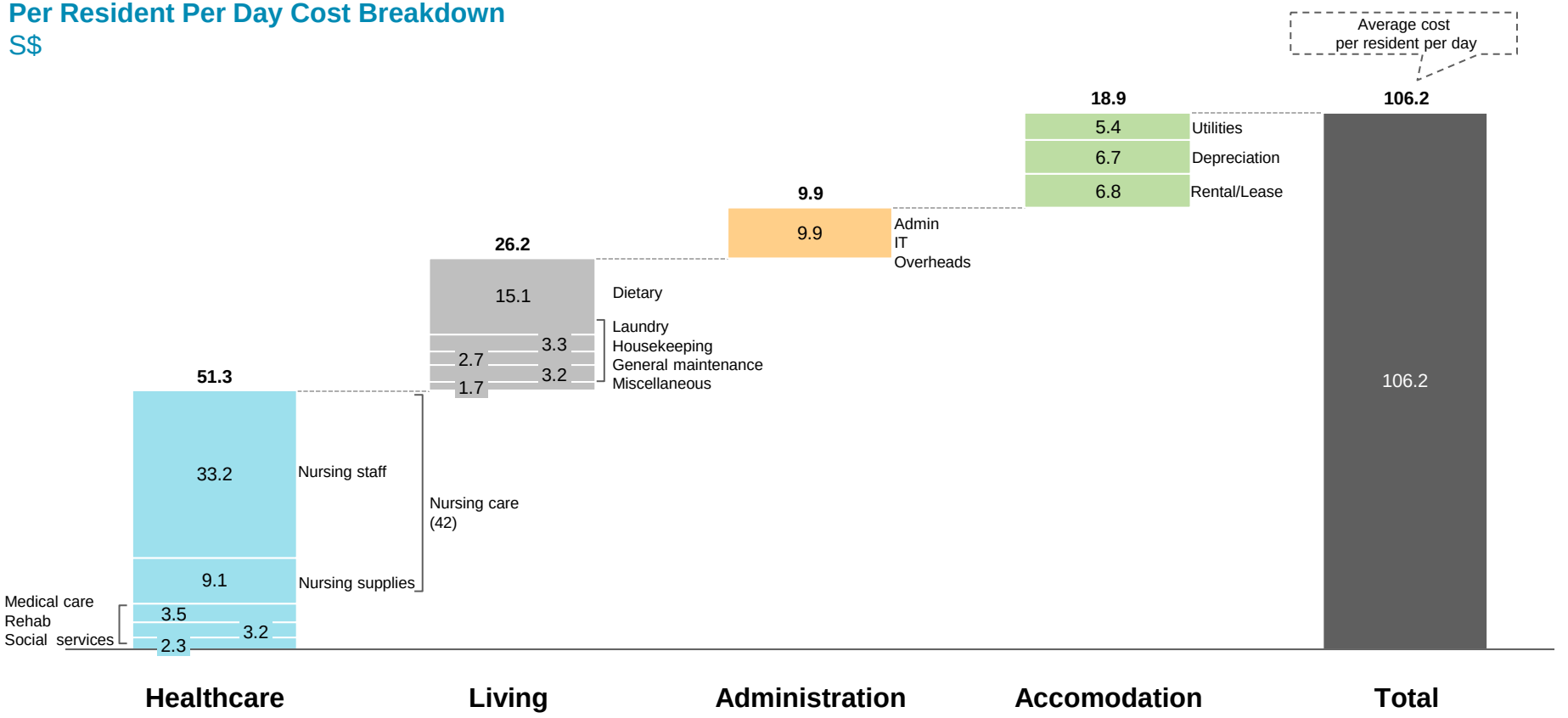
Source: Aggregate data from 5 nursing homes

Current Cost Structure – Deep Dive

Direct care provision accounts for almost half of the costs with nursing staffing contributing to a third of total costs

Per Resident Per Day Cost Breakdown

S$



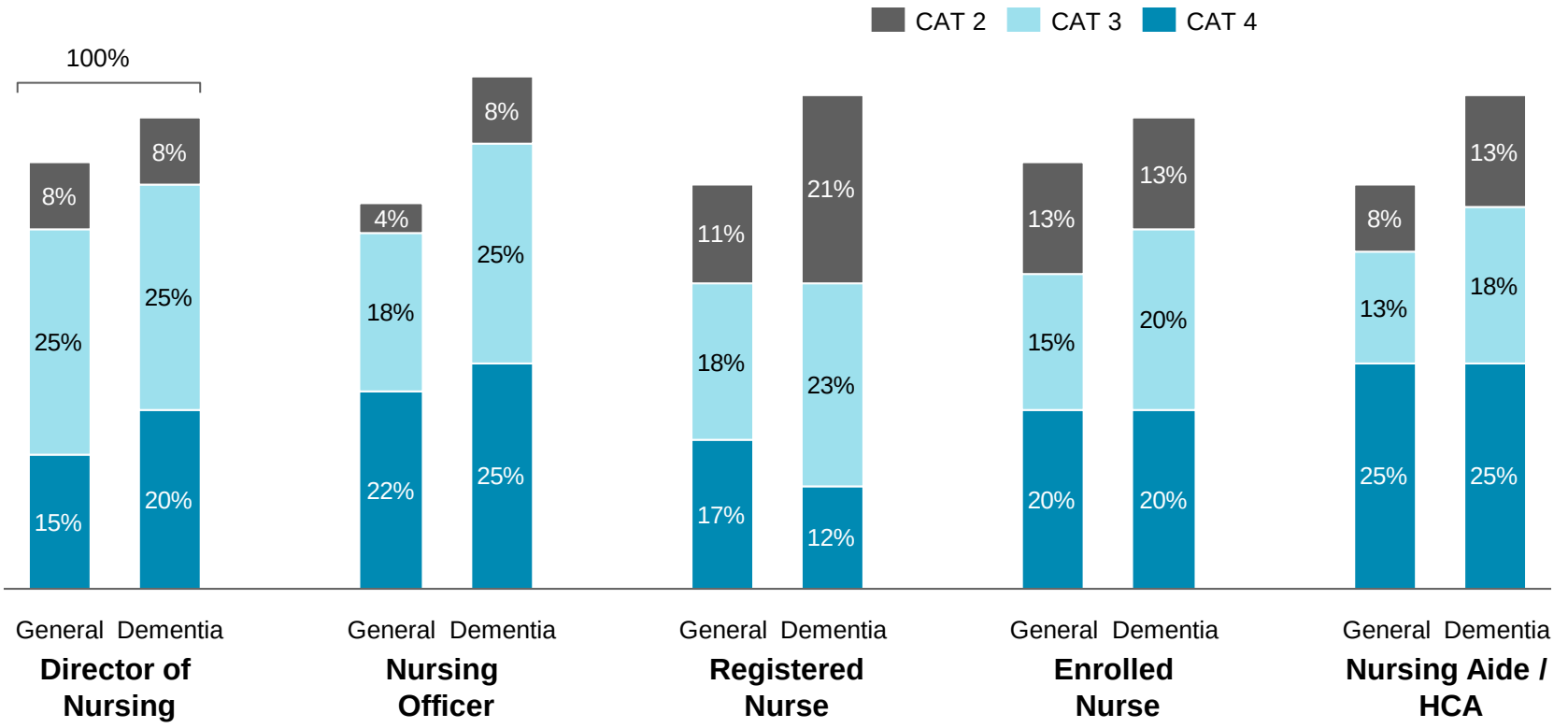
Notes

1. Costs breakdown is that of a representative nursing home
2. Costs indicated are incurred costs without taking any subsidies or grants into consideration
3. For the purposes of analyses, the staffing and supplies components have been taken together as some NHs provide select services in-house whereas some NHs outsource them
4. Depreciation costs here include the furniture, fittings and equipment; and estimated building costs (based on current construction benchmarks)
5. Rental/lease arrangements with parent group. Other nursing homes in the study had rental subventions in the range of $0.9-1.2M
6. Across the 5 nursing homes, average per resident per day costs are in range of $90-120

Staffing Allocation

Variation in the utilisation of nursing services is driven by the physical and mental acuity of residents

Allocation of Nursing Staff Time by Category
%

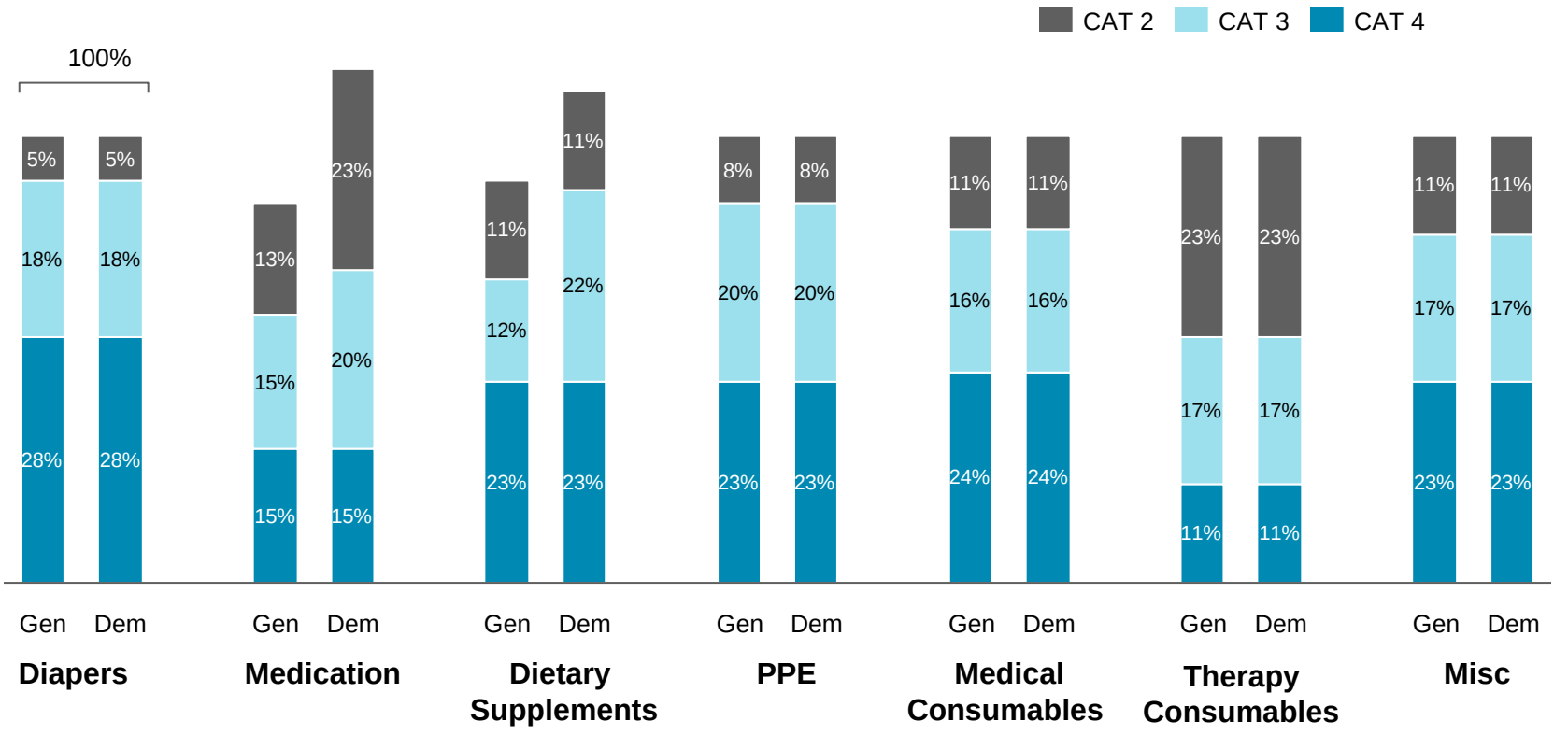


Dementia residents require relatively higher allocation of nursing time

Healthcare Supplies Allocation

Similarly, there is variation in the utilisation of supplies driven by the physical and mental acuity of residents

Allocation of Healthcare Supplies By Category
%



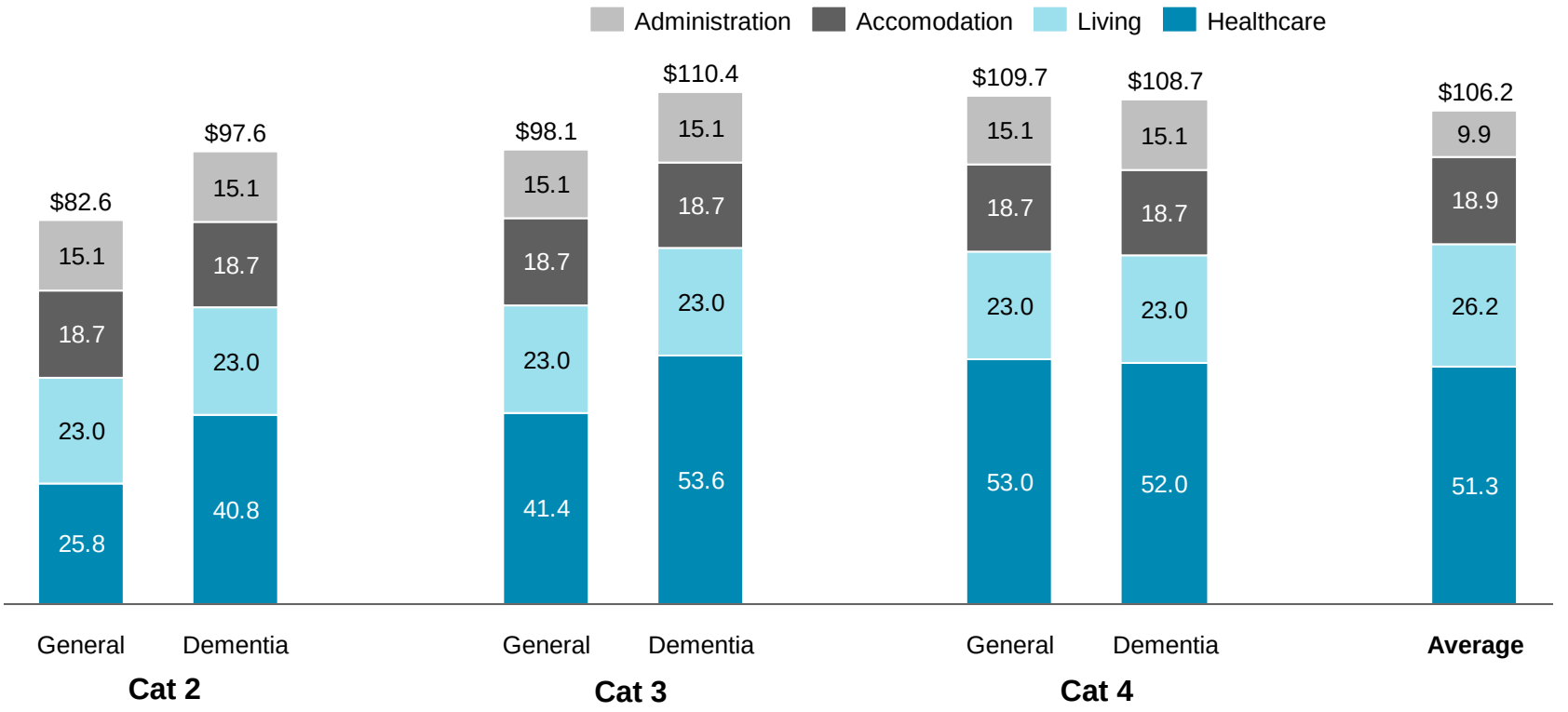
Generally similar consumption of supplies between dementia and non-dementia cases except for medication and supplements

Per Resident Per Day Cost[1]

On Cat 2-3 basis, costs range between $83-109 (average $106) and driven by combination of physical and mental acuity of residents

Per Resident Day Cost by Category

S$



Costs for dementia care relatively higher than non-dementia care except for Cat 4, where immobility of residents equalises costs for both dementia and non-dementia

1. Includes all incurred costs, including rental and depreciation, irrespective of any subsidy or funding provided by govt, parent institution or charity

Silver Hope – Staffing Model (1/2)

At the centre of this model are skilled senior care associates who manage residents' care in an household, with support from roving team of nurses and therapists

Roving Team | **1 Nursing Officer** Nurse + **3 Nursing Aides (NA)** NA NA NA

1 Household | **1 Household** | **1 Household**

Ancillary Support | DIET | ACTIV | SW | PT | OT | SPEECH

This model is a reversal of traditional nursing home model which places nursing staff as main caregivers with support from others

Silver Hope – Staffing Model (2/2)

Single point of contact and staff empowerment change the paradigm of care with greater responsiveness to non-clinical needs of patients

Staffing Model

Nursing Roving Team

Ancillary Support Roving Team

Key Features

- The clinical staff become the **clinical roving support** team
- Nursing officers and nursing aides visit the household on a scheduled basis and meet the clinical needs of the elders as required

- Each household of 8-10 residents functions semi-independently with **consistent and dedicated staffing by a trained Senior Care Associate (SCA)**
- By virtue of being the **single point of contact** for the household, the SCA and residents develop **greater bonding** and have **better communication**
- The SCA assumes a **multi-functional role** and supports eldercare, housekeeping, etc. providing the majority of direct contact with the resident
- The SCA **partners with the roving teams** for clinical and ancillary support to ensure care planning is done in timely manner and there is compliance from the elderly
- The SCA also **actively engages** the residents for daily activities, and supports them towards greater enablement

- Ancillary support stays similar, on an as needed basis
- However, it is **coordinated by the SCA** in alignment with residents' preferences

"With SCA being the pivot of all care needs, residents are expected to have greater commitment as they see someone responsible for them and they don't want to let him/her down"

Silver Hope – Nursing Staffing Assumptions (1/2)

The proposed staffing model places greater emphasis on dementia and needs staff trained with higher skills

	Current Nursing Standards	Silver Hope Model
RAF category	Current staffing primarily determined by MOH licensing requirement of staff to resident ratio in different RAF categories	Proposes to use **similar staff to resident ratio across all RAF categories** • Similar to staffing practices internationally • NHs have given feedback that a uniform staffing ratio is more pragmatic
	MOH licensing requirement based on total resident population in NH	***Proposed staffing based on household of 8-10 residents***
	RAF category / **Care Staff to Residents** **Cat 2** 1:8 **Cat 3** 1:4 **Cat 4** 1:2	1 X Senior Care Associate : 1 household 1 X Nursing Aide : 1 household 1 X Nursing Officer : 3 household
	Ratio is for overall staffing irrespective of shifts	*Above staffing would apply to 1 shift of 12 hours*
Dementia	No additional staffing requirements for dementia residents	Dementia households **allocated 25% more SCA and Nursing Aides** as they require more staff contact time for communication and supervision
Experience	Within stipulated ratios, staff experience can range from entry level to very experienced	Preferential need for staff trained with higher skills (e.g. Senior Care Associates with NITEC diplomas) and more experience especially in addressing dementia and psycho-social aspects of care
Other Costing assumptions	• Actual staff employed by NHs generally exceeds ratio to allow for leaves, training, attrition etc • For comparison, **actual incurred** staffing costs (including CPF, bonuses, allowances, other benefits etc) are taken into account	• Staff requirement is further increased by 10% to allow for leave, training, attrition etc • Higher end of the current salaries (with CPF, bonuses , allowances, other benefits) is used to factor in for experienced staff

Silver Hope – Nursing Staffing Assumptions (2/2)

Nursing costs will increase by $1-2 for non-dementia patients and $6-7 for dementia patients, with staff experience and skills as key cost drivers

Nursing Staff Annual Salary Ranges

S$

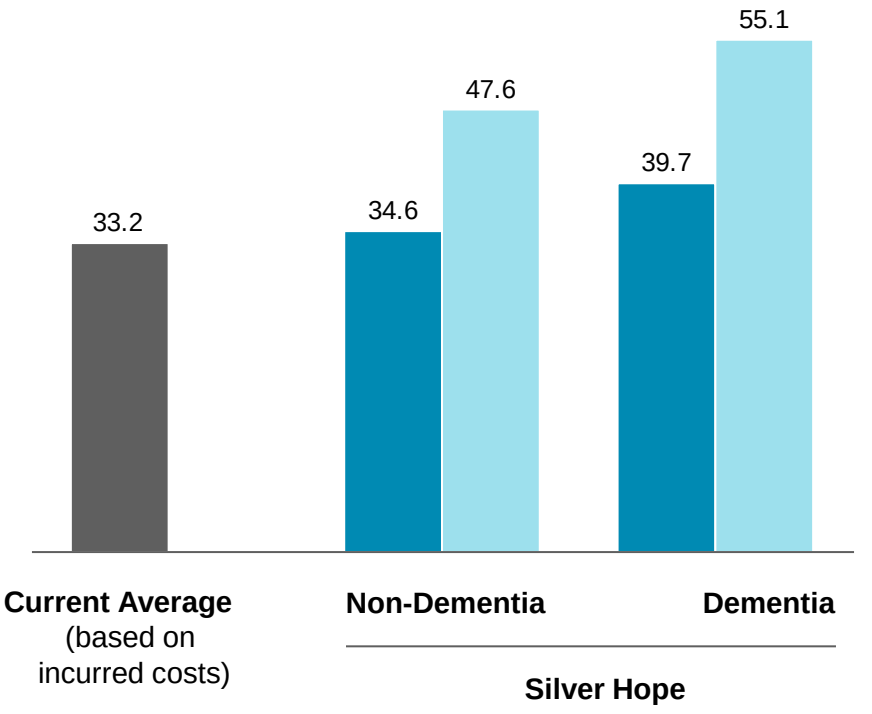
Staff	Est. 12-mth Compensation Range (S$)
Director of Nursing	80,000 – 90,000
Nursing Officers	35,000 – 61,000
Nursing Aides	7,200 – 20,000
Healthcare Associates	6,900 – 20,000

Notes and Assumptions:

- Wide compensation ranges between local and foreign staff; further, different NHs have different mix of local and foreign staff thus impacting their cost structures
- 1 FTE for Director of Nursing employed in both models
- 12-month compensation is factored by 1.3 to account for CPF, bonuses, allowances etc
- Staff requirement is further increased by 10% to allow for leave, training, attrition etc
- For Silver Hope, the costs would be in a range reflective of the experience of the staff

Per Resident Per Day Nursing Staff Costs

S$



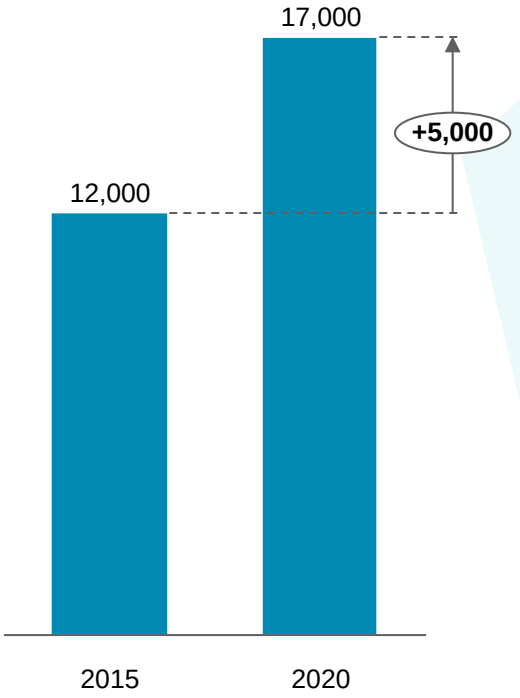
Note: Actual costs may vary based on experience of staff

6.7 Scenario Analysis

Silver Hope – Implications for National Spending

Assuming that projected supply of 5K new beds is built on Silver Hope model, the annual costs would increase by $19M

Projected Increase in Supply
beds, 2015-2020



Assumptions

- All new 5000 beds are built on Silver Hope model
- Mixed single and double rooms in 20:80 ratio
- 50% of the beds are for dementia patients
- Incremental per resident per day costs for:
  - Non-dementia $8
  - Dementia $13

Impact

Annual Incremental Cost

~$19 M

which equates to

0.2%

of MOH Budget (~$11 Billion)

Source: Singapore 2016 Budget

Silver Hope – Tiered Adoption in 200-bed Nursing Home

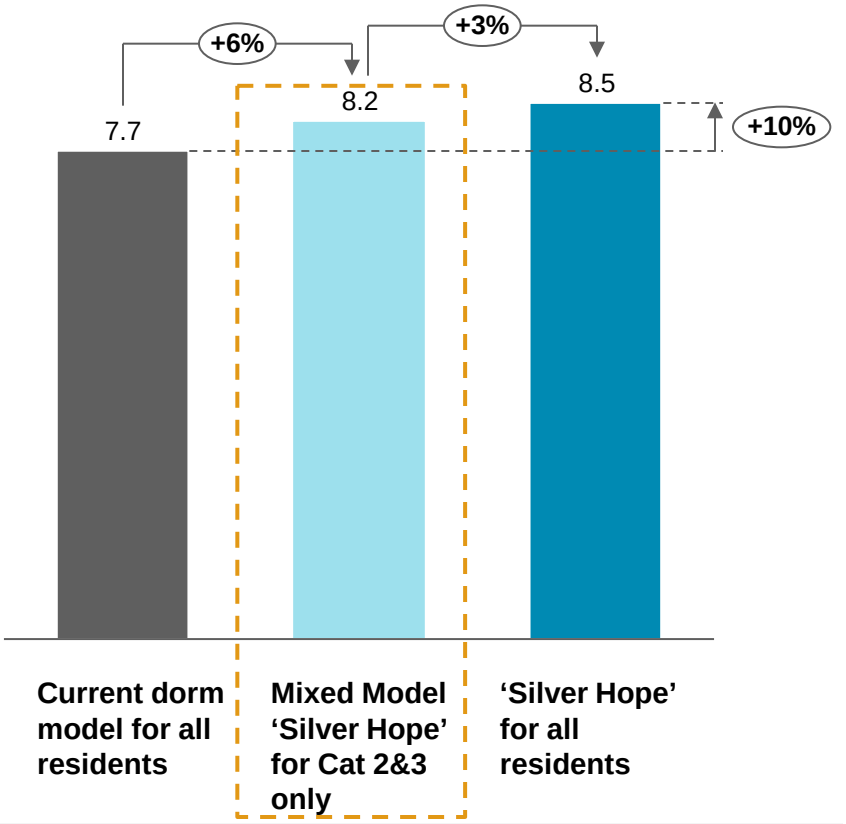
Nursing homes using a stratified approach of Silver Hope for Cat 2 & 3 patients will incur <10% cost increase annually

Key Considerations

- Clinical experts and NH operators have suggested that Silver Hope will have a differential impact
  - **Higher impact on Cat 2 & 3 residents** especially those with dementia
  - **Lower impact on Cat 4 residents** as they are immobile and unlikely to benefit from 'self-reliance' approach and 'personalisation' of care
- Further, experts have recommended a mixed model to offer options of dorm vs single/double room to patients
- We did bottom-up calculations to construct the annual costs for a 200-bed nursing home, assuming:
  - 50% residents are in Cat 4 and 50% in Cat 2&3
  - Cat 4 residents will continue in the current dorm model and Cat 2&3 residents will opt for 'Silver Hope'
  - Among Cat 2&3 residents, 45% residents have dementia

Estimated Annual Costs of a 200-bed NH

S$, Millions



<10% cost increment required for tiered adoption of Silver Hope

All Single Rooms

If only single rooms were considered with Silver Hope staffing and features, the per resident per day costs would increase by $12-17

Key Considerations

- Silver Hope model employs a mix of single and double occupancy rooms in 20:80 ratio

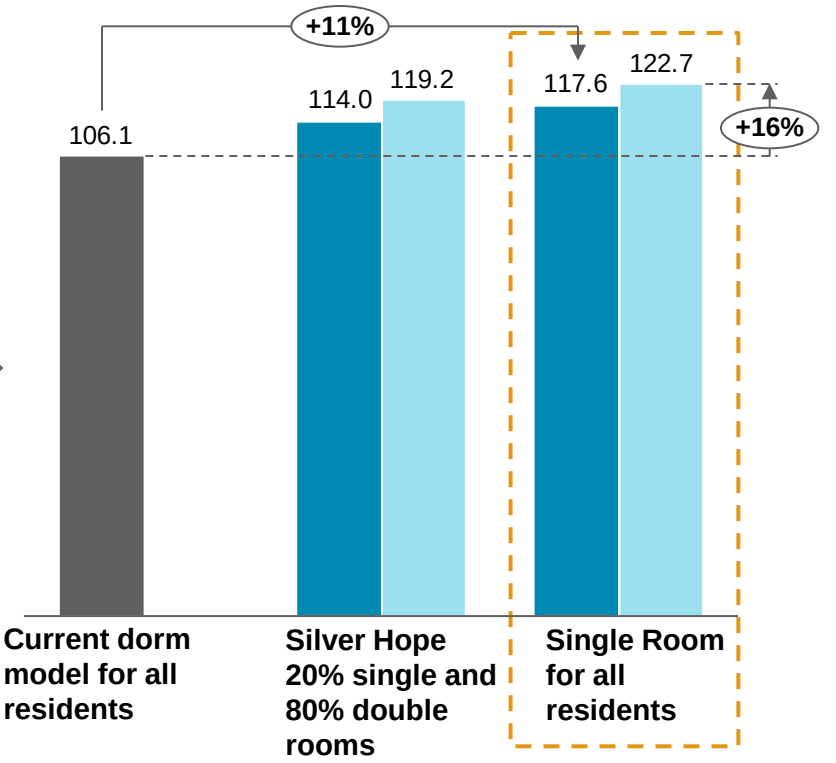
- If the Silver Hope layout was to be enhanced for 100% single rooms with en-suites, with no change in common areas, the increased requirements would be:
  - **15%** increased space requirement (i.e. ~40m^2 in a 10-bed household)
  - **15%** higher construction costs

  The increase would primarily be due to the addition of 4 more bathrooms

- Staffing norms would be similar to Silver Hope as the household would maintain a limit of 10-residents

Estimated Per Resident Per Day Costs

S$



11-16% cost increment required for transitioning to an all-single room model

6.8 Prospects of Cost-reduction through Technology

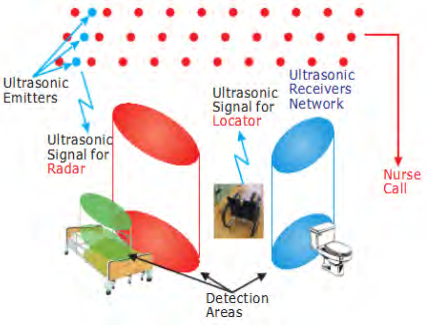
Prospects for Technology (1/3)

Passive integrated monitoring systems are witnessing extensive biomedical research; expected to reduce nursing workload and costs when implemented

Key Features

Complements care and support to residents

- Learns daily activity patterns and detect changes that may signal potential health or emergency situations
- Uses non-intrusive sensors to capture actions, allowing privacy and independence to be maintained
- Monitors activities such as when an older person gets out of bed, goes into the bathroom, etc.
- Alerts staff to resident fall, early onset of urinary tract infections (UTIs) etc
- Systems also include a “wander” alert for residents with an onset of dementia or Alzheimer's to ensure they are safe and closely monitored



Most sensory and monitoring systems in advanced developmental phase; commercialisation and NH adoption expected in 3-5 years

Source: Stanford Medicine X;Bamlabs; Turnstall; Hori and Ishida, Conference paper on ‘Ultrasonic Sensors for the Elderly and Caregivers in a Nursing Home’

Prospects for Technology (2/3)

Tech-enabled gadgets and systems are emerging to engage elderly at various touch points and expected to reduced manpower requirements

Robotic Aids	Features
Humanoids 	• Human like robots with mechanical arms • Helps seniors: – Get out of the bed – Grab condiments from the fridge – Delivers trays of food • Cost ~USD 215,000
Robotic Seal "Paro" 	• Fuzzy robotic seal with anti-bacterial fur • Useful in calming dementia patients and stops them from wandering around • Claims reduced use of psychotropic drugs • Used in 80% of Denmark's state run NHs • Cost ~US$6,000
Virtual Companion 	• Virtual caregiving companion • Employs global team of highly trained remote caregivers • Provides 24x7 personalised care through an avatar for: – Emotional support – Cognitive stimulation – Timely reporting – Medication and task reminders and 'real' stimulating social interactions • Cost ~USD 125 / month

Sources: Gerijoy, Rehacare, Parorobots, BBC, GeorgiaTech University

Prospects for Technology (3/3)

Nursing homes are piloting virtual care with a host of technologies and have showed promising results

Smartcare Home Gateway

- The Panasonic Smartcare Home Gateway is a health monitor that is operated through a client's television rather than a separate device
- Client simply answers the dialogues that appear on their television screen during regular programming
- 6-month pilot in the Jewish Home with 37 residents with heart failure and/or diabetes showed positive outcomes

44% reduction in hospitalisation
43% reduction in A&E visits
>USD 9K Projected annual savings

Virtual Rehabilitation

- Combines evidence-based treatments, virtual games and motion-tracking sensors
- Patients use the system with physical and/or occupational therapists while in the facility, and can continue rehab while at home, allowing for continuum of care
- 3-month pilot with 139 patients showed positive outcomes

38% reduction in hospitalisation

Source: The Jewish Home, Panasonic, Jintronix

Telemedicine implementation in Singapore

Telemedicine can result in greater cost savings from better utilisation of manpower and reduced medical costs

Description of program	• GeriCare@North is a MOH-funded programme for nursing homes • For Nurse training, the program provides courses like Enhanced Nursing Home Standards Training, and Palliative Care Courses • Specialist geriatric services are provided through telegeriatrics
Use in Nursing Homes	• Telemedicine is a recent healthcare trend due to the advancement of live-streaming technologies • The geriatrics field has one of the most potential for telemedicine as the geriatrician tasks mainly focuses on managing the patient and diagnostic dilemmas are few
Impact – Better utilisation of manpower	• Number of geriatricians are limited, affecting the ability of geriatricians to physically provide care to patients in the nursing home • Telegeriatrics enable geriatricians to hold consultations without having to be physically present by the patient, reducing time wasted on travelling to nursing homes • With physical visits, doctors can only cover one nursing home per afternoon, whereas with telegeriatrics doctors can cover multiple nursing homes
Impact – Reduced hospital visits	• Nursing home patients that require a visit to the specialist outpatient clinics (SOC) are usually transported via the ambulance • Through telegeriatrics the need for hospital visits decrease, cutting costs but increasing efficiency

Each tele-consultation costs approximately **S$$60** compared to **S$240** for each SOC visit

Sources: GeriCare@North Official Website, http://www.gericarenorth.com/, ; Study estimates

QUALIFICATIONS, ASSUMPTIONS AND LIMITING CONDITIONS

Oliver Wyman was commissioned by Lien Foundation and Khoo Chwee Neo Foundation to conduct a study on different models of long term care and to evaluate the economic impact of Singapore adopting different models.

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