Designing and implementing service models to promote health equity among older adults

Jean Woo

Director, Jockey Club Institute of Aging
Co-Director, Institute of Health Equity
The Chinese University of Hong Kong

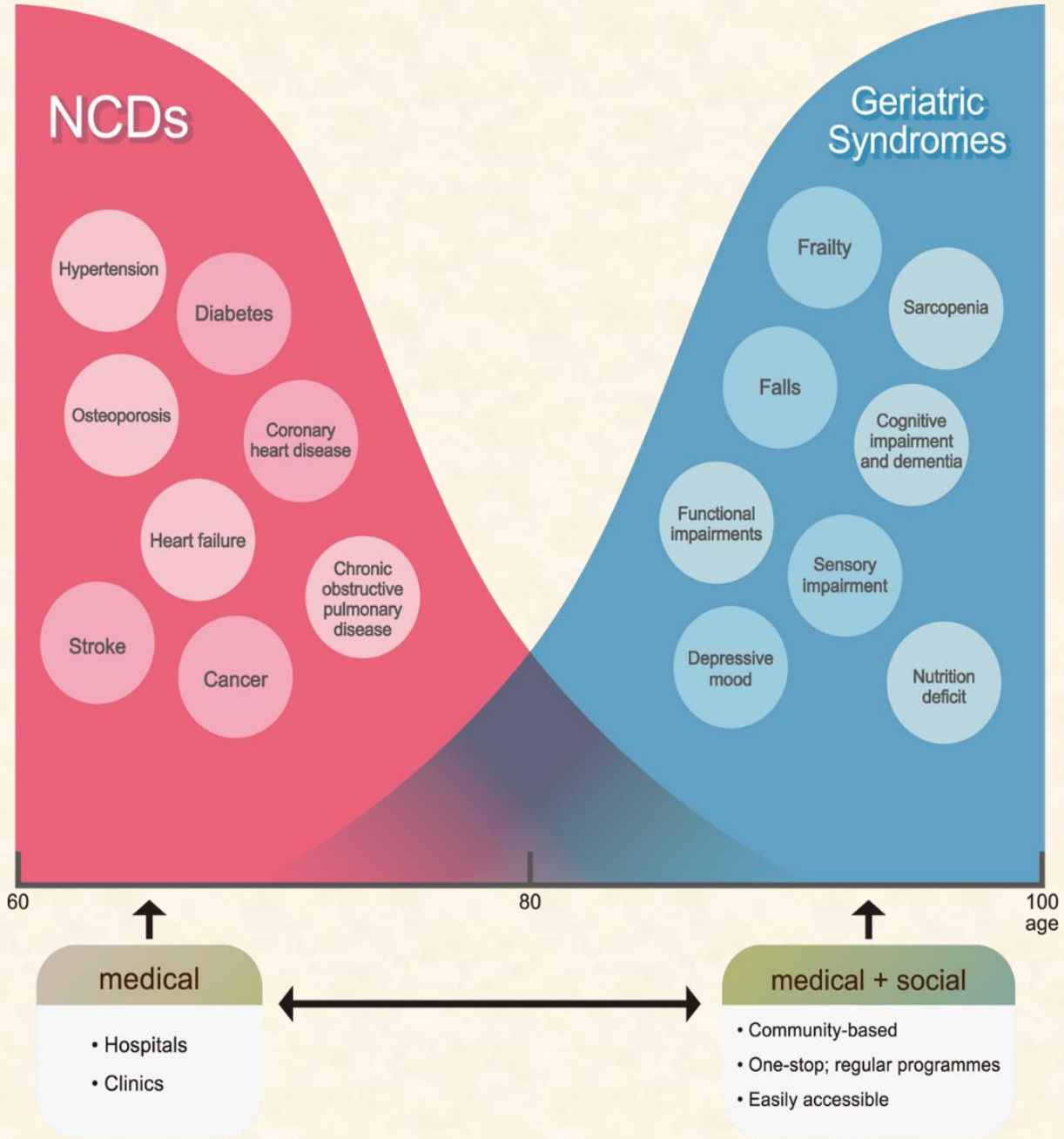
Overview

- Demography and implication on health and social service needs
- Current service to needs mismatch
- Health inequalities for older adults
- Principles of design
- Operational model
- Potential for further development and self-sustaining model

Are there health inequalities among older adults?

- Healthy ageing as an outcome; in addition to chronic diseases indicators
- Function, rather than mortality and chronic disease to be measures
- Physical and cognitive function is a reflection of intrinsic capacity, or frailty and resilience (further down the life course)

(who.int/publications/i/item/9789240017900)


NCDs
Hypertension
Diabetes
Osteoporosis
Coronary heart disease
Heart failure
Chronic obstructive pulmonary disease
Stroke
Cancer
Geriatric Syndromes
Frailty
Sarcopenia
Falls
Cognitive impairment and dementia
Functional impairments
Sensory impairment
Depressive mood
Nutrition deficit
60
80
100
age
medical
• Hospitals
• Clinics
medical + social
• Community-based
• One-stop; regular programmes
• Easily accessible

An Integrated Framework

Personal Factors

- ***Lifestyle***
  Diet; Physical activity; Smoking habit; Substance abuse/usage; Gambling; Internet usage
- ***Socio-economic***
  Education; Occupation; Absolute & disposable income
- ***Psychosocial***
  Self-rated ranking in society; Social norms; Family influence; Stigma

Environmental Factors

- ***Home & neighbourhood environment***
- ***Open spaces***
- ***Air pollution***
- ***Climateric stress***

Ageing Well: Outcomes

- ***Population level***
  Mortality, DALY, productivity loss
- ***Individual level***
  Neurodegenerative, musculoskeletal diseases; heart failure; mental health; Frailty, physical and cognitive dysfunction, multi-morbidity, quality of life,
- ***Biological level***
  Pathophysiology, biomarkers, genetic markers, e.g. Telomere length as an indicator of life span at the cellular level, and a reflection of accumulated damage during the life course

Innovation of Service Development and Evaluation

Examples of documentation of health inequalities among older people in Hong Kong

- Cognitive impairment, depression, subjective well being
- Decline in physical function; frailty
- Avoidable hospital conditions (a reflection of adequacy of primary care) : higher among 65+ compared with 15-64, a reflection of existence of barriers to accessing or provision of primary care.
- Evidence of ageism resulting in health policy neglect
- Older people in disaster management

JAMDA 17 (2016) 188–192

JAMDA

journal homepage: www.jamda.com

Special Article

Frailty: An Emerging Public Health Priority

Matteo Cesari MD, PhD [a,b,*], Martin Prince MD [c], Jotheeswaran Amuthavalli Thiyagarajan MD, PhD [d], Islene Araujo De Carvalho MD [e], Roberto Bernabei MD, PhD [f], Piu Chan MD, PhD [g], Luis Miguel Gutierrez-Robledo MD, PhD [h], Jean-Pierre Michel MD [i], John E. Morley MB, BCh [j], Paul Ong PhD [k], Leocadio Rodriguez Manas MD, PhD [l], Alan Sinclair FRCP, MD [m], Chang Won Won MD, PhD [n], John Beard PhD [e], Bruno Vellas MD [a,b]

[a] *Gérontopôle, University Hospital of Toulouse, Toulouse, France*
[b] *INSERM UMR1027, University of Toulouse III Paul Sabatier, Toulouse, France*
[c] *Institute of Psychiatry, King's College, London, United Kingdom*
[d] *Public Health Foundation of India, New Delhi, India*
[e] *Department of Ageing and Life Course, World Health Organization, Geneva, Switzerland*
[f] *Department of Geriatrics, Neurosciences and Orthopaedics, Catholic University of the Sacred Heart, Roma, Italy*
[g] *Department of Geriatrics, Neurobiology and Neurology, Xuanwu Hospital of Capital Medical University, Beijing, China*
[h] *National Institute of Geriatrics, Mexico City, Mexico*
[i] *Department of Geriatrics and Rehabilitation, Geneva Medical School and University Hospitals, Geneva, Switzerland*
[j] *Division of Geriatric Medicine, Saint Louis University School of Medicine, Saint Louis, MO*
[k] *HelpAge International, London, United Kingdom*
[l] *Department of Geriatrics, University Hospital of Getafe, Madrid, Spain*
[m] *Foundation for Diabetes Research in Older People, Luton, United Kingdom*
[n] *Department of Family Medicine, College of Medicine, Kyung Hee University, Seoul, South Korea*

Subjective social status at baseline and the risk of incident frailty at 14-year follow-up, both sexes (n=694)

	Model 1	Model 2
Subjective social status (ref=High)		
Middle	1.69 (1.21–2.38)	2.03 (1.36–3.02)
Low	2.43 (1.33–4.42)	2.34 (1.19–4.60)

Model 1 was adjusted for age and sex at baseline; Model 2 was adjusted for variables in model1 plus marital status at baseline; educational level and maximum life-time income at baseline; medical history (hypertension, diabetes, and stroke) at baseline; lifestyle (smoking status, alcohol consumption, physical activity (PASE score), diet quality (DQI), BMI) at baseline; mental health (SF-12 MCS score) at baseline; and cognitive function (MMSE score) at baseline

Ref, Reference

[Yu et al. In J Environ Res Public Health. 2020; 17(4): 1301]

Examples of mitigating strategies

- Age friendly cities movement, covering physical and social environments e.g. neighbourhood walkability, loneliness and welbeing
- Raising health literacy regarding ageing
- Identification of vulnerable seniors e.g. social vulnerability index
- Fit for purpose healthcare systems and modifying primary care orientated to older people that is not just based on chronic diseases
- Day care voucher schemes and healthcare vouchers
- Geography of elder suicide during hot weather

Towards a comprehensive public health response

- Multi-morbidity
- Loss of function
- Geriatric syndromes (frailty, cognitive impairment…)
- Immuno-senescence and inflammageing
- Social and physical environments (age-friendly environments)

WHO Healthy ageing- conceptual framework focusing on function; age friendly environment

[Beard et al Lancet 2014 Nov 6 online View point]

Designing fit for purpose integrated health and social care systems using the concept of frailty

- Public health significance:

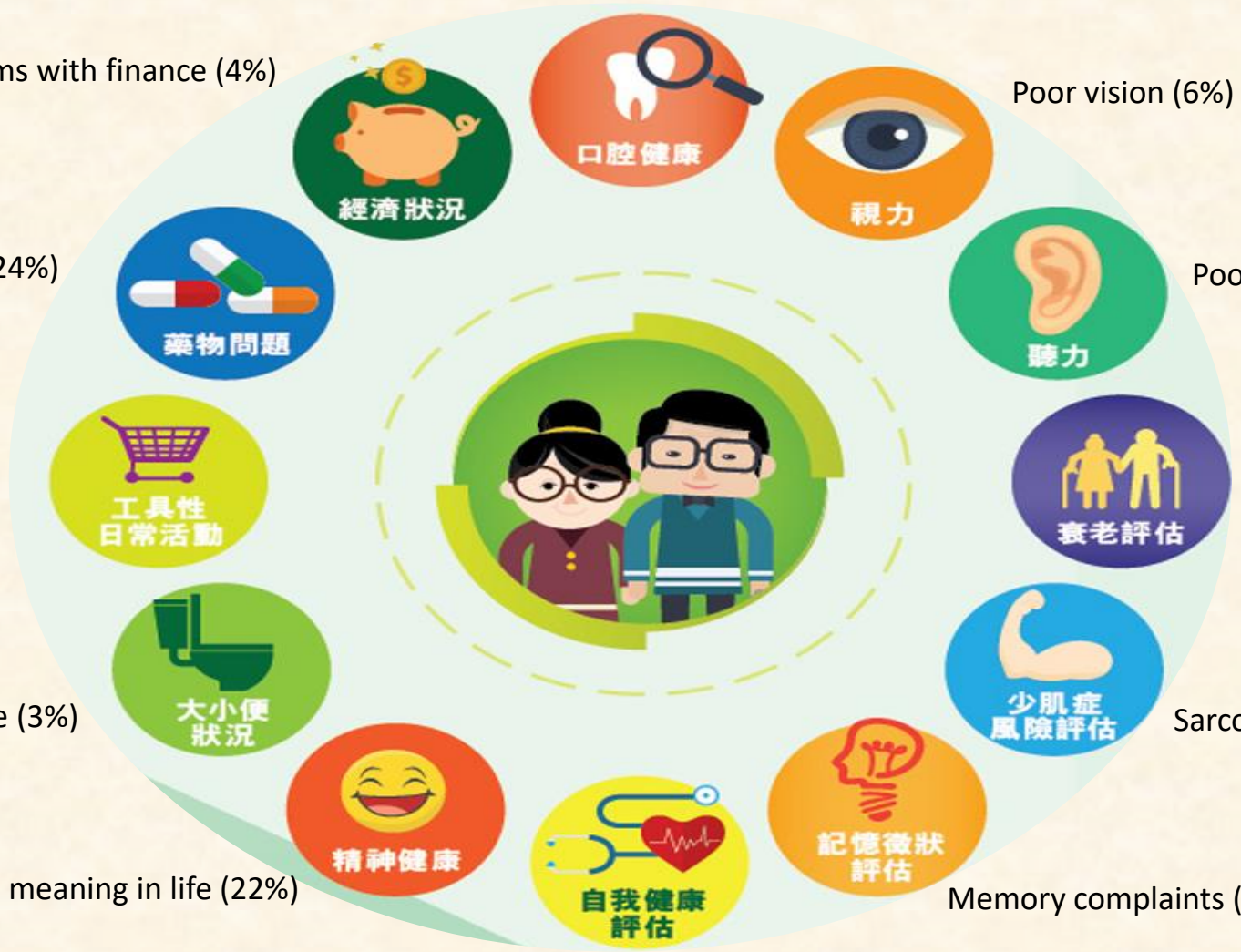
  Magnitude of problem with societal consequences
  Early detection, reversibility, prevention, intervention (non-pharmacological a main component)
- Responsive to needs centering on function and quality of life
- Integrated health and social care systems, with easy accessibility
- Empowerment and self management supported by IT

[Woo J. Int J Epidemiol Environ Res Public Health 2017;14:457]

Unmet needs

- Primary care setting
- Older people who are frail: cognitive as well as physical; living alone
- Problems encountered:
  -poor oral health, problems with hearing and vision
  -physical and cognitive frailty
  -poor psychological well being
  -dependency in instrumental activities of daily living
  -problems with medication
  -problems with finance, and care
- Frequent use of hospital services

Results of Well-being Survey



Chewing difficulties (38%)

Problems with finance (4%)

Poor vision (6%)

Polypharmacy (24%)

Poor hearing (4%)

Problems with IADL (27%)

Frailty (>60%)

Incontinence (3%)

Sarcopenia (15%)

No meaning in life (22%)

Memory complaints (>70%)

Poor self-rated health (12%)

WHO recommendation of primary care for older people

Integrated care for older people (ICOPE)

Guidelines on community-level interventions to manage declines in intrinsic capacity

- Comprehensive assessment of health status in an older person
- Delivery of the integrated health care that will enable an older person to maintain their physical and mental capacities, and/or to slow or reverse any declines in these

Use of technology
-Use of tablets for WBS
-Health data (e.g., BP, BG) send to nurse team by cloud technology
-Big data

Step 3
Referral to district health centres for chronic health problems management

District Health Centres

Step 2
Follow-up assessments +/- low intensity services (Interventions)

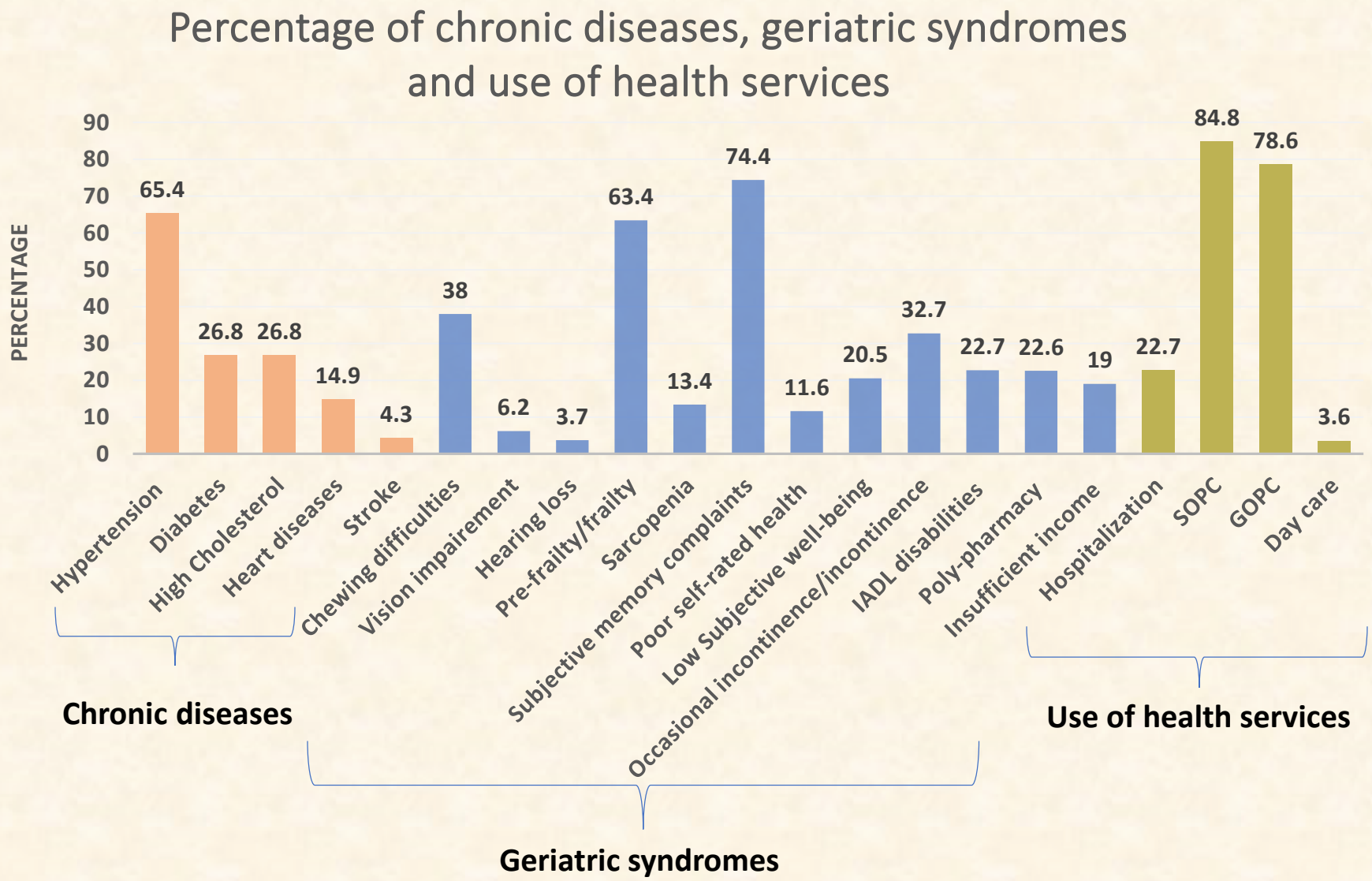
Community Health Centres

Step 1
Recognition
Well-being survey (WBS)
(Monitor of BP, BG + brief geriatric screening)
conducted by non-health care professionals

A stepped care model with the utilization of technology

香港中文大學
The Chinese University of Hong Kong

eHealth pilot data shows extensive unmet needs



香港中文大學
The Chinese University of Hong Kong

Subjective memory complaints increase instrumental activities of daily living (IADL) risk and use of hospital services

- Subjective memory complaints were significantly associated with an increased risk of functional disability and hospitalization at 1-year follow-up

	Incident IADL disability at 1-year follow-up (n=559)		Incident hospitalization at 1-year follow-up (n=708)	
Subjective memory complaints	n	Adjusted odds ratio (95% CI)	n	Adjusted odds ratio (95% CI)
No (AMIC score<3)	1274	Reference	1260	Reference
Yes (AMIC score≥3)	2892	1.8 (1.4 - 2.3)***	3289	1.5 (1.2 - 1.8)***

***p<0.001. Models were adjusted for age, sex, marital status, educational level, hypertension and diabetes. No. of participants without IADL disability at baseline (n=4168). No. of participants without hospitalization at baseline (n=4551). Totals may not add up due to missing values. AMIC, Abbreviated Memory Inventory for the Chinese.

香港中文大學
The Chinese University of Hong Kong

Frailty increases instrumental activities of daily living (IADL) risk and use of hospital services

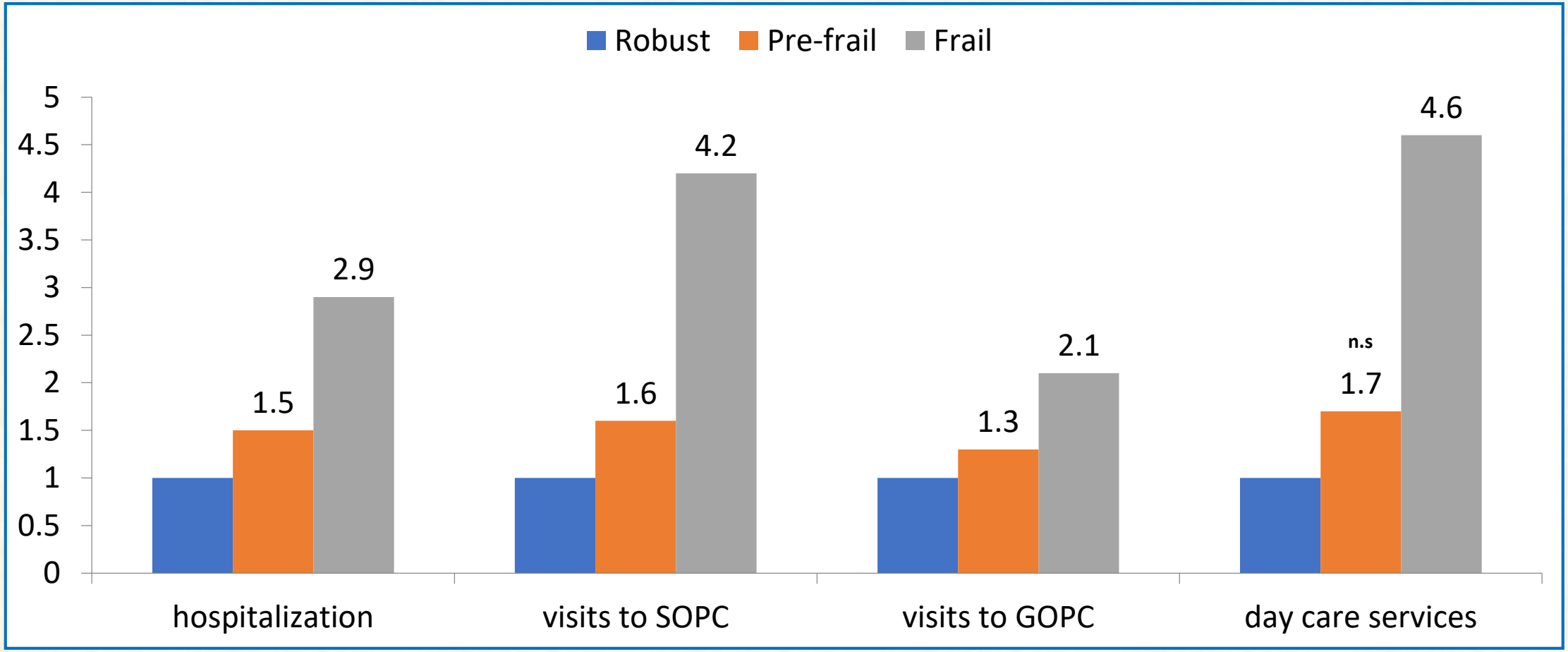
- Frailty at baseline was significantly associated with an increased risk of functional disability and hospitalization at 1-year follow-up

	Incident IADL disability at 1-year follow-up (n=559)		Incident hospitalization at 1-year follow-up (n=708)	
Frailty status	n	Adjusted odds ratio (95% CI)	n	Adjusted odds ratio (95% CI)
Robust	1748	Reference	1757	Reference
Pre-frail	2013	2.3 (1.8 - 2.9) ***	2207	1.4 (1.2 - 1.7)***
Frail	406	4.4 (3.3 - 5.9)***	586	2.4 (1.9 - 3.1)***

***p<0.001. Models were adjusted for age, sex, marital status, educational level, hypertension and diabetes. No. of participants without IADL disability at baseline (n=4168). No. of participants without hospitalization at baseline (n=4551). Totals may not add up due to missing values.

香港中文大學
The Chinese University of Hong Kong

Multivariate regression models for healthcare utilization (during the past 12 months) among older people



The models have been adjusted for age, gender, marital status, education level, diabetes, heart diseases, stroke, and chronic obstructive pulmonary disease.

Comprehensive Geriatric Assessment in a medico-social model

- Physical
- Functional
- Psychological
- Nutritional
- Social

Service model

- HK setting and philanthropic funding opportunity
- Underlying philosophy for service model
- Funding model
- Design and feasibility
- Evaluation: primary care; day care

Enhanced Primary Care

- To step up our efforts in providing quality primary care to a wider community, two new projects have been introduced:-
  1. Health Promotion and Maintenance - Frailty Programme
     - Funded by The Hong Kong Jockey Club Charities Trust
     - Components range from frailty prevention to frailty intervention
  2. Health Maintenance - eHealth Station
     - One of the community partners of Jockey Club Community eHealth Care Project
     - Applying eHealth solution to empower elders in self-management of health

Frailty Programme

Background

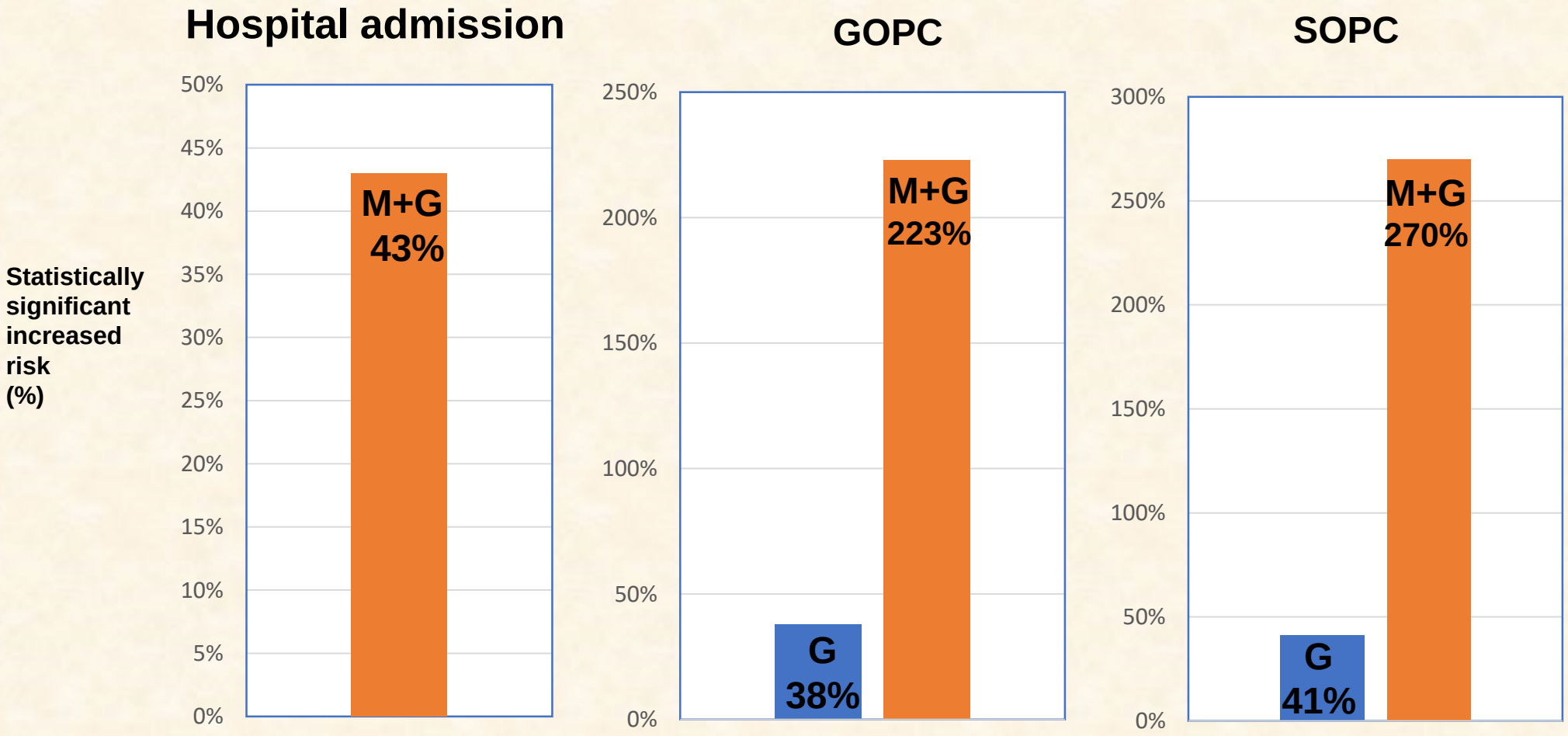
- Older people living with frailty are at risk of adverse outcomes such as fall, hospitalisation, and institutionalisation, causing great burden on caregiving and healthcare expenditure
- Frailty has a correlation with increased health and community service utilisation
- Frailty is a public health indicator of ageing well for projection of health and social care resource allocation and informing social and health policies

Frailty Programme and WHO ICOPE

- Improving musculoskeletal function, mobility and vitality
- Preventing severe cognitive impairment and promote psychological wellbeing
- Preventing falls

Frailty Programme

- Frailty is correlated with increased risk of health and community service utilisation



M = Multi morbidity G = Geriatric syndrome

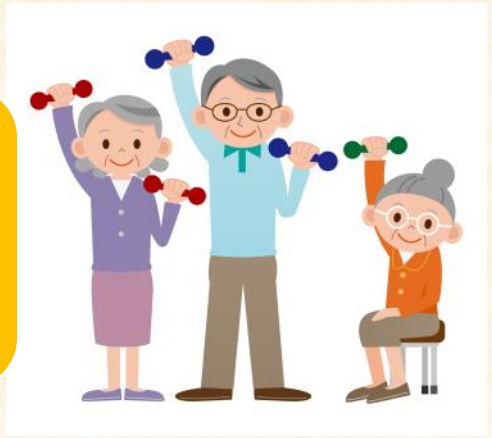
Is frailty treatable?
衰老是否可以醫治?

- **Yes! 是!**
- Frailty is not an inevitable part of ageing
  衰老並非老化過程的必然結果
- Physical frailty (sarcopenia) is reversible
  身體衰老(可導致缺肌症)是可逆轉的

Recognition of Frailty (Screening)
辨認衰老狀況(篩查)

Comprehensive Geriatric Assessment
全面性老年健康評估

Individualized care and training / intervention
個人化的介入治療、訓練及護理服務



Yu R et al. Geriatr Gerontol Int 2014;14(suppl1):15-28
Lee J et al. J Am Med Dir Assoc 2014;15(4):281-6

香港中文大學
The Chinese University of Hong Kong

Interventions in NGOs can reduce frailty and improve memory functions

	Intervention (n=66)	Control (n=61)
% of participants converted from pre-frailty to robust status	83%	2%
% of participants increased in Frontal Assessment Battery score (executive function)	+ 14%	No change
% of participants increased in Digit Span score (attention and working memory)	+ 5%	- 1%

JAMDA 21 (2020) 294.e1–294.e10

ELSEVIER

JAMDA

journal homepage: www.jamda.com

Original Study

Effects of a Multicomponent Frailty Prevention Program in Prefrail Community-Dwelling Older Persons: A Randomized Controlled Trial

Check for updates

Ruby Yu PhD [a,b,*], Cecilia Tong MSc [a], Florence Ho MSc [c], Jean Woo MD [a,b]

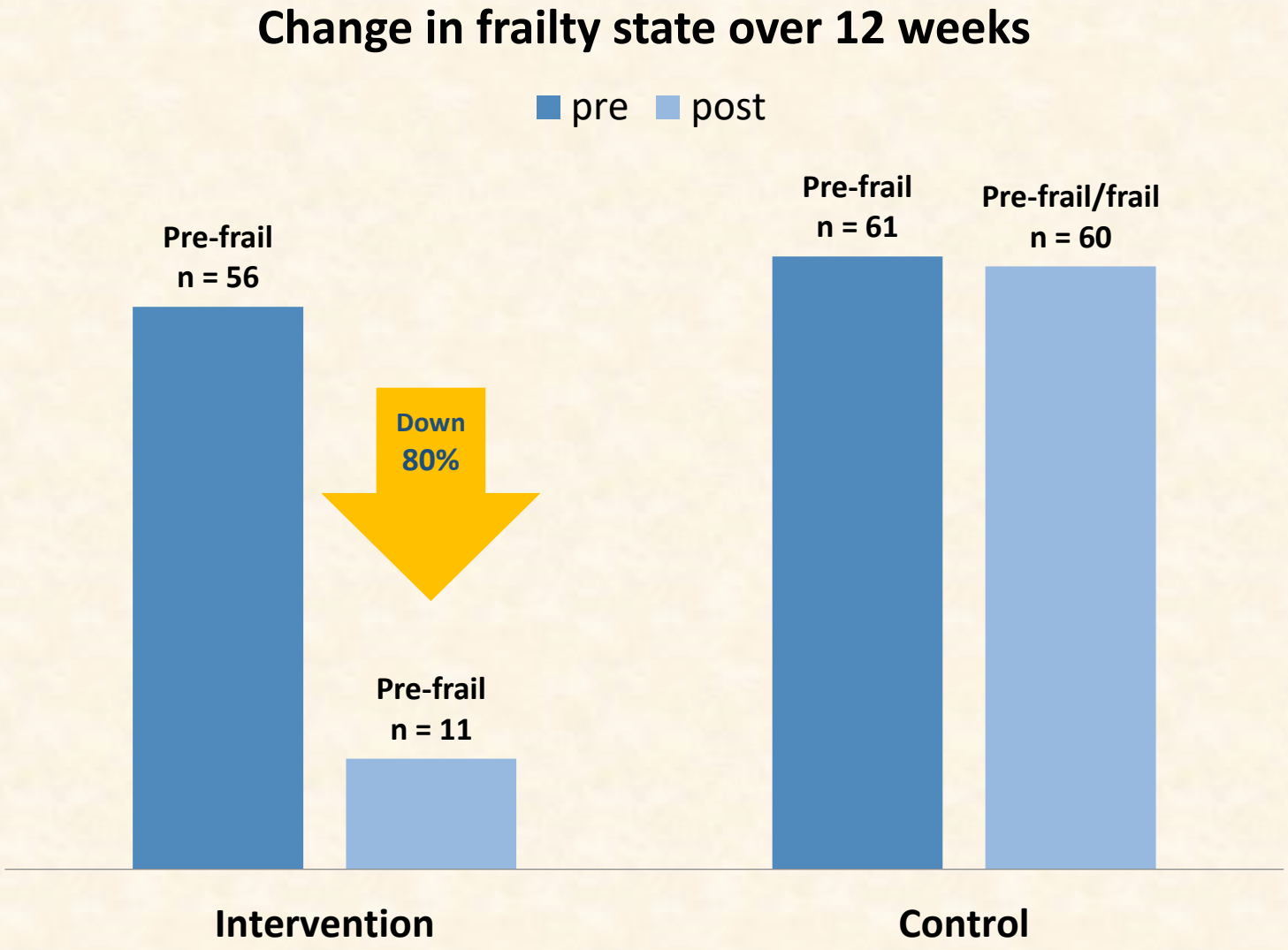
[a] Jockey Club Institute of Ageing, Chinese University of Hong Kong, Hong Kong SAR, China
[b] Department of Medicine and Therapeutics, Faculty of Medicine, Chinese University of Hong Kong, Hong Kong SAR, China
[c] Jockey Club Cadenza Hub, Hong Kong SAR, China

Keywords:
Frailty
multicomponent
randomized controlled trial

A B S T R A C T

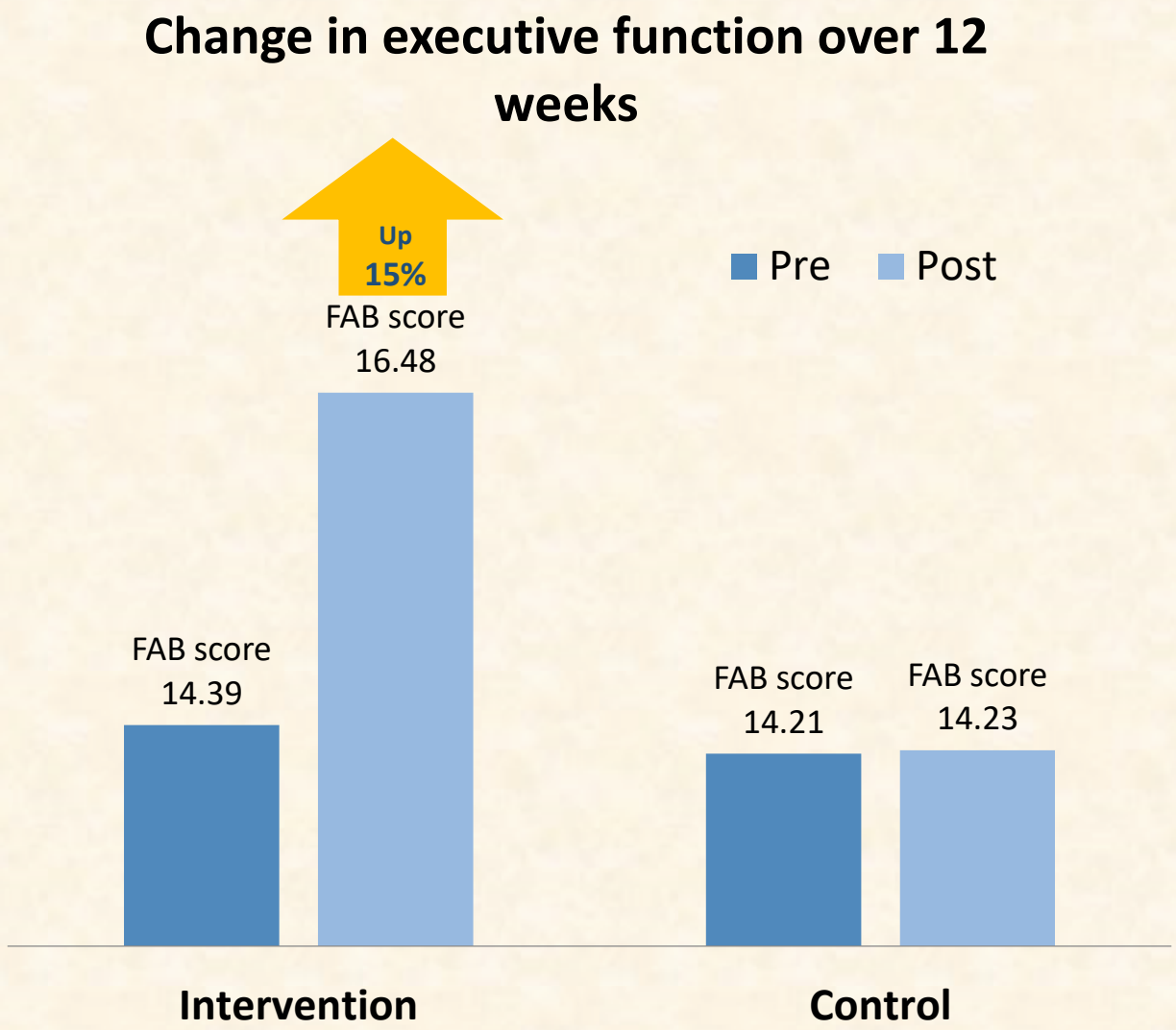
Objective: To examine the effects of a multicomponent frailty prevention program in community-dwelling older persons with prefrailty.
Design: A randomized controlled trial.
Setting: A community elderly center in Hong Kong.
Participants: Persons aged ≥50 years who scored 1-2 on a simple frailty questionnaire (FRAIL)
Methods: Participants (n = 127) were randomly assigned to a 12-week multicomponent frailty prevention program (exercise, cognitive training, board game activities) or to a wait-list control group. The primary outcomes were FRAIL scores, frailty status, and a combined frailty measure including subjective (FRAIL total score) and objective (grip strength, muscle endurance, balance, gait speed) measures. The secondary outcomes were verbal fluency assessed by dual-task gait speed, attention and memory assessed by digit span task, executive function assessed by the Frontal Assessment Battery, self-rated health, and life satisfaction. Assessments were conducted at baseline and at week 12.
Results: The mean age of the participants was 62.2 years, and 88.2% were women. At week 12, the FRAIL score had decreased in the intervention group (−1.3, $P < .001$) but had increased in the control group (0.3, $P < .01$) (between-group differences $P < .001$). In addition, 83.3% and 1.6% of the intervention and control groups, respectively, had reversed from prefrailty to robust phenotype (between-group differences $P < .001$). Participants in the intervention group also had a greater reduction in the combined frailty score and greater improvements in muscle endurance, balance, verbal fluency, attention and memory, executive function, and self-rated health than those in the control group (all $P < .05$). There were no significant differences between the groups with respect to grip strength, gait speed, and life satisfaction.
Conclusions and implications: The multicomponent frailty prevention program reduced frailty and improved physical and cognitive functions, and self-rated health in community-dwelling older persons with prefrailty. Findings can provide insights into the consideration of incorporating frailty prevention programs into the routine practice of community elderly services.

The program can reverse frailty state



香港中文大學
The Chinese University of Hong Kong

The program can improve cognitive function



香港中文大學
The Chinese University of Hong Kong

The program is ready to be adopted

89%

Good participation rate

85%

Good attendance

5%

Low drop out rate

>95%

Positive feedback

"After the exercise, I can sense a great change of my knee, with better stretching and muscular strength…" F/64

"I met a lot of friends in the program…" F/61

"After the training, I can be sharper in thinking, better in analysis,
more attentive in observation…" M/72

香港中文大學
The Chinese University of Hong Kong

eHealth pilot data shows feasibility of adoption of technology in meeting needs after one year

Raising health literacy and behavior change

- Level of knowledge on hypertension ↑ **25.1%**
- Level of knowledge on diabetes ↑ **43.9%**
- Proportion of individuals who had increased participation in centre-based activities
  - Exercise ↑ **43.2%**
  - Cognitive training ↑ **24.5%**
  - Social activities ↑ **41.5%**
  - CDSM* activities ↑ **48.3%**

***CDSM**
Chronic Disease Self-Management

Better control of blood pressure

- Blood pressure levels
  - SBP ↓ **5.1 mmHg**
  - DBP ↓ **2.0 mmHg**
- Proportion of known hypertensive participants failed to control their SBP ↓ **from 28.3% to 14.2%**
- Proportion of known diabetic participants failed to control their BG ↓ **from 5.5% to 3.0%**

Improvement in subjective well-being

- Proportion of participants who were satisfied with their lives ↑ **2.9%**
- Proportion of participants who felt happiness ↑ **1.2%**
- Proportion of participants who had a sense of purpose and meaning in life ↑ **10.7%**
- Proportion of participants with low subjective wellbeing* ↓ **48.9%**

***Low subjective wellbeing**
Participants who were either dissatisfied with their lives (evaluative wellbeing), scored 2 or less in the happiness scale (hedonic wellbeing), or had no sense of purpose and meaning in life (eudemonic wellbeing) were classified as people having low subjective wellbeing

香港中文大學
The Chinese University of Hong Kong

eHealth pilot data shows positive response from Centre staff and members of centres

Response from Centre staff

Coherence

- Centre staff felt that the Project can raise their understanding on health and well-being of the elderly, as they can get in touch with health issues through various health talks, groups and members' repeated blood pressure and blood glucose measurements

Participation

- Centre staff felt that they have more financial resources in organizing diversified activities to address the health needs of their members
- Some centres have already set up nurse clinic

Collective action

- Centre staff felt that the Project is a feasible model to implement medical-social integration as there are follow-ups from nurse and that centre is the first contact point for the elders to get in touch with community resources

Appraisal

- Centre staff felt that the ASK resource kit is useful in providing health knowledge, although they have limited time to go through it
- Centre staff felt that they can answer some health related questions in case elders asked them

Response from members of centres

Coherence

- Participants felt that the Project can empower them in managing their health conditions

Perceived effectiveness

- Participants felt that joining the Project had helped them to stay or become healthier

Satisfaction

- Participants with regular measurements with telephone calls and monthly visit support appreciated these services and activities

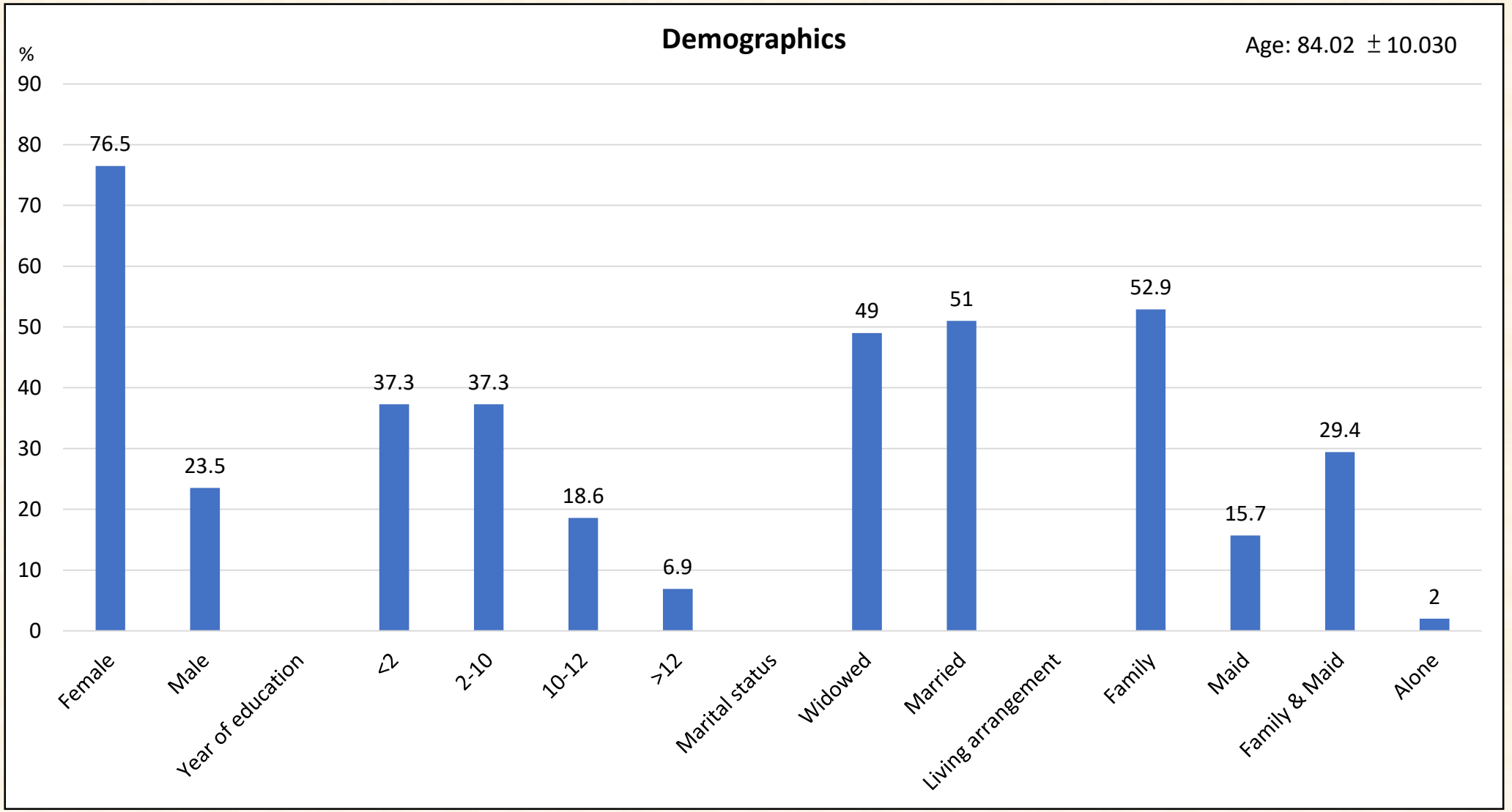
Self-efficacy

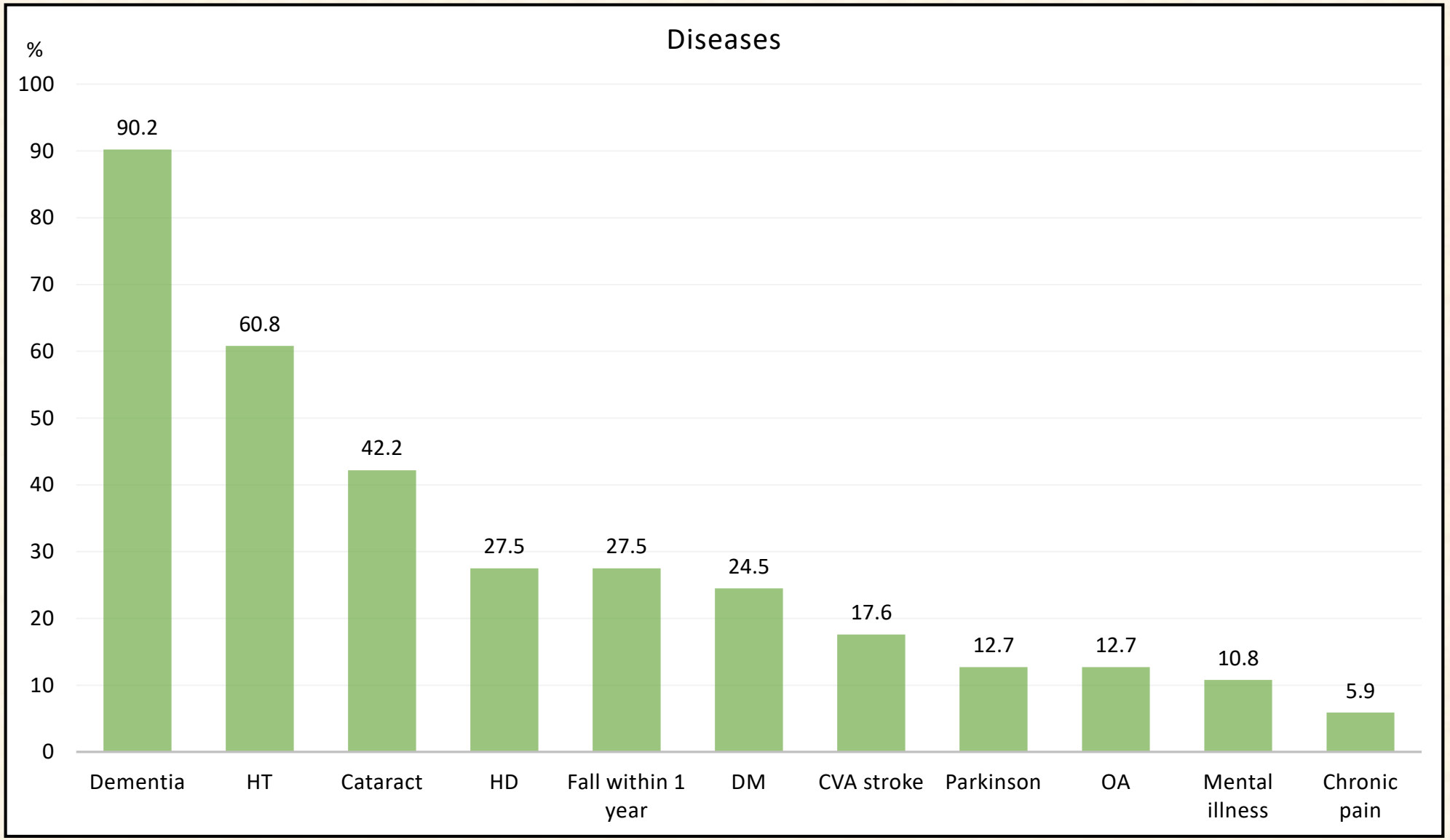
- Participants felt that they have confidence in managing their health conditions

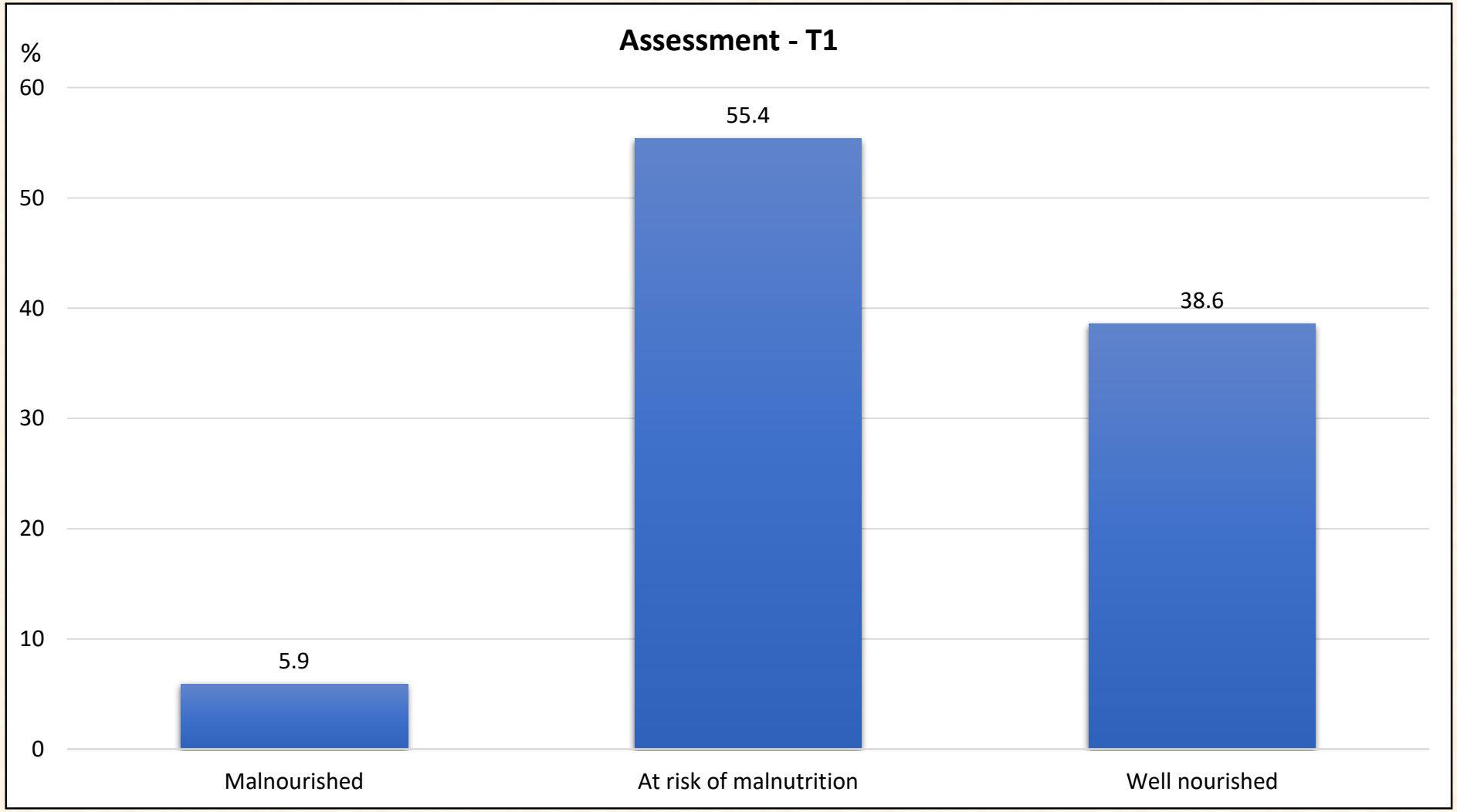
香港中文大學
The Chinese University of Hong Kong

Dementia Day Care

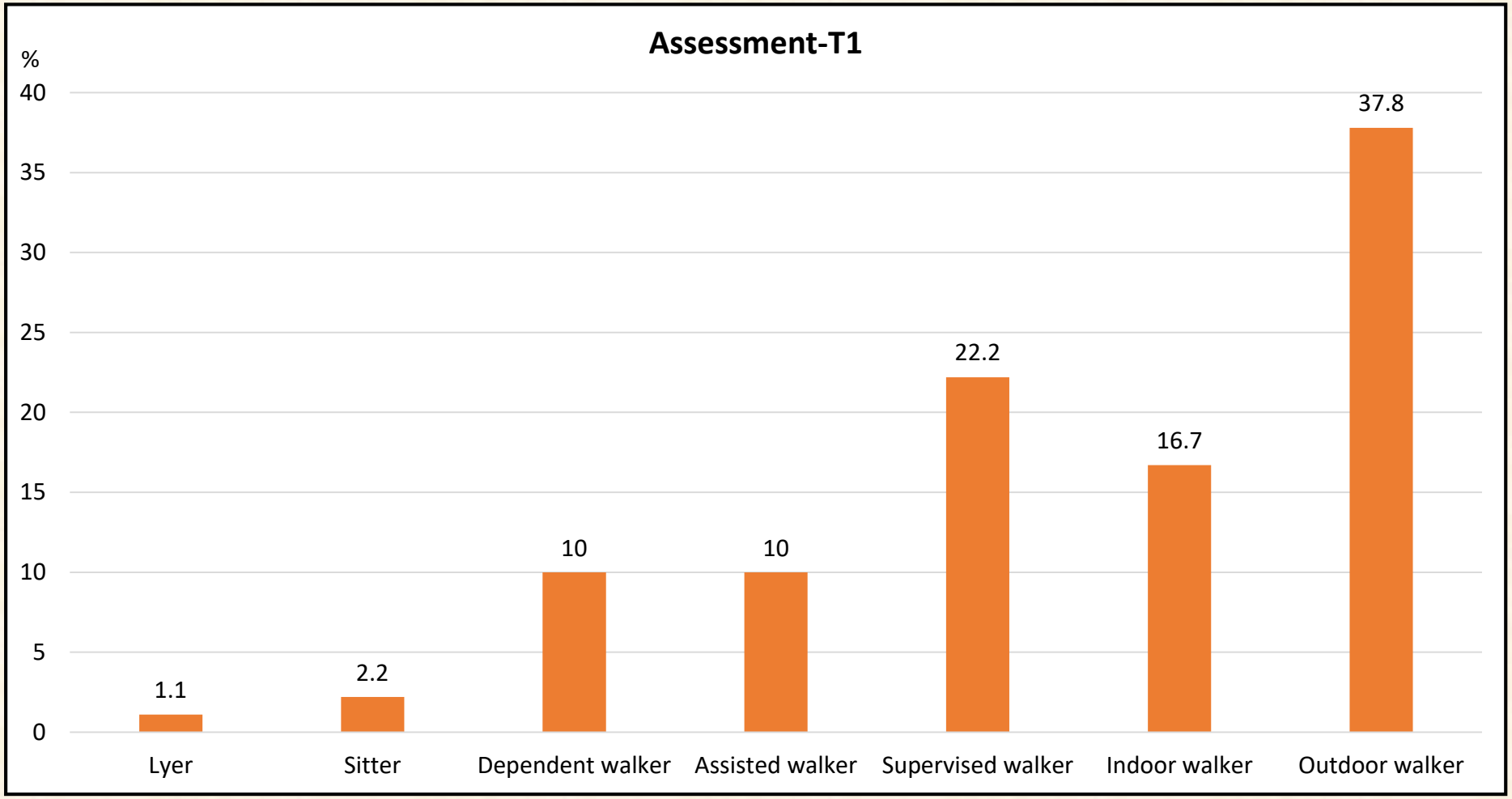
At the Tai Po Cadenza Hub


Demographics
Age: 84.02 ± 10.030
%
90
80
70
60
50
40
30
20
10
0
76.5
23.5
37.3
37.3
18.6
6.9
49
51
52.9
15.7
29.4
2
Female
Male
Year of education
<2
2-10
10-12
>12
Marital status
Widowed
Married
Living arrangement
Family
Maid
Family & Maid
Alone

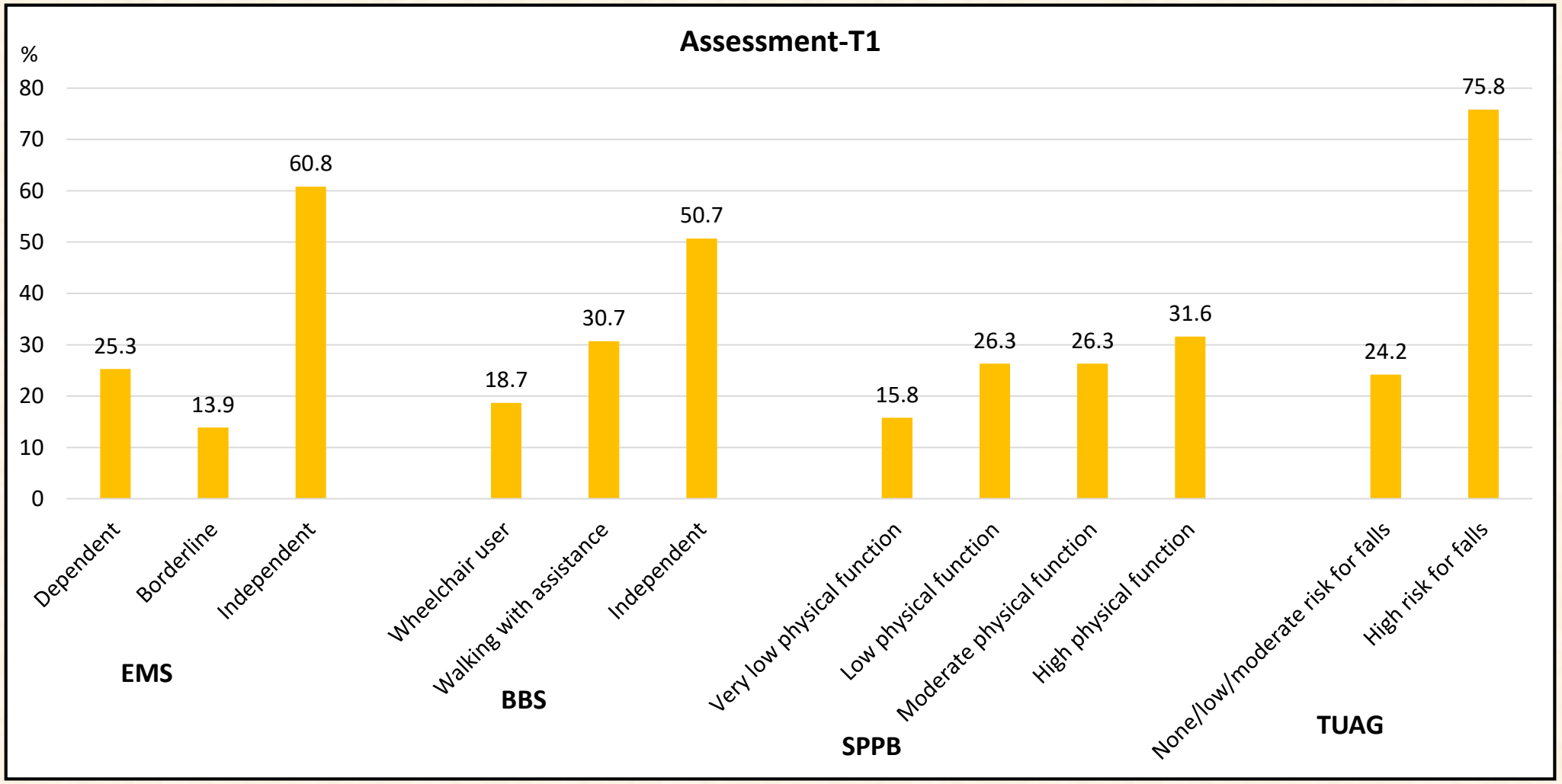

Diseases
%
100
90
80
70
60
50
40
30
20
10
0
90.2
60.8
42.2
27.5
27.5
24.5
17.6
12.7
12.7
10.8
5.9
Dementia
HT
Cataract
HD
Fall within 1 year
DM
CVA stroke
Parkinson
OA
Mental illness
Chronic pain



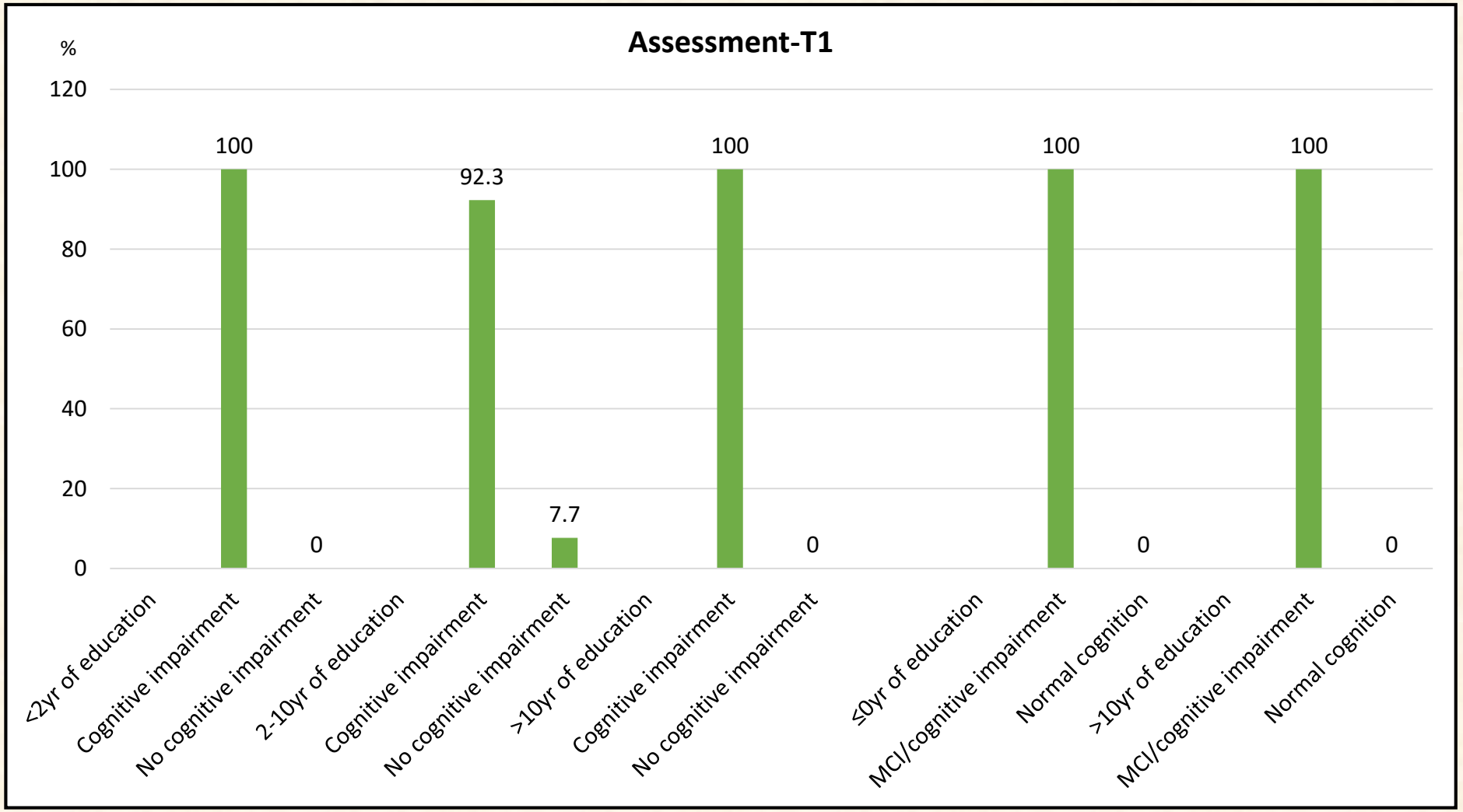
Mini Nutritional Assessment (MNA)

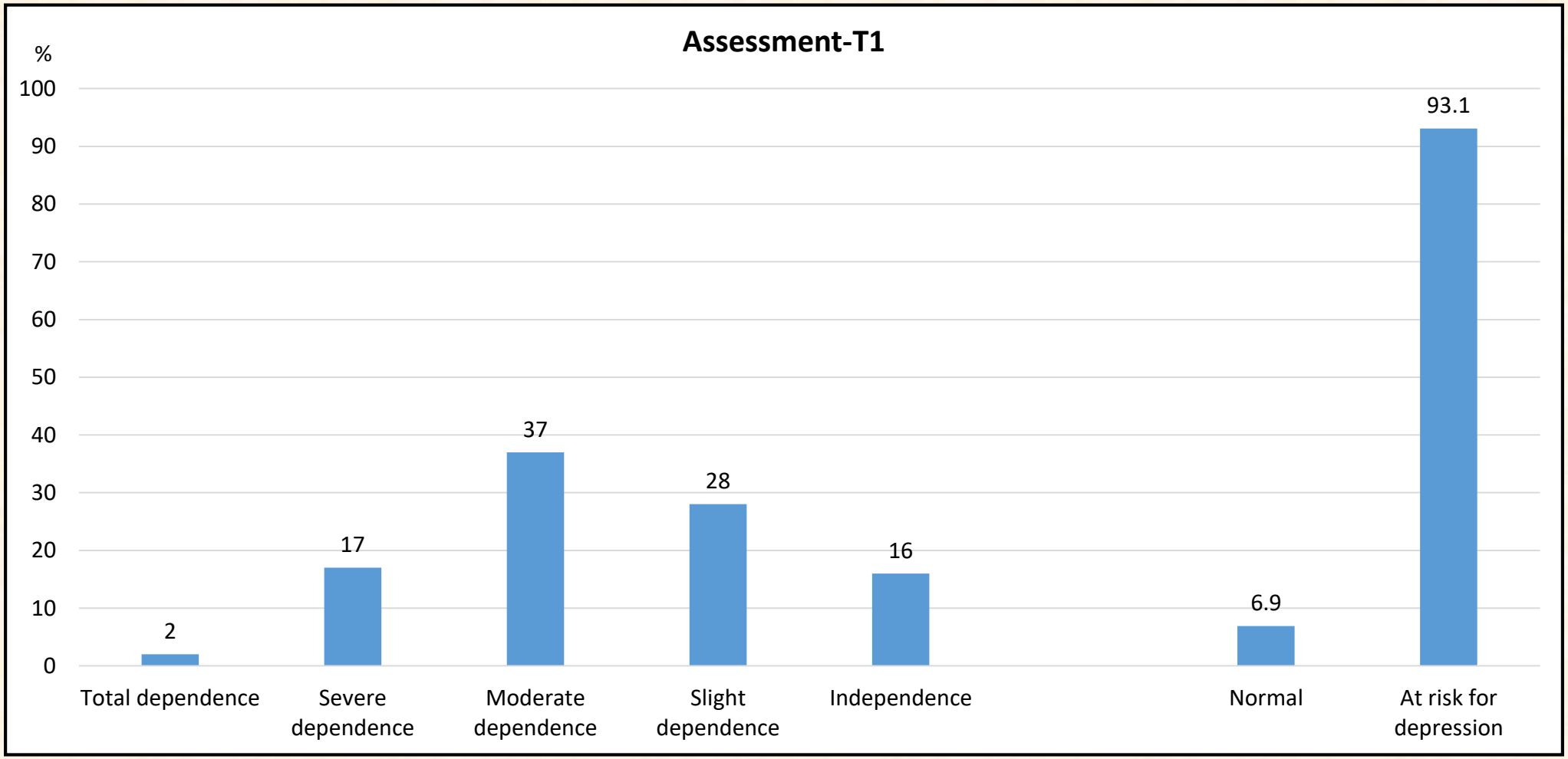


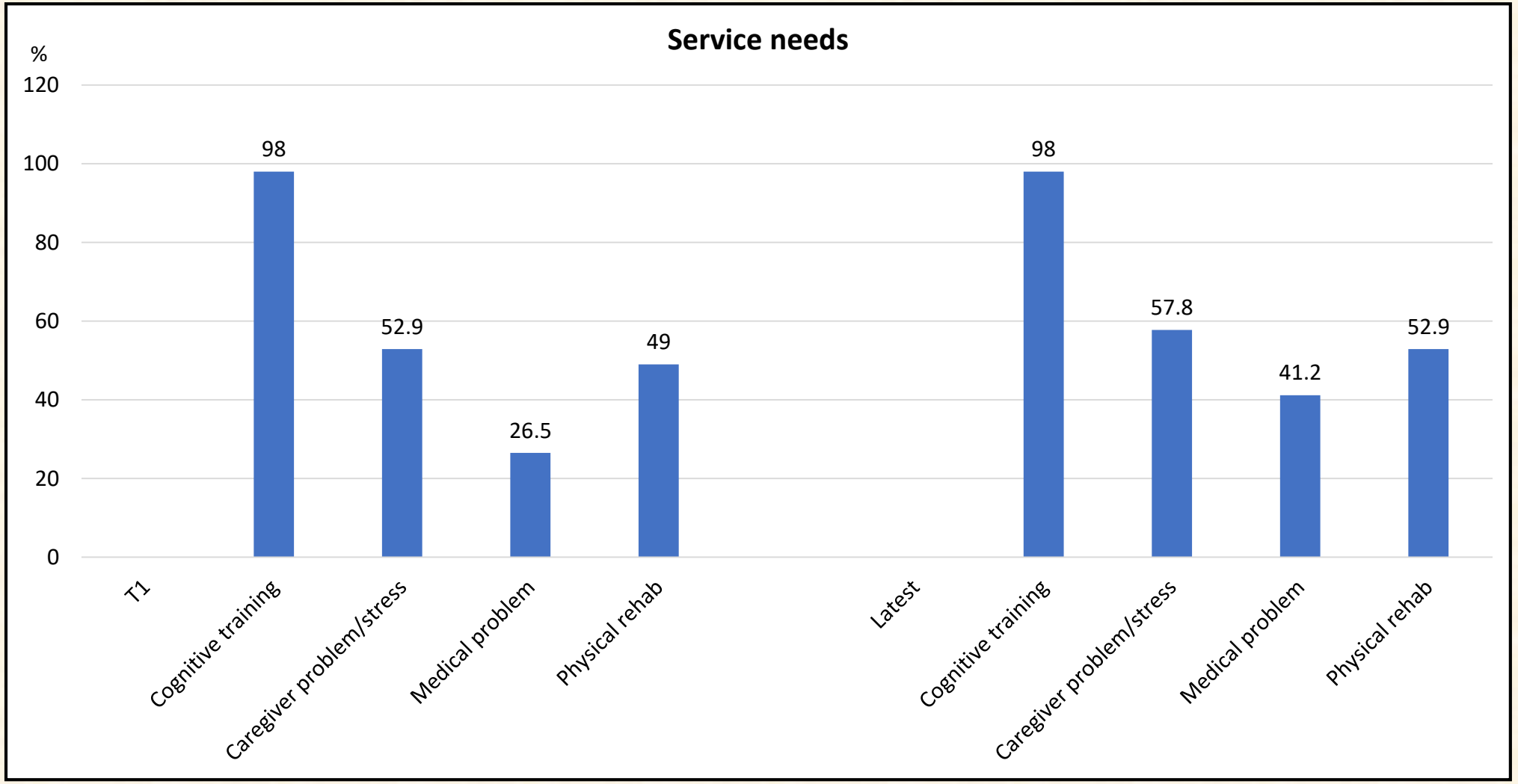
PT: Modified Functional Ambulation Classification (MFAC) in point

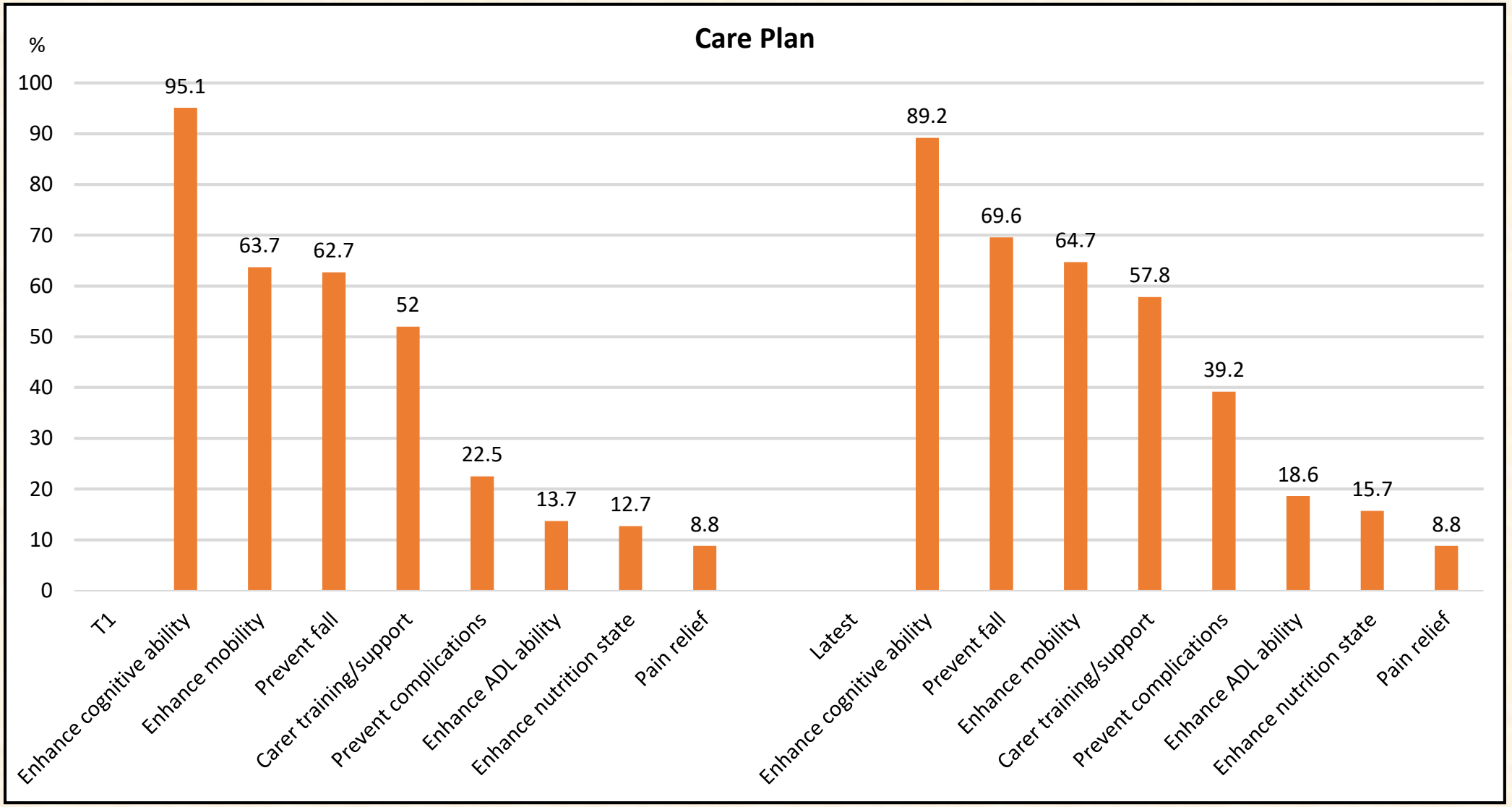


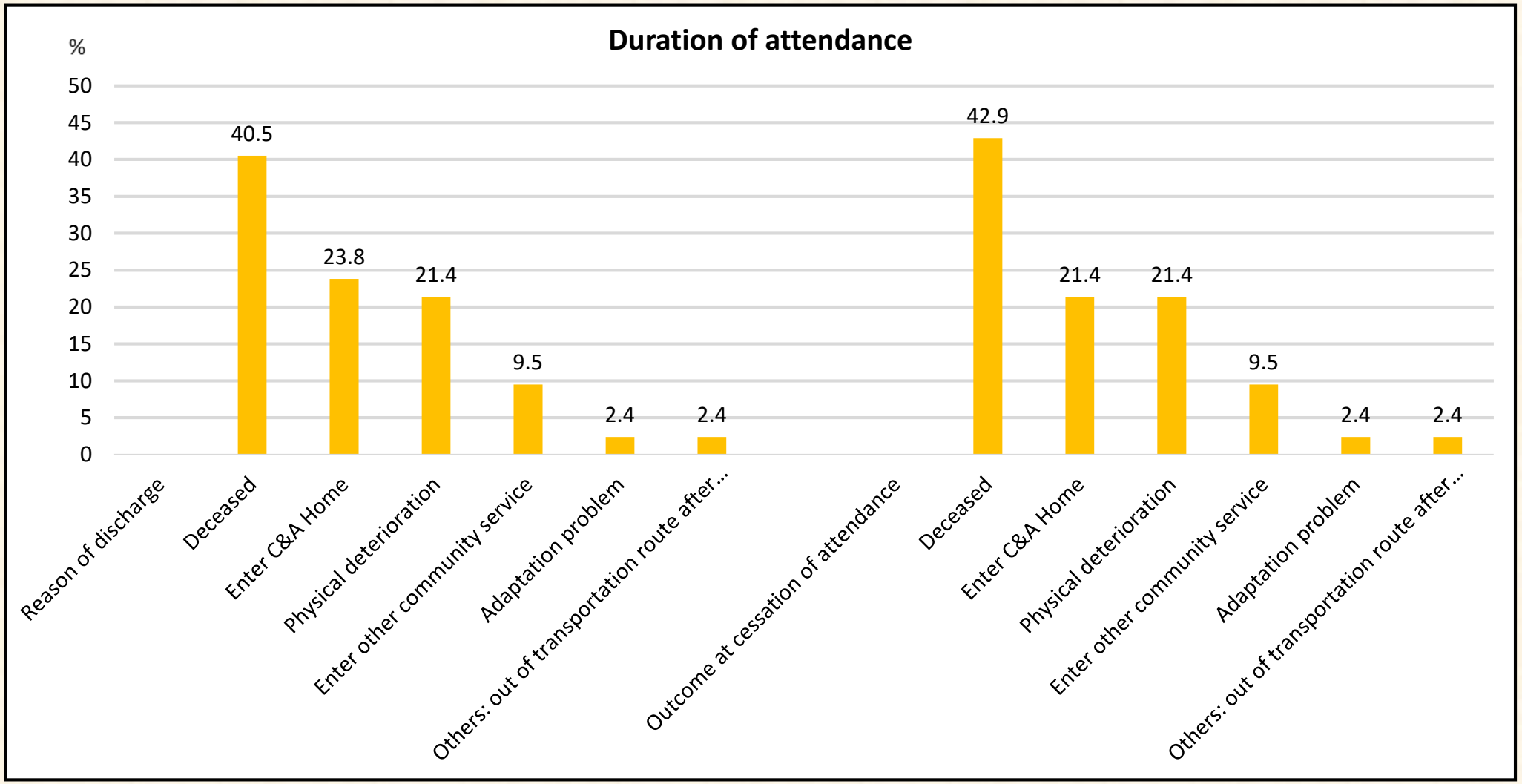
EMS – Elderly Mobility Scale; BBS – Berg Balance Scale; SPPB – Short Physical Performance Battery; TUAG – Timed Up an Go


Assessment-T1
%
120
100
80
60
40
20
0
100
0
92.3
7.7
100
0
100
0
100
0
<2yr of education
Cognitive impairment
No cognitive impairment
2-10yr of education
Cognitive impairment
No cognitive impairment
>10yr of education
Cognitive impairment
No cognitive impairment
≤0yr of education
MCI/cognitive impairment
Normal cognition
>10yr of education
MCI/cognitive impairment
Normal cognition
Mini-Mental State Examination (MMSE)
Montreal Cognitive Assessment (MoCA)


Assessment-T1
%
100
90
80
70
60
50
40
30
20
10
0
2
17
37
28
16
6.9
93.1
Total dependence
Severe dependence
Moderate dependence
Slight dependence
Independence
Normal
At risk for depression
Barthel Index (BI)
Zarit Burden Interview (ZBI)


Service needs
%
120
100
80
60
40
20
0
98
52.9
26.5
49
98
57.8
41.2
52.9
T1
Cognitive training
Caregiver problem/stress
Medical problem
Physical rehab
Latest
Cognitive training
Caregiver problem/stress
Medical problem
Physical rehab


Care Plan
%
100
90
80
70
60
50
40
30
20
10
0
95.1
63.7
62.7
52
22.5
13.7
12.7
8.8
89.2
69.6
64.7
57.8
39.2
18.6
15.7
8.8
T1
Enhance cognitive ability
Enhance mobility
Prevent fall
Carer training/support
Prevent complications
Enhance ADL ability
Enhance nutrition state
Pain relief
Latest
Enhance cognitive ability
Prevent fall
Enhance mobility
Carer training/support
Prevent complications
Enhance ADL ability
Enhance nutrition state
Pain relief


Duration of attendance
%
50
45
40
35
30
25
20
15
10
5
0
40.5
23.8
21.4
9.5
2.4
2.4
42.9
21.4
21.4
9.5
2.4
2.4
Reason of discharge
Deceased
Enter C&A Home
Physical deterioration
Enter other community service
Adaptation problem
Others: out of transportation route after...
Outcome at cessation of attendance
Deceased
Enter C&A Home
Physical deterioration
Enter other community service
Adaptation problem
Others: out of transportation route after...

Case studies

- Physical domain- diagnosis of urinary tract infection; adjustment of hypertensive medication after hypotensive episode
- Psychological domain- post bereavement depression support; resolving marital disharmony
- Functional status- post hip fracture rehabilitation
- Nutritional domain- malnutrition reversed by hub services
- Social domain-carer support/respite care/alternative to residential care
- Advance care planning- choice of artificial feeding in late stage dementia

Comments from carers

- Help with difficulties of care giving
- Place for health maintenance activities
- Provision of skilled care
- Relieve carer stress and improve family relationships
- Government subsidy is very important in enabling them to use this service

Impact

- Addresses unmet needs
- Addresses health inequalities by tackling social as well as behavioural determinants for prevention of age-related decline ad promoting healthspan
- Government day care vouchers with value depending on income is a key feature of mitigating health inequalities using this service model
- Allows scaling up of social enterprises and further development of integrated care.

Way forward

- To achieve financial sustainability, closer links with the private medical sector, insurance industry, government supported organizations such as the District Health Centres, Hospital Authority, Department of Health Elderly Health Centres, and community NGOs would need to be developed further

Summary

- Health inequalities and unmet needs are prevalent among older adults living in the community
- These can be mitigated through redesign of models of service delivery based on integrated medico social step care approach (such as the WHO ICOPE program)
- Users' feedback is important in implementation of any policy changes
- Social enterprise with government financial support may be a more responsive model for mitigating health inequalities among older adults