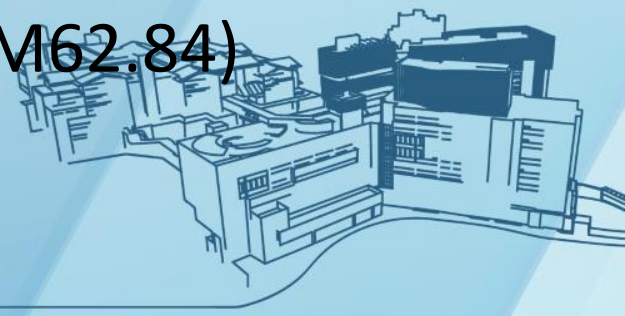
“Sarco-Tackle” Programme

Addressing Sarcopenia in Geriatric Patients with Hip Fracture

3L Ward, Haven of Hope Hospital

Introduction

- Sarcopenia(From Greek root, *Sarx*- = Flesh, *-penia* = low) originally simply defines as loss of muscle mass back in 1988, primarily deemed as a geriatric syndrome (Cruz-Jentoft & Morley, 2021)
- Different societies, working groups and institutes have more “modernized” definitions on sarcopenia based on newest evidences and clinical needs
- WHO accepts as a muscle condition with an ICD-CM diagnosis code (ICD-10-CM M62.84)



Definition of sarcopenia

- No “gold standard” like osteoporosis
- The most accepted definition suggested by The European Working Group on Sarcopenia in Older People (EWGSOP2) in 2018:

➢Progressive and generalized skeletal muscle disorder

➢Associated with increased likelihood of adverse outcomes → Falls, fractures, physical disability and mortality

(Cruz-Jentoft et al., 2019)

3 tiers operational definition of Sarcopenia by EWGSOP2

Probable
- Low muscle strength
- Handgrip/Chair stand test

Confirm
- Low muscle quality or quantity
- Imaging e.g. DXA, CT/MRI

Severe
- Low physical performance
- Gait speed, Timed up and go test(TUG)

Significance of sarcopenia

- Increases risk of fall (OR 2.38 – 3.23)
- Increase osteoporosis and fracture risks
- Functional declines(OR 2.5-3.0)
- lower quality of life

Situation in Ward 3L, HHH

- Orthopaedic rehabilitation ward
- >95% patients are aged >60
- >70% of cases are fragility hip fractures resulted from fall
- High recurrent fall risk and functional decline

Area of interest

- As sarcopenia is known risk factor of fall and fractures, how many of fragility fracture hip cases are probably sarcopenic?
- Is there any interventions can help to prevent/improve sarcopenia?

Service gap

- No routine screening and treatment protocol for sarcopenia
- No routine protein supplement and nutritional education on sarcopenia patients
- Existing restrictive exercise recommendations may not be applicable due to lower limb mobilization limitations

Sarco Tackle Programme

- Initiated in March 2024
- Core members:
  - Nurses
  - Physiotherapist
  - Dietitian

Objectives

1. To investigate the prevalence of sarcopenia in fracture hip patients in 3L
2. To enhance muscle strength in targeted patients
3. To empower patients to manage sarcopenia through lifestyle modifications

Patient screening for sarcopenia

- Clinically not applicable for imaging and physical performance test
- Adopted The Asian Working Group for Sarcopenia (AWGS2) for handgrip strength cut-offs(Male<28kg, Female <18kg) as majority of patients are Chinese

Methodology

- Convenience sampling
- Physiotherapist assesses handgrip using JAMAR Plus + hydraulic type dynamometer on admission and before discharge(~1-2 days)
- APNs screen every admitted patient for whether eligible for the programme
- Interventions carried out by responsible nurses during inpatient stay
- 2 Phone follow ups for evaluation

Inclusion criteria

- Age ≥60
- Home dwelling
- Primary diagnosis of fracture hip with post operation order full weight bearing (FWB)
- Reasonable premorbid functional status(MFAC≥5)
- Cognitive intact (AMT≥6)
- Handgrip(Male<28kg, Female <18kg) using AWGS2 II standard

Exclusion Criteria

- Medical conditions prohibits using dumbbell for restrictive exercise, e.g.
  - CVA with residual deficits
  - Neurological diagnosis(e.g. parkinsonism)
  - Upper limb injuries
- Unable to comprehend educational materials
  - Visual/hearing impairment
  - Iliterate/dialect speaking

Outcome measures

- Primary outcome
  - ➢Handgrip strength difference(Before discharge vs admission)
  - ➢Data analysis and statistics by SPSS(Version 26)
- Secondary outcomes
  - ➢Lifestyle modification compliance
  - ➢Patient satisfaction scores

Study design

- Quasi-experimental study design
- Patients with same eligibility criteria in December 2023 to February 2024 were assigned to comparison group
- Usual care is given to comparison group
- Additional interventions + usual care were given to intervention group(March 2024 onwards)
- Handgrip strength on admission(initial handgrip) and before discharge(predischarge handgrip) were assessed by PT to evaluate whether the interventions can improve handgrip strength

Interventions

- 4 major components:

1. Restrictive upper limb exercises
2. Nutritional counselling and support
3. Sunlight exposure
4. Lifestyle modification strategies

Restrictive upper limb exercises

- Using dumbbells(1lb/2lb/3lb)
- 20-min Demonstration video(designed and recorded by physiotherapist) available in ward iPads
- Responsible nurses arrange patients to carry out exercises with video aids from iPad 4 times/week
- Male patients start from 2lb dumbbells while 1lb for females, upgrade PRN

Nutritional counselling and support

- Nutritional counselling and support for high quality protein and calcium intake
- Order protein supplements in DCMS

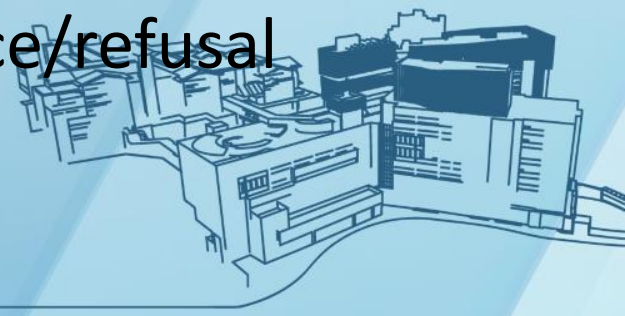
➢Refer dietitian for CKD patients

➢Ensure by default

➢Glucerna for DM patients

➢Isosource 1.2HN/ Resource ultra clear fruit beverage(orange) for milk intolerance/refusal

- Algorithm supported by dietitian



Sunlight exposure

- Sunlight exposure for ~15mins every Sunday(±Public holidays) in Rehabilitation Garden of Trinity Block, HHH
- To empower patient to develop habits of regular sunlight exposure for Vitamin D metabolism

Lifestyle modification strategies

- Fall prevention
- Exercises
- Nutrition
- Knowledge quiz

Patient's package for the programme

- Towel
- Dumbbell
- Education pamphlet

Education pamphlet

2. 肌少症的症狀及潛在風險

症狀	潛在風險
肌肉力量減弱 (如手握力下降)	容易跌倒
行動力減慢 (如步距及步速)	自理能力下降
耐力下降，容易減到疲倦	骨質疏鬆 增加骨折風險

研究顯示，患有肌少症的病人跌倒風險比一般人高 2.3-3.2 倍左右，自理能力下降機率亦為一般人的 2.5-3.0 倍，所以預防肌少症對維持生活質素及預防受傷十分重要。

3.如何預防肌少症

A.運動篇

肌肉的生成及強化需要施加一定阻力(重量)，所以除了日常物理治療運動鍛練下肢外，病房護士及物理治療師為您設計了一套鍛練上肢肌肉的阻力運動，此運動好處是只要預備好簡單的物品，坐在椅上或床上就可以進行。

運動 Youtube 片 QR code (全長約 19 分鐘)	預備物品: 1. 啞鈴一對(1 磅，如合適可加碼) 如無啞鈴，可用注滿水的水樽代替(500 毫升水樽大約 1 磅) 2. 毛巾一條

QR code for accessing to the video at home

Phone follow ups

- Phone follow up at 4-week and 12-week after discharge
- Collect compliance data, i.e. exercise, nutrition, sunlight exposure
- Collect number of fall events after discharge
- Satisfaction score of the programme

Photo highlights

Photo highlights

Video highlights

Results

- As at 31/3/2025, 50 patients assigned to comparison group and 73 patients recruited to the programme as intervention group
- Some patients dropped out from the programme as need to transfer back to acute hospital due to acute medical conditions
- 36 of comparison group and 68 of intervention group completed handgrip strength measurement on admission and before discharge

Demographic data

	Comparision group (n=36)	Intervention group (n=68)	*P* value
Age	83.72	81.82	0.155
Gender(M)	14 (38.9%)	14 (20.6%)	
Gender(F)	22 (61.1%)	54 (79.4%)	

Independent sample T-test(Comparison vs Intervention, Initial vs predischarge handgrip)

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
Initial Handgrip	Control	50	15.512	5.2167	.7378
	Intervention	73	15.052	4.7336	.5540
Predischarge handgrip	Control	36	16.089	4.5185	.7531
	Intervention	68	17.463	5.1116	.6199

*Following statistics reported using 95% confidence interval otherwise specified

Independent sample T-test(Comparison vs Intervention, Initial + predischarge handgrip)

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Initial Handgrip	Equal variances assumed	1.016	.315	.508	121	.613	.4599	.9059	-1.3336	2.2535
	Equal variances not assumed			.499	98.526	.619	.4599	.9226	-1.3708	2.2907
Predischarge handgrip	Equal variances assumed	.094	.760	-1.356	102	.178	-1.3738	1.0133	-3.3837	.6361
	Equal variances not assumed			-1.408	79.442	.163	-1.3738	.9754	-3.3151	.5675

The initial handgrip strengths for both comparison and intervention group do not have statistical difference(p = 0.61)

Paired-Samples T test(Comparison group, initial vs predischarge handgrip)

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Predischarge handgrip	16.089	36	4.5185	.7531
	Initial Handgrip	15.811	36	4.7516	.7919

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Predischarge handgrip - Initial Handgrip	.2783	2.9436	.4906	-.7177	1.2743	.567	35	.574

In comparison group, the mean predischarge handgrip strength is 0.2783kg higher than initial with no statistical significance(p = 0.574)

Paired-Samples T test(Intervention group, initial vs predischarge handgrip)

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Predischarge handgrip	17.463	68	5.1116	.6199
	Initial Handgrip	14.924	68	4.6985	.5698

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Predischarge handgrip - Initial Handgrip	2.5397	2.6562	.3221	1.8968	3.1826	7.885	67	.000

In intervention group, the mean of predischarge handgrip strength is 2.5397kg higher than initial with statistical significance(p<0.01), with medium effect size(cohen's d = 0.51)

Paired-Samples T test(Comparison group, male, initial vs predischarge handgrip)

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Predischarge handgrip	18.929	14	3.7172	.9935
	Initial Handgrip	19.779	14	3.6945	.9874

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Predischarge handgrip - Initial Handgrip	-.8500	2.2870	.6112	-2.1705	.4705	-1.391	13	.188

Paired-Samples T test(Comparison group, female, initial vs predischarge handgrip)

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Predischarge handgrip	14.283	22	4.0842	.8708
	Initial Handgrip	13.286	22	3.4654	.7388

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Predischarge handgrip - Initial Handgrip	.9964	3.1329	.6679	-.3927	2.3854	1.492	21	.151

In comparison group, both male and female subgroup did not show statistical significant change in handgrip strength

Paired-Samples T test(Intervention group, male, initial vs predischarge handgrip)

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Predischarge handgrip	24.071	14	5.8237	1.5565
	Initial Handgrip	21.136	14	3.7195	.9941

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Predischarge handgrip - Initial Handgrip	2.9357	2.9734	.7947	1.2189	4.6525	3.694	13	.003

In male patients of intervention group, the mean of predischarge handgrip strength is 2.9397kg higher than initial with statistical significance(p<0.01), with medium effect size(cohen's d = 0.60)

Paired-Samples T test(Intervention group, female, initial vs predischarge handgrip)

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Predischarge handgrip	15.750	54	3.1915	.4343
	Initial Handgrip	13.313	54	3.4172	.4650

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Predischarge handgrip - Initial Handgrip	2.4370	2.5881	.3522	1.7306	3.1435	6.920	53	.000

In female patients of intervention group, the mean of predischarge handgrip strength is 2.4370kg higher than initial with statistical significance(p<0.01), with medium to large effect size(cohen's d = 0.74)

Independent samples T test(Comparison vs Intervention group, Length of Stay)

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
Length of stay	Control	36	26.56	6.687	1.114
	Intervention	68	25.28	7.782	.944

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Length of stay	Equal variances assumed	2.337	.129	.834	102	.406	1.276	1.530	-1.759	4.312
	Equal variances not assumed			.874	81.344	.385	1.276	1.460	-1.629	4.182

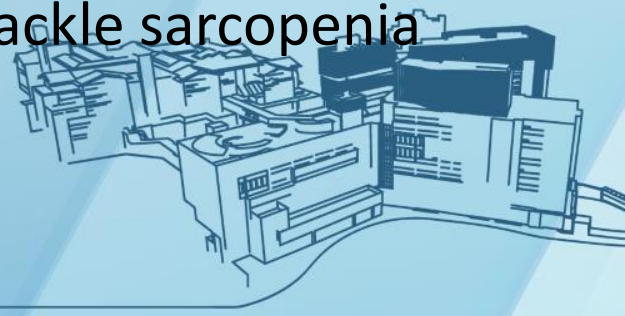
There was no statistically significant difference in length of stay between both groups

Prevalence of sarcopenia in geriatric hip patients

- 346(87.8%) out of total 386 patients probably had sarcopenia since March 2024
- 93.1% of male patients and 87.4% of female patients probably had sarcopenia
- The result is comparable to previous local study in CMC (73.6% in male, 67.7% in female) (Ho et al., 2015) and QEH(71.4% in male, 37.7% in female)(Au et al., 2021)
- As comparison, a study in Taiwan estimated the prevalence of sarcopenia in community dwelling older Chinese adults as 10.8% in male and 3.7% in female(Lee et al., 2013)

Secondary outcomes

- 33 patients(48.5%) were successfully contacted via phone for follow up
- 23 patients(~70%) continued restrictive upper limb exercise at home regularly
- 30 patients(~90%) maintained high quality protein and calcium diet
- 30 patients(~90%) established sunlight exposure routine
- All patients were satisfied with the programme(average Satisfaction score 8.9/10)
- All patients committed to take actions to tackle sarcopenia
- No fall events reported



Conclusion

- The programme is effective in improving handgrip strength with medium effect size

References

- Au, I. L., Chan, W. L., Tiu, K. L., Lee, K. B., Li, W., & Chan, A. C. (2021). Prevalence of sarcopenia and the Association of Sarcopenia, premorbid factors, early functional outcome and 1-year mortality in Hong Kong chinese Fragility Hip Fracture Patients. *Journal of Orthopaedics, Trauma and Rehabilitation*, *28*. https://doi.org/10.1177/2210491721995981
- Cruz-Jentoft, A. J., Bahat, G., Bauer, J., Boirie, Y., Bruyère, O., Cederholm, T., Cooper, C., Landi, F., Rolland, Y., Sayer, A. A., Schneider, S. M., Sieber, C. C., Topinkova, E., Vandewoude, M., Visser, M., & Zamboni, M. (2019). Sarcopenia: Revised European consensus on definition and diagnosis. *Age and Ageing*, *48*(4), 601–601. https://doi.org/10.1093/ageing/afz046
- Cruz-Jentoft, A. J., & Morley, J. E. (2021). *Sarcopenia*. John Wiley & Sons, Incorporated.
- Ho, W. H. A., Lee, M. L., Chan, W. C., Ng, M. Y., Lee, C. W., Ng, W. S., & Wong, S. H. (2015). Sarcopenia and osteoporosis in Hong Kong Chinese geriatric hip fracture patient. *Osteoporosis and Sarcopenia*, *1*(2), 140. https://doi.org/10.1016/j.afos.2015.11.016
- Lee, W.-J., Liu, L.-K., Peng, L.-N., Lin, M.-H., & Chen, L.-K. (2013). Comparisons of sarcopenia defined by IWGS and EWGSOP criteria among older people: Results from the I-Lan Longitudinal Aging Study. *Journal of the American Medical Directors Association*, *14*(7). https://doi.org/10.1016/j.jamda.2013.03.019