醫院管理局
HOSPITAL AUTHORITY

新界西・醫院聯網
New Territories West Cluster

*Hospital Authority Convention 2025*
*F2.7 Oral Presentation*

# An Innovative Smart Heart Failure Program to Reduce Heart Failure Hospitalization in Older Adults Living in Residential Care Homes


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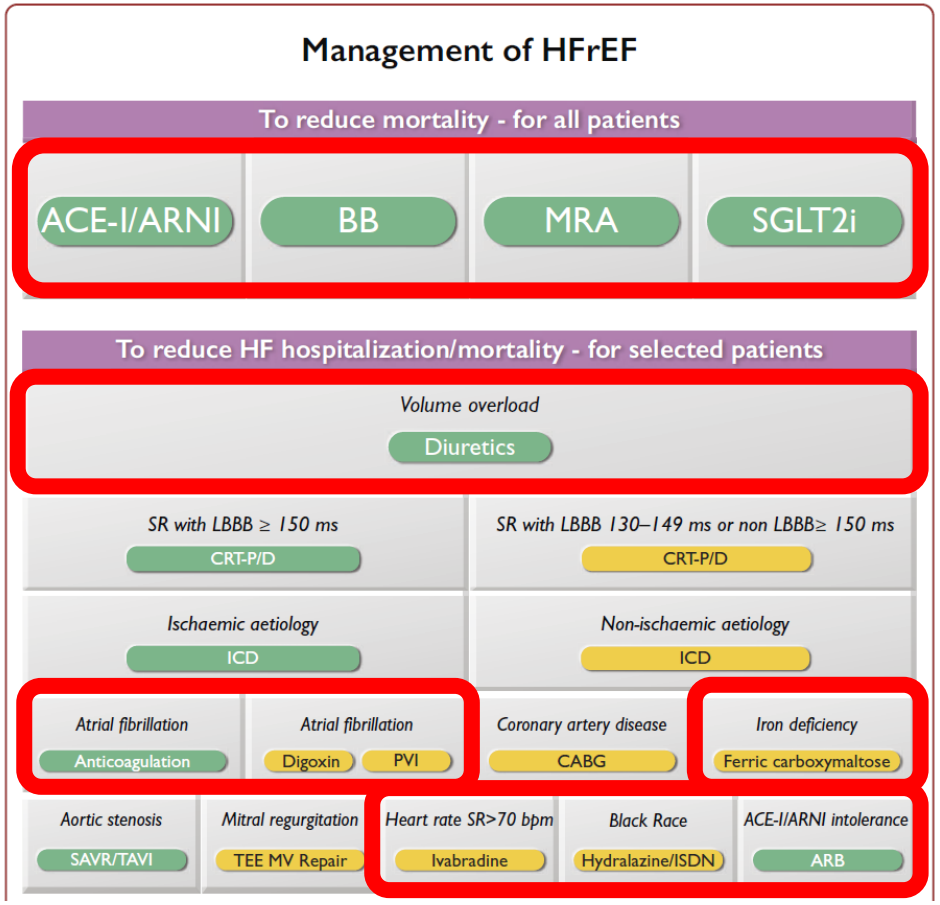
# Introduction

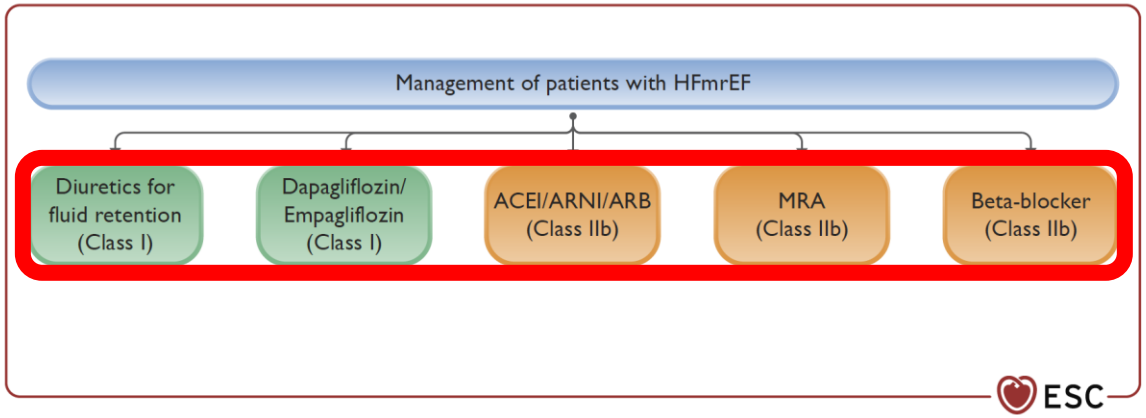
- **Heart failure patients**, especially older adults, have high rates of readmission and mortality after discharge from acute heart failure but are often under-treated.

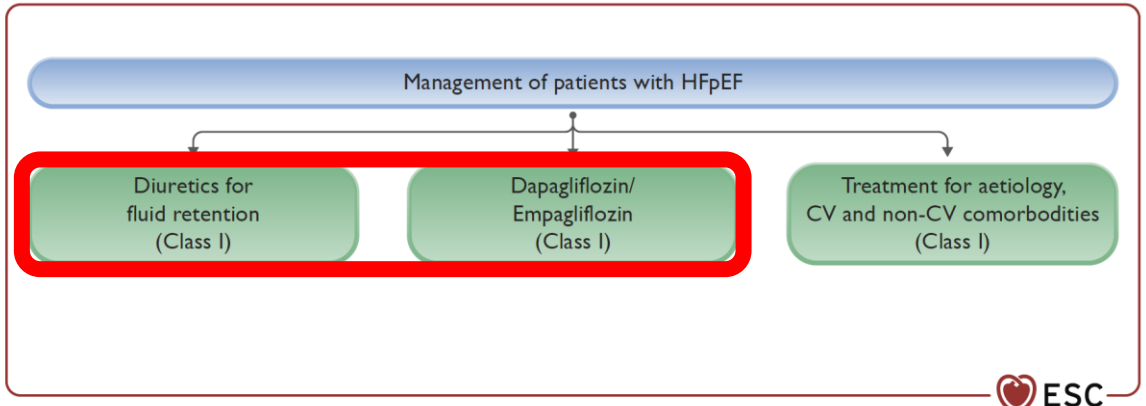
- **New Territories West Cluster (NTWC) Statistics from Clinical Data Analysis and Reporting System (CDARS):**
  - From Dec 2022 to Nov 2023 (1 year), there were:
    - 524 admissions in NTWC from residents living in residential care homes with a diagnosis of “congestive heart failure” (319 TMH, 183 POH, 22 TSWH) (i.e. around 44 admissions per month).
    - Emergency readmission within 28 days after discharge = 37.0%

# Introduction

- With advances in medicine, a number of evidence-based heart failure medications are *currently available*.



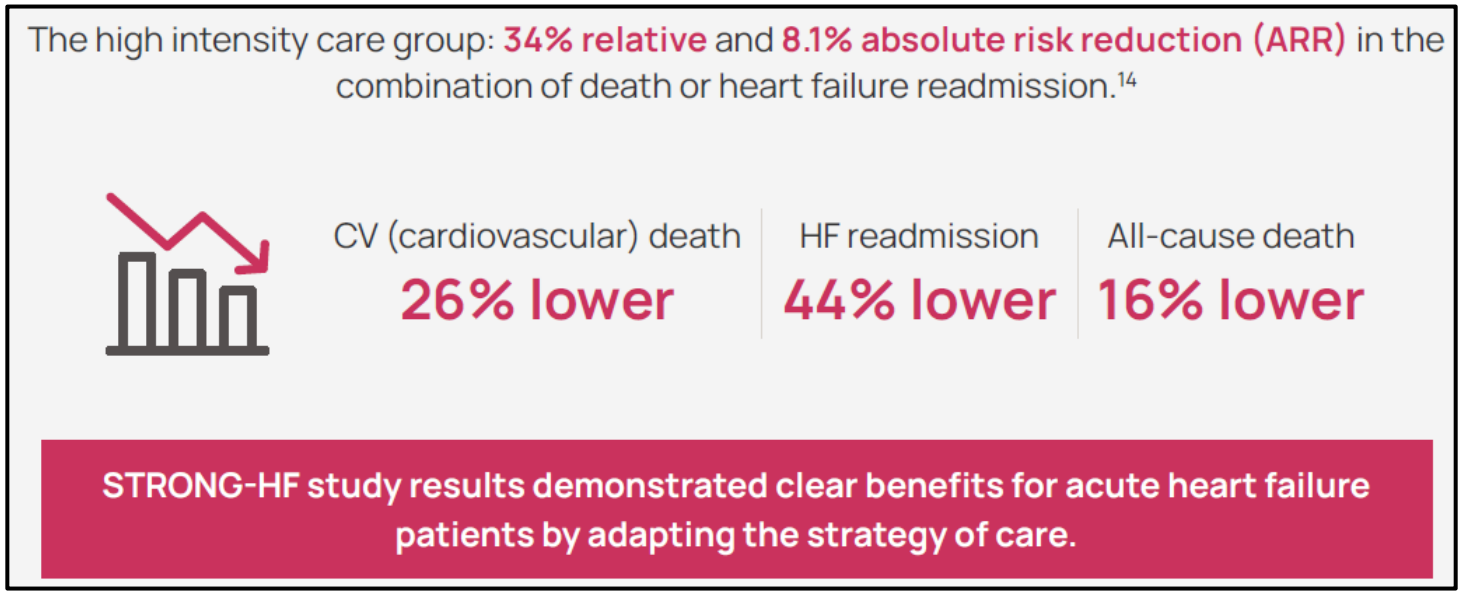




HFrEF: heart failure with reduced ejection fraction
HFmrEF: heart failure with mid-range ejection fraction
HFpEF: heart failure with preserved ejection fraction

*Eur Heart J. 2021;42(36):3599-3726.*
*Eur Heart J. 2023;44(37):3627-3639.*

# Introduction

- Studies found that high intensity care led to better use of heart failure medications and reduced heart failure hospitalization and mortality in community-dwelling adult patients.




*Lancet. 2022;400(10367):1938-1952.*

- However, **data** are **scarce** for frail older adults living in residential care homes (RCHs).

# Objectives

① To allow a safe and rapid up-titration of evidence-based medications after acute heart failure according to international guidelines; and

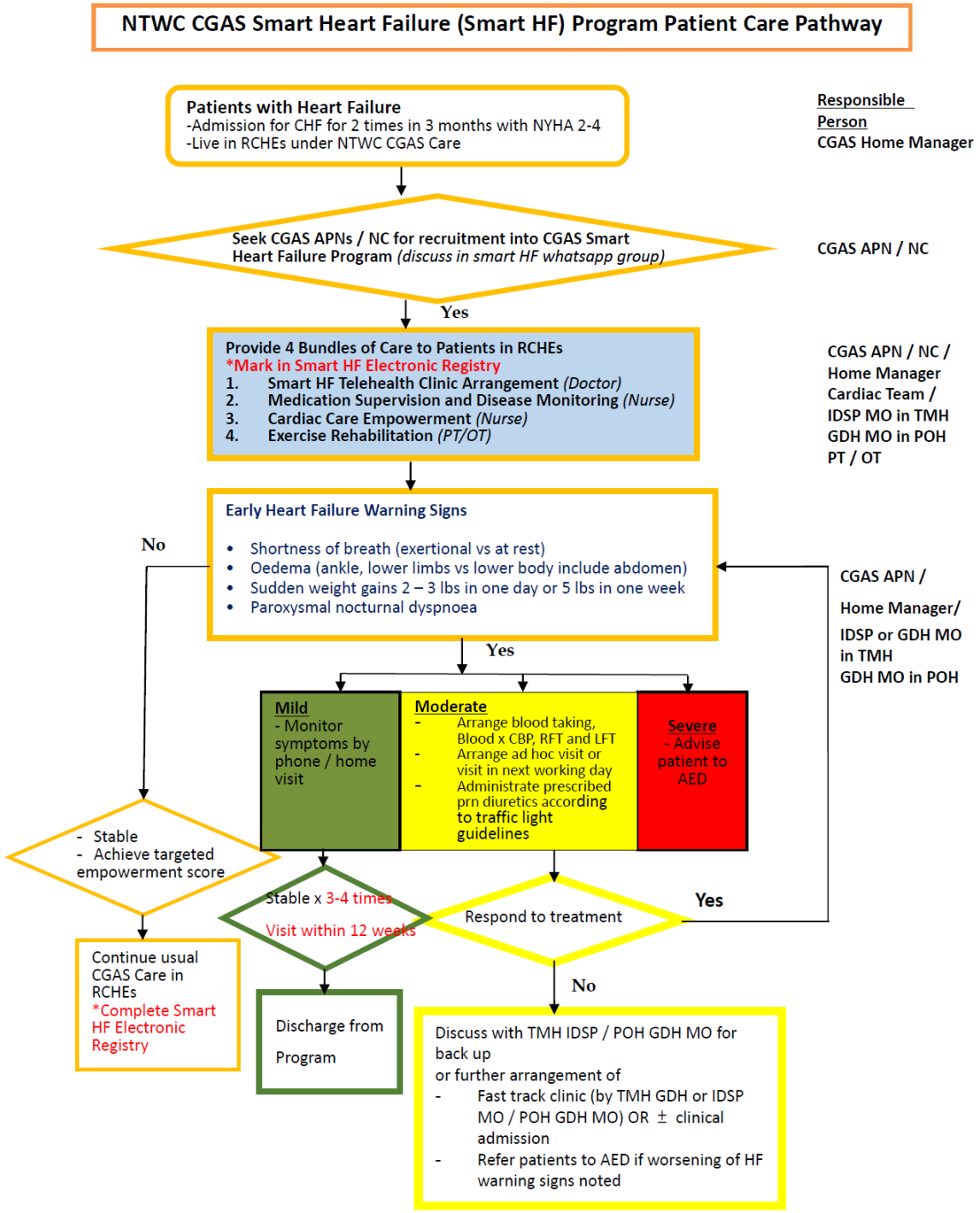
② To reduce heart failure hospitalization in *frail older adults living in RCHs*.

# Methodology

- A **Smart Heart Failure Program** was piloted with an innovative use of telehealth and multidisciplinary team support to *cover 97 RCHs* under New Territories West Cluster (NTWC) Community Geriatric Assessment Service (CGAS) in Feb 2024.

# Methodology

- **Inclusion criteria:**
  - Older adults (age ≥65 years) living in RCHs under NTWC CGAS with recurrent (≥2) heart failure hospitalization in previous 3 months
- **Exclusion criteria:**
  - Advanced failure of other organs (e.g. CKD with Cr ≥200umol/L, advanced COPD, advanced liver cirrhosis)
  - Advanced malignancy
  - Advanced dementia



# Methodology

- **Recruited patients** would be followed up for 3 months with:
  ① telehealth doctor clinics to allow rapid up-titration of heart failure medications and treat other comorbidities;
  ② nursing visits to empower patients and/or RCH staff for disease monitoring and medication supervision; and
  ③ exercise rehabilitation by physiotherapists and occupational therapists.

# Methodology: Telehealth Doctor Clinics

1. Monitor **heart failure symptoms and control.**
2. Arrange **echocardiogram** if not performed in recent 2 years (**fast track** quota available, please liaise with cardiac team).
3. Titrate **heart failure medications** to target doses or maximally tolerated doses quickly **according to guidelines.**

| **Guideline-Directed Medical Therapy (GDMT)** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| ☐ **HFrEF** | ACEi □ / ARB □ / ARNI □ | BB □ | MRA □ | SGLT2i □ | Diuretic □ for volume overload | AF: anticoagulant □, digoxin □ | Treatment of iron deficiency □ | SR HR >70 bpm: Ivabradine □ | Black Race: Hydralazine/ Isordil □ |
| ☐ **HFmrEF** | ACEi □ / ARB □ / ARNI □ | BB □ | MRA □ | SGLT2i □ | Diuretic □ for fluid retention | | | | |
| ☐ **HFpEF** | | | | SGLT2i □ | Diuretic □ for fluid retention | Treatment for etiology, CV and non-CV comorbidities □ | | | |

4. Set target **body weight**.
5. Prescribe **PRN diuretic**.
6. Check **blood** CBP, LRFT, CaPO4, CO2, non-fasting lipid, HbA1c, RG, TFT, Fe profile, ferritin
7. (Optional) Arrange **home O2** in RCHE for symptom relief and set a range for titration.
8. (Optional) Refer **GDH** for **cardiac rehabilitation** for patients with rehabilitation potential.
9. (Optional) Refer **CGAS EOL** for advanced heart failure patients for **ACP discussion**.


新界西醫院聯網 – 老人科社區評估服務

醫生視像會診專用(心臟衰竭遙距醫療診所)

| 數目 | 姓名 | GERI 編號 | 備註（必須填寫）<br>1. 血壓/心率<br>*心率>100 要重檢 | 2 體溫 | 3. 血糖<br>(糖尿病人) | 4. 體重<br>(近三個月) | 5. 病徵 | 其他備註<br>請在( )內適當加上 ✓ |
|---|---|---|---|---|---|---|---|---|
| 1 | | | BP:_____<br>P:_____<br>Sp02:_____ | | | (　kg)____<br>(　kg)____<br>(　kg)____<br>(　kg)____<br>(　kg)____ | | ) |

* 請院舍職員填寫有關資料

# Methodology: Patient/RCH Staff Empowerment by CGAS Nursing Visits

## Patient / Carer Empowerment Score (max. 14 marks)

### 6 crucial points

① Maintain self-monitor body weight at least 2 times per week. Seek CGAS nurse or medical advice if body weight gain 2-3 lbs in one day or 5 lbs in one week.

② Administer medication as prescribed correctly and completely comply with prescribed home LTOT.

③ Maintain low salt, low fat, high fiber diet, frequent small meal and restricted fluid intake.

④ Perform regular exercise as advised. Demonstrated daily activity and energy saving technique.

⑤ Identify early heart failure warning signs, seek CGAS nurse or medical advice for support.

⑥ Identify deteriorating signs and symptoms, seek medical advice for emergency support.

**Patient / Carer Empowerment Score**
**NTWC CGAS Smart Heart Failure Program**

| No. | Items / Date | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Physical Care | ✪ Maintain self-monitor body weight at least 2 times per week. Seek CGAS Nurse or medical advice if body weight gain 2-3 lbs in one day or 5 lbs in one week | | | | | | | | |
| 2 | | Maintain self-monitor blood pressure & pulse / ± apical rate daily with record. | | | | | | | | |
| 3 | | Verbalize healthy lifestyle e.g. quit smoking and alcohol intake # | | | | | | | | |
| 4 | Coping Skill | Verbalize and / or use stress relieving technique to avoid psychosocial disturbance | | | | | | | | |
| 5 | | Patient / carer accept the illness and participate in the care programme | | | | | | | | |
| 6 | Home Environment | Keep clean & tidy environment | | | | | | | | |
| 7 | Medication | Verbalize the effects and side-effects of medication | | | | | | | | |
| 8 | | ✪ Administer medication as prescribed correctly and completely comply with prescribed home LTOT | | | | | | | | |
| 9 | | Store medication as instructed | | | | | | | | |
| 10 | Nutrition | ✪ Maintain low salt, low fat, high fibre diet, frequent small meal and restricted fluid intake | | | | | | | | |
| 11 | Elimination | Maintain regular bowel habit | | | | | | | | |
| 12 | Activity & Exercise | ✪ Perform regular exercise as advised. Demonstrated daily activity & energy saving technique. | | | | | | | | |
| 13 | Access | ✪ Identify early Heart Failure warning signs, seek CGAS Nurse or medical advice for support. e.g. tire, dizzy, occasional dry cough, exertional shortness of breath, ankle / lower limbs oedema, paroxysmal nocturnal dyspnea | | | | | | | | |
| 14 | | ✪ Identify deteriorating signs & symptoms, seek medical advice for emergency support e.g. confusion, frequent dry cough, shortness of breath at rest, lower body include abdomen oedema, paroxysmal nocturnal dyspnea | | | | | | | | |
| **Total score : 14 (1 item 1 mark)** | | | /14 | /14 | /14 | /14 | /14 | /14 | /14 | /14 |
| **✪ Crucial points : 6** | | | /6 | /6 | /6 | /6 | /6 | /6 | /6 | /6 |
| Rank / sign | | | | | | | | | | |

# Methodology: Patient/RCH Staff Empowerment

- **Traffic Light Guidance**


- **Pitting Edema Scale**

| Scale | Oedema | Pitting depression | Time to baseline |
|---|---|---|---|
| 0 | None | 0 | rapid |
| + | Trace | 2mm | rapid |
| ++ | Mild | 4mm | 10-15 sec |
| +++ | Moderate | 6mm | 1-2 min |
| ++++ | Severe | 8mm | 2-5 min |


0+ No pitting edema
1+ Mild pitting edema. 2 mm depression that disappears rapidly.
2+ Moderate pitting edema. 4 mm depression that disappears in 10–15 seconds.
3+ Moderately severe pitting edema. 6 mm depression that may last more than 1 minute.
4+ Severe pitting edema. 8 mm depression that can last more than 2 minutes.

# Methodology: Exercise Rehabilitation

- **Exercise rehabilitation** was delivered either on-site in RCHs or in Geriatric Day Hospital by physiotherapists and occupational therapists.

**Mobility Training**

**Aerobic Training**

**Resistance Training**

**Inspiratory Muscle Training**

# Methodology: Exercise Rehabilitation

## Energy Conservation

### 4.2 體力節省篇

心臟病發後，你的身體有沒有出現以下狀況？

- 容易覺得疲倦
- 做同樣的事情比過往吃力
- 需要更長的休息時間
- 休息過後，疲倦情況仍然持續

如出現以上狀況，可應用以下六項**體力節省法**原則協助你適應現時的身體狀況，以減輕心臟負擔並能夠應付日常生活。

**體力節省法**

01 日常生活節奏要適中
02 預先安排日常活動
03 注意人體力學
04 改善及配合周圍環境
05 善用輔助器具
06 了解自己的能力

## Stress Management

### 壓力的處理

**1. 控制個人情緒**

學習情緒管理，保持心境平靜。盡量減少引致情緒波動的活動，如打麻雀、看刺激的電影等，避免對心臟造成突然巨大的壓力。

學習各種壓力調適的策略，如冥想、瑜伽、健身氣功、太極等，通過調節自律神經系統或肌肉骨骼系統的功能，從而降低緊張的狀態。

**2. 了解壓力來源**

先了解導致壓力的原因，再找出解決問題的方法，從而對症下藥。

**3. 找適當的對象傾訴或專業人士幫忙**

找不到解決辦法時，可找一些關心你的人士抒發煩惱和討論，或尋求專業人士的幫助。


## Relaxation Techniques

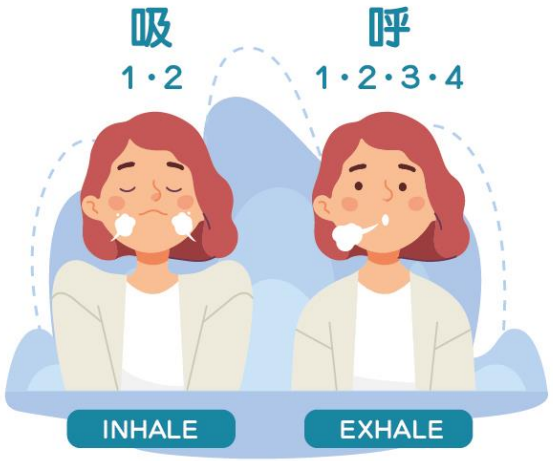
**7. 鬆弛練習**

**呼吸放鬆法**

閉起雙眼，用鼻子緩慢地吸入空氣，胸腹有微微的鼓起，自己心裡說“放鬆”。

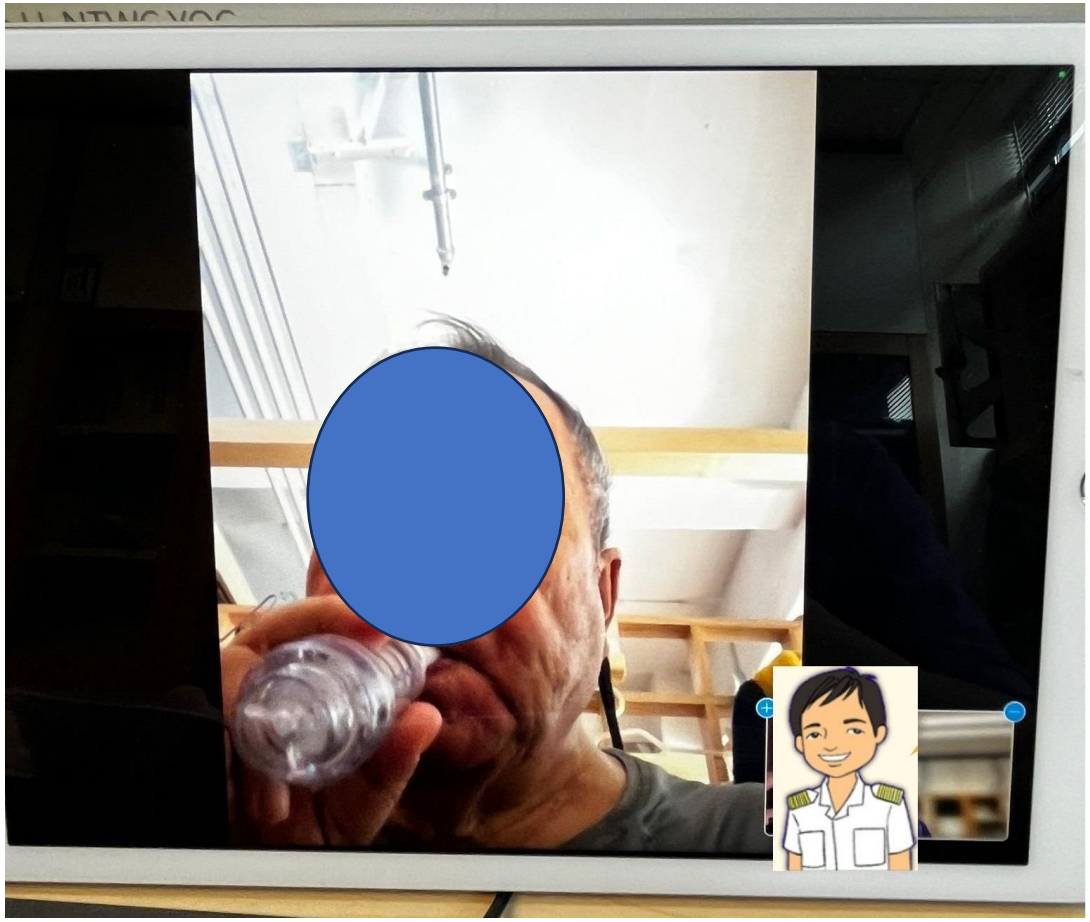
當呼氣時想像將自己的“緊張”亦從口呼出，胸腹則微微落下。盡量慢慢呼吸及放鬆身體。

緊張狀態會慢慢紓緩及有一種寧靜的感覺。每天練習兩次，各做十至十五分鐘。



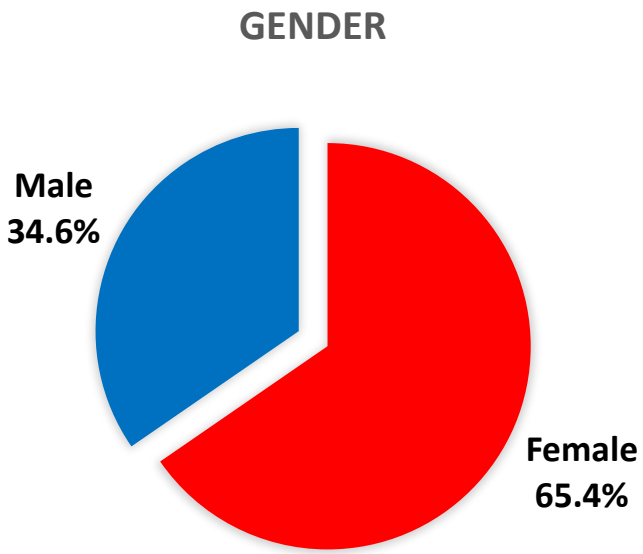
# Methodology: Home-Based Telerehabilitation

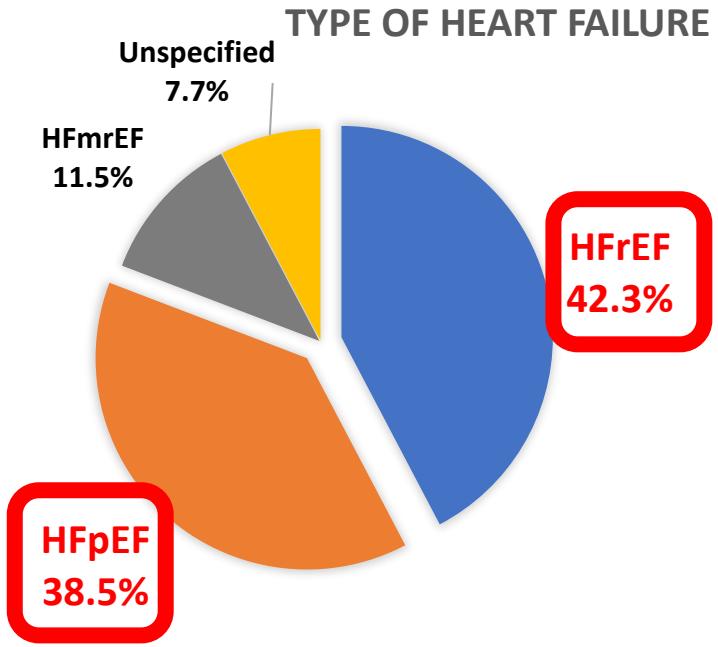
- **Home-based telerehabilitation** was delivered to patients at RCHs.



# Results: Baseline Characteristics

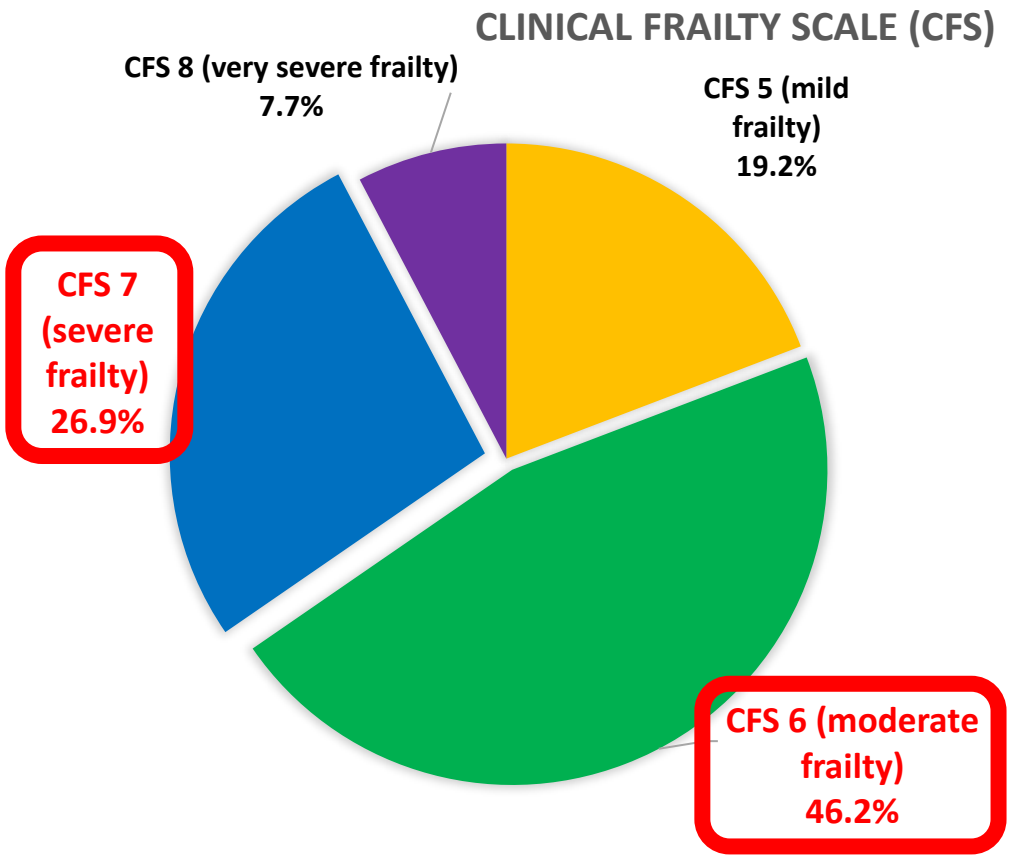
- From *Feb 2024 to Jan 2025*, a total of 26 patients aged 66-95 years (mean±SD 85.5±7.7 years) were recruited and completed the program.
- 65.4% were female.
- Heart failure types included 42.3% HFrEF, 38.5% HFpEF, 11.5% HFmrEF, 7.7% unspecified.



# Results: Baseline Characteristics

- All patients were frail (clinical frailty scale 5-8) and the majority had high cardiovascular comorbidities.



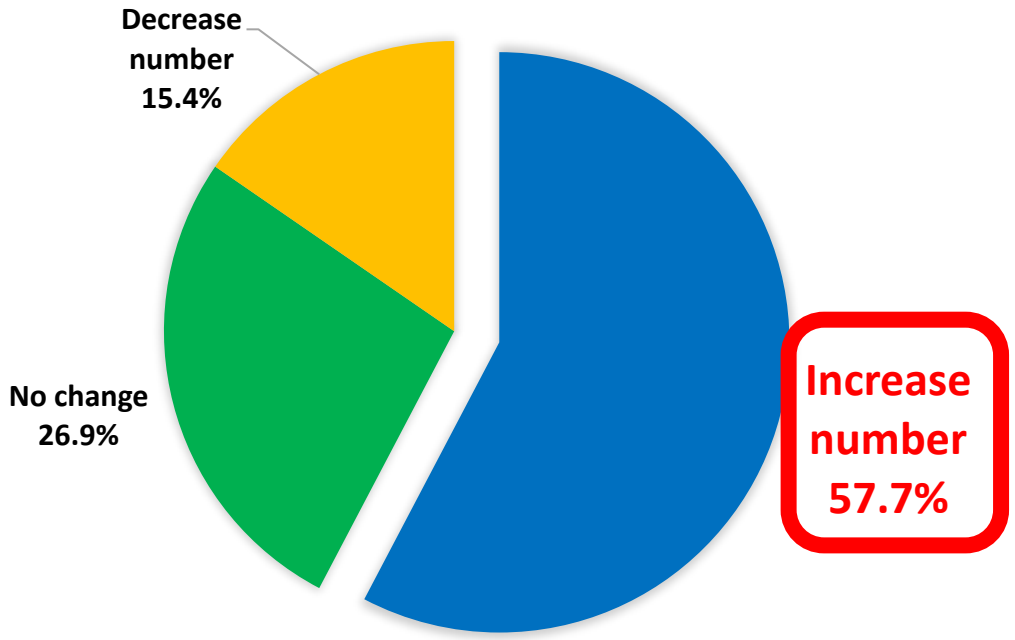

| Cardiovascular comorbidities | |
|---|---|
| Chronic kidney disease (stage 3 or above) | 92.3% |
| Hypertension | 73.1% |
| Atrial fibrillation | 73.1% |
| Ischemic heart disease | 50.0% |
| Diabetes mellitus | 46.2% |
| Stroke | 15.4% |


*Can Geriatr J. 2020 Sep 1;23(3):210-215.*

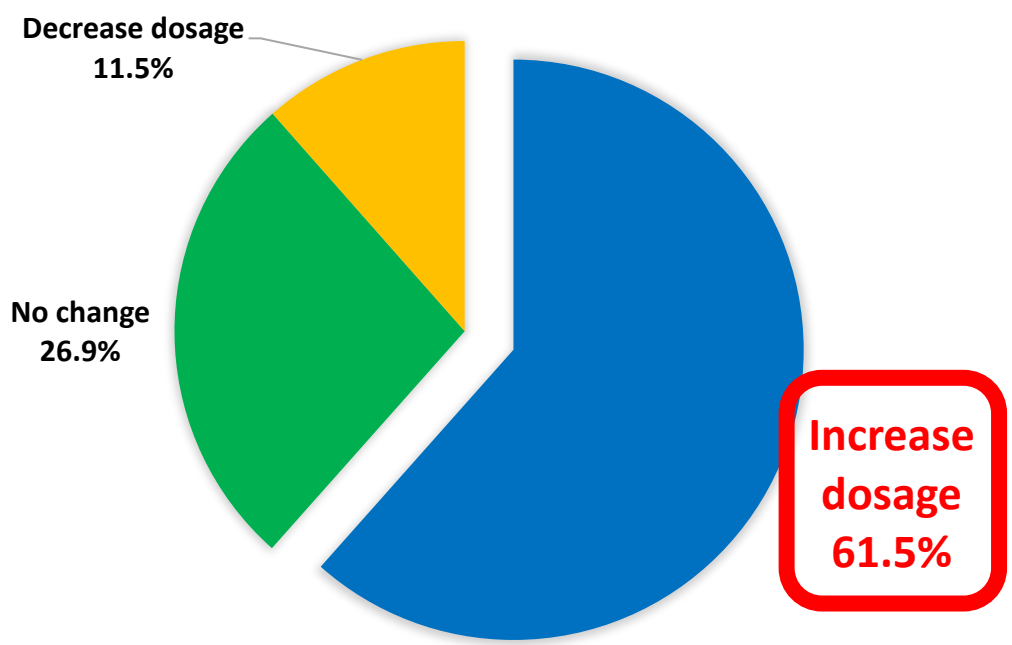
# Results: Heart Failure Medications

- 4 (3-5) (median (IQRs)) telehealth doctor clinics were provided per patient.
- At the end of the program, **80.8%** (n=21) of patients received either more heart failure medications or mediations at higher dosages.

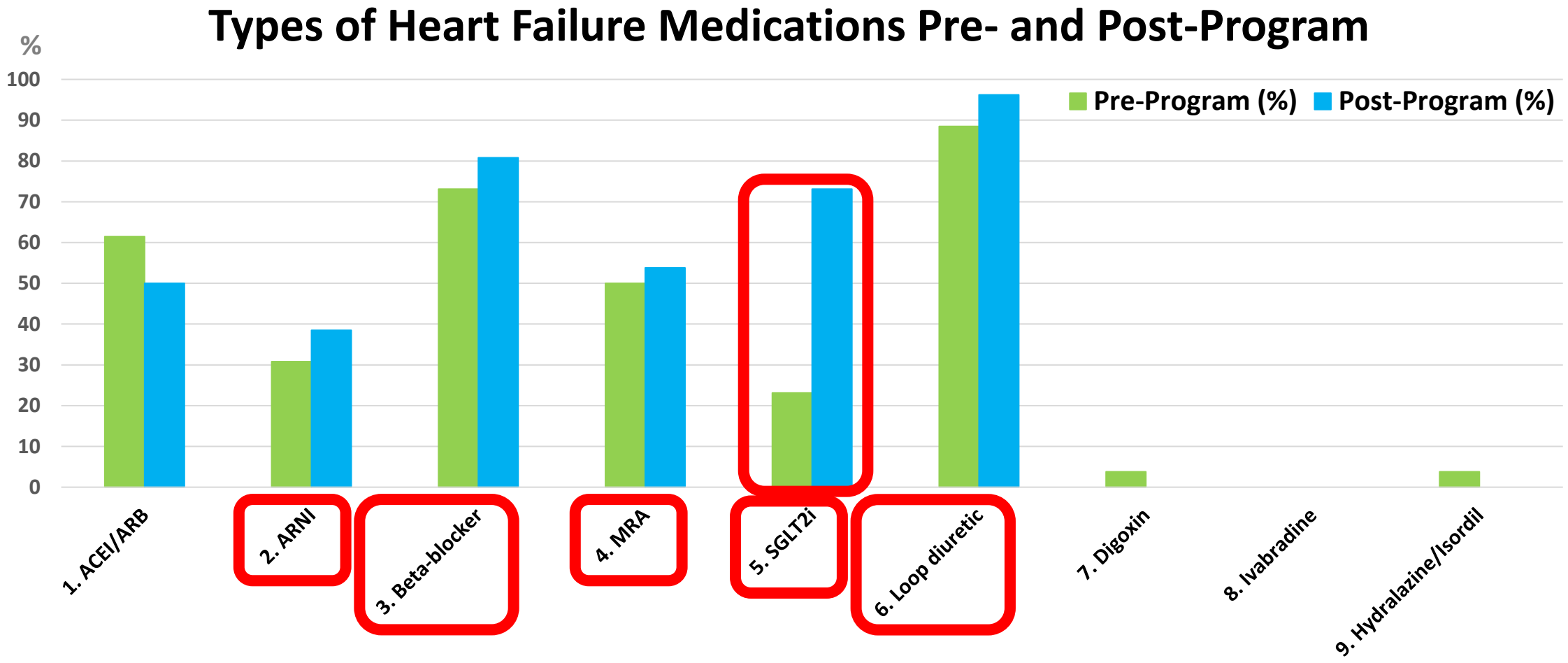
CHANGE IN NO. OF HEART FAILURE MEDICATIONS




CHANGE IN DOSAGE OF HEART FAILURE MEDICATIONS



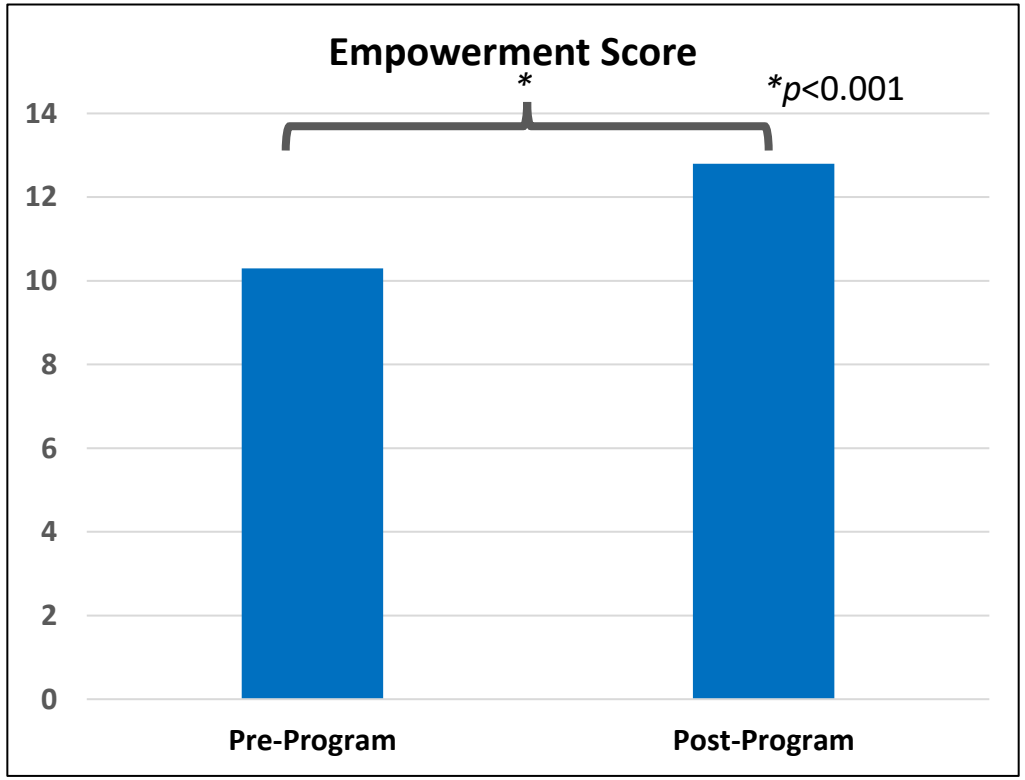
# Results: Heart Failure Medications




ACEI/ARB: Angiotensin-Converting Enzyme Inhibitor/Angiotensin II Receptor Blocker
ARNI: Angiotensin Receptor-Neprilysin Inhibitor
MRA: Mineralocorticoid Receptor Antagonist
SGLT2i: Sodium/GLucose coTransporter 2 (SGLT-2) inhibitor

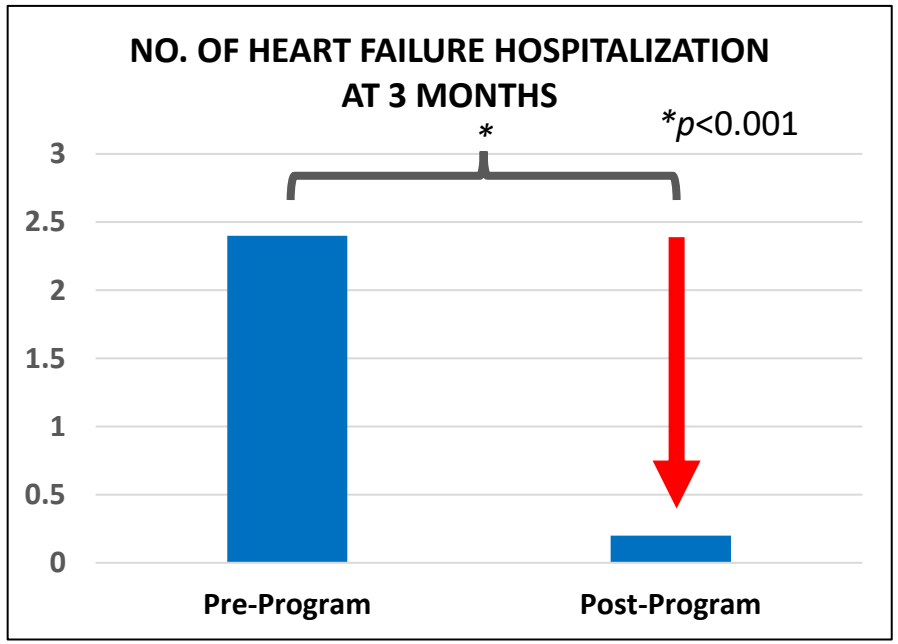
# Results: Empowerment

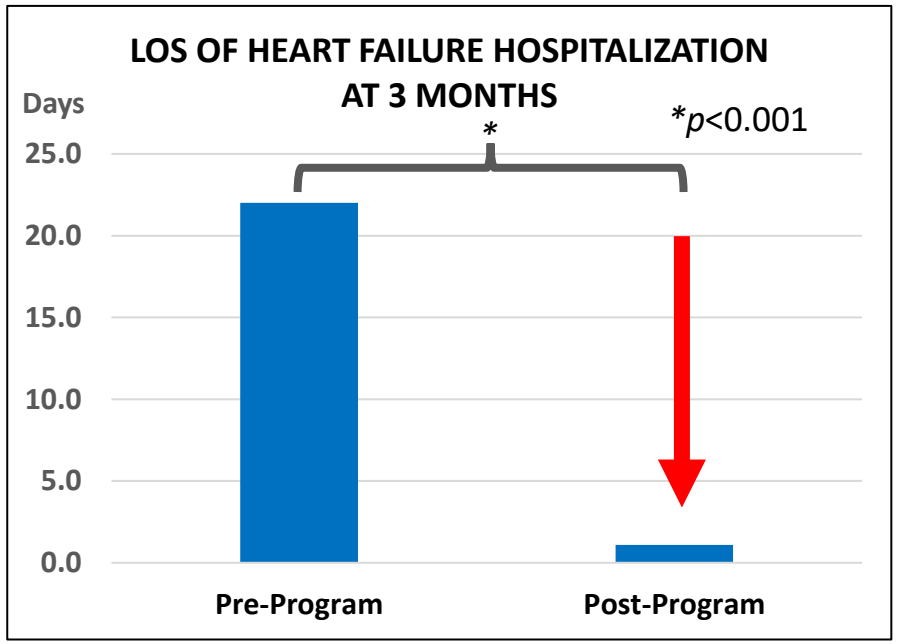
- **Patients and/or RCH staff** had a higher empowerment score after the program (pre-program 10.3±3.0 vs. post-program 12.8±1.6, *p<0.001*)
- 34.6% and 65.4% fulfilled the 6 crucial points in empowerment pre- and post-program respectively.



# Results: Heart Failure Hospitalization

- Patients had lower rates of heart failure hospitalization (pre-program 2.4±0.7 vs. post-program 0.2±0.4 at 3 months, $p<0.001$) and shorter hospital length of stay (LOS) due to heart failure (pre-program 22.0±15.2 days vs. post-program 1.1±2.2 days at 3 months, $p<0.001$).
- There was no admission due to adverse drug reactions.



# Results: Hospital Bed Days Saved

- Assumed that patients would have the *same pattern of heart failure (HF) hospitalization without the program:*
  - Average no. of HF hospitalization (pre-program): 2.4 in 3 months
  - Average no. of HF hospitalization (post-program): 0.2 in 3 months
  - Average LOS per HF hospitalization (pre-program): 10.1 days
  - Average LOS per HF hospitalization (post-program): 4.7 days
  - Total hospital bed days due to HF hospitalization (pre-program): 573 days
  - Total hospital bed days due to HF hospitalization (post-program): 28 days

- 545 hospital bed days were saved for 26 patients (i.e. saved 21 hospital bed days per patient) in this program.

# Conclusion and Future Direction

- The **Smart Heart Failure Program** is an innovative, safe, effective and potentially health care cost-saving discharge support program to *reduce recurrent heart failure hospitalization* in *older patients living in RCHs*.

- **Future extension** may include:
  1. patients with single heart failure admission; and
  2. other reasons of emergency hospitalization (e.g. COPD exacerbation).


# Acknowledgement


- *Division of Geriatrics, TMH M&G, POH/TSWH M&G, NTWC*
- *Community Care Department, NTWC*
- *Department of Physiotherapy, NTWC*
- *Department of Occupational Therapy, NTWC*
- *Patients and RCH staff joining this program*