STRONG-HF:
Transforming management of acute heart failure

A new pathway for optimising heart failure treatment in patients with acute heart failure has been adopted by three NHS hospital trusts in the UK with the aim of reducing hospital readmissions and improving outcomes in this vulnerable patient group.

The unmet need

Heart failure admissions are a significant financial burden on the NHS. It is estimated that heart failure (HF) accounts for **2%** of the total NHS budget, with **70%** of these costs attributed to hospitalisation.[1]

Patients with acute HF are at high risk of being readmitted to hospital or dying in the weeks and months following hospitalisation. This is often referred to as the vulnerable period and a study in 2021 found that in England:

- **18% of patients with acute heart failure are readmitted and 12.5% die within 30 days of discharge.** [2]

Adherence to European Society of Cardiology (ESC) guidelines for the prescription of guideline directed medical therapies (achieving ≥50% of recommended dose) is associated with better clinical outcomes in HF.[3] However, in the UK, **only 1 in 3 patients are on >50% of the guideline-recommended dose** for angiotensin-converting enzyme inhibitor (ACE-i), angiotensin receptor blocker (ARB) or Beta Blockers (BB) 12 months after their diagnosis.[4]

“ We know once we establish people on guideline-recommended therapies for heart failure, we reduce their chances of dying by 62% and their chances of rehospitalisation for heart failure by 30%.[5]”

Matthew Sunter, Lead Heart Failure Nurse, St George’s Hospital

A report by the Health Foundation published in July 2023 on projected patterns of illness in England revealed that **the number of cases of heart failure in England was forecast to increase by 92% between 2019 and 2040.[6]** We believe that urgent action is needed to change the trajectory for patients with HF and reduce the significant burden on the system.[6]

STRONG-HF

STRONG-HF is a multinational study, published in The Lancet in 2022 to evaluate the safety and efficacy of rapid up-titration of treatments guided by biomarkers including NT-proBNP.[7] The study demonstrated that a biomarker-guided intensive treatment strategy significantly reduced readmission risk for patients with acute HF. The trial stopped early due to the efficacy of the new approach and the protocol was then recommended by the ESC guidelines, reflecting the importance of this treatment strategy.[8]

STRONG-HF 'rapid optimisation' pathway

Patient with suspected AHF admitted to hospital

24-48 h after admission — Clinical assessment

0-2 days before discharge — Confirm eligibility for STRONG-HF

Half target GDMT dose

Patient discharged

Week 1 — Half target GDMT dose

Week 2 — Full target GDMT dose

Week 3 — Full target GDMT dose

Week 6 — Full target GDMT dose

Week 12 — Full target GDMT dose

90 and 180 day follow up

GDMT dosing guidance based on clinical assessment and bloods:

- eGFR <30 ml/min/1.73m2 → Reduce diuretic dose if possible or reduce dose **or** not uptitrate ACEi/ ARB/ ARNI or MRA
- Serum potassium >5 mmol/L → Reduce dose or not uptitrate MRA or ACEi/ ARB/ ARNI
- SBP <95 mmHg → Reduce dose or not uptitrate ACEi/ ARB/ ARNI or MRA
- HR <55 bpm → Reduce dose or not uptitrate beta blocker
- NT-proBNP increase >10% from pre-discharge value → Consider increase diuretic dose and decrease or not uptitrate beta blocker

Yes / No

Continue or uptitrate ACEi/ARB/ ARNI and MRA

Continue or uptitrate beta blocker

1. Mebazaa-A et al. Lancet. 2022 Dec 3;400(10367):1938-1952. 2. Kimmoun et al. Eur J Heart Fail. 2019 Nov 21(11):1459-1467.

ACEi, angiotensin-converting enzyme inhibitor; AHF, acute heart failure; ARB, angiotensin receptor blocker; ARNi, angiotensin receptor-neprilysin inhibitor; bpm, beats per minute; BB, beta-blocker; eGFR, estimated glomerular filtration rate; GDMT, guideline-directed medical therapy; HF, heart failure; MRA, mineralocorticoid receptor antagonist; NT-proBNP, N-terminal pro-brain natriuretic peptide; SBP, systolic blood pressure

Adopting STRONG-HF in the UK

Historically, **'it takes an average of 17 years for new knowledge generated by randomised controlled trials to be incorporated into practice, and even after all that time, application is highly uneven'.**[9] To accelerate local adoption of this transformative pathway, Roche Diagnostics created an 'Early Adopter Programme (EAP)' open to 14 hospital networks globally to be supported by a team of Healthcare Consultants on effective implementation.

In the UK, we were delighted to partner with three hospital trusts: St George's University Hospitals NHS Foundation Trust, Swansea Bay University Health Board and NHS University Hospitals of Liverpool Group to be the first sites to implement a STRONG-HF pathway.

> ***" We were keen to adopt it because of the projected increase in heart failure cases over the next two decades, making it impossible for services to stand still without innovation. Being able to innovate and find new ways of working which are more effective and delivering far better outcomes for patients is always something myself and my team back at St George's are passionate to do."***
>
> Matthew Sunter, Lead Heart Failure Nurse, St George's Hospital

How the STRONG-HF pathway has changed care locally

Matthew Sunter, Lead HF Nurse at St George's, said the Strong-HF trial had transformed their approach to treating heart failure. Previously they would start patients on a very low dose of guideline-directed medical therapies as recommended by the ESC. Then they would increase the dose gradually and optimisation could take up to a year, but with the accelerated pathway, optimisation of therapies could be completed in a matter of weeks:

> ***" Strong-HF has allowed us to think completely differently about services. In the past, we would start patients on very low doses of guideline-directed medical therapies recommended by the European Society of Cardiology and gradually increase them over 6 to 12 months. STRONG-HF gave us the abili-ty to see a different way of treating heart failure, with strong evidence to do this safely and effectively to improve patients' lives.***
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> ***For the first time ever, we offer patients a review one week after discharge. We can catch those patients who are not quite optimised before they go home, before they get sick enough to need to come back into hospital, and we can get them onto the recommended therapy for their heart failure within two to three weeks, saving at least six months off the patient's journey. "***
>
> Matthew Sunter, Lead Heart Failure Nurse, St George's Hospital

Dr Lisa Anderson, Heart Failure Specialist and Consultant Cardiologist at St George's Hospital, said that clinicians have traditionally been cautious in their treatment of frail multi-morbidity patients and quite slow in up-titrating medication, which may have been detrimental to patient safety in the past. She believes that STRONG-HF will now transform the way clinicians look after their patients:

" STRONG-HF has really energised heart failure clinicians because we all know there's a massive gap in what we provide and what could be provided. STRONG-HF proposed something totally different."

Dr Lisa Anderson, Heart Failure Specialist and Consultant Cardiologist, St George's Hospital.

While St. George's are still early in their adoption timeline they have already seen the impact of this pathway on both patients and their heart failure service, as Matt describes:

" We've now got 10 patients* going through the pathway and so far this new approach has saved at least one acute hospital admission. From our perspective, this pathway reduces the touchpoints we have with patients by about five appointments on average, freeing up capacity in our system. This is beneficial for patients, who can focus on living well with heart failure without the burden of numerous hospital appointments. Additionally, creating system capacity through efficiencies and improved methods of care allows clinicians to be more confident and have more time to deliver quality care."

Matthew Sunter, Lead Heart Failure Nurse, St George's Hospital

*Number correct as of January 2025

Eligibility for inclusion on the STRONG-HF pathway

The team at St George's used the established STRONG-HF protocol to work out who was eligible for and who was excluded from the new treatment regime. See the table below for details:

Inclusion Criteria:

- ✓ Hospitalisation for HF
- ✓ BP >100 mm/Hg and HR >60 bpm at point of entry to STRONG-HF pathway
- ✓ K+ <5.0 mmol/L when screening for entry to STRONG-HF pathway
- ✓ eGFR >30 ml/min/1.73m² when screening for entry to STRONG-HF pathway
- ✓ NT-proBNP >2500 pg/ml on admission and any reduction prior to discharge (Changed from 10% reduction pre-discharge in the trial criteria)
- ✓ On suboptimal doses of GDMT (i.e. less than 50% target dose of any of the four pillars of therapy) (changed from trial criteria, see below)
- ✓ Age 18–85 years

Exclusion Criteria:

- ✗ Evidence of chronic severe respiratory disease or primary pulmonary hypertension or recurrent pulmonary embolisms (PEs)
- ✗ Cardiac surgery within 3 months (coronary intervention [PCI] or device therapy are not excluded)
- ✗ Fast AF ventricular rate >130 bpm
- ✗ Severe anaemia hemoglobin <70 g/L
- ✗ Non-adherence to medications as cause for decompensation
- ✗ Active myocarditis
- ✗ Known cardiac amyloid (all types)
- ✗ Known hypertrophic cardiomyopathy (HCM)
- ✗ Uncontrolled thyrotoxicosis
- ✗ Pregnancy or breastfeeding
- ✗ Long-term dialysis
- ✗ Acute CVA (stroke) during admission
- ✗ Primary valvular stenosis/regurgitation, active malignancy where life expectancy <6 months
- ✗ Planned discharge to a nursing or care home due to increased care needs or significant frailty limiting clinic follow-up
- ✗ Patient not willing to participate in accelerated titration programme
- ✗ Confirmed Takotsubo cardiomyopathy
- ✗ History of heart transplant/VADS or listing for transplant consideration

The team at St George's have largely followed the STRONG-HF clinical trial inclusion and exclusion criteria, with the following minor adjustments:

- People with an acute Myocardial Infarction (MI) or Acute Coronary Syndrome (ACS) were excluded from the original clinical trial. But at St. George's, once the ACS has been managed and they've had their intervention in the cath labs, they can put them onto the STRONG programme if they meet the other eligibility criteria.

- In the original trial only patients with a) an NT-proBNP > 2,500 pg/mL at screening and b) an NT-proBNP > 1,500 pg/mL prior to discharge (and has decreased by more than 10% compared to screening) were eligible. At St. George's, the team relaxed the criteria so that patients with an NT-proBNP >2500pg/ml on admission and any reduction in NT-proBNP levels prior to discharge were eligible.

- Patients on less than 50% target dose of any of the four pillars of therapy were eligible, whereas in the original trial the inclusion criteria around sub-optimal dose of GDMT was:
    - ≤ ½ the optimal dose of ACEi/ARB/ARNi prescribed, no beta blocker prescribed and ≤½ the optimal dose of MRA prescribed or
    - No ACEi/ARB/ARNi prescribed, ≤½ the optimal dose of beta blocker prescribed and ≤ ½ the optimal dose of MRA prescribed

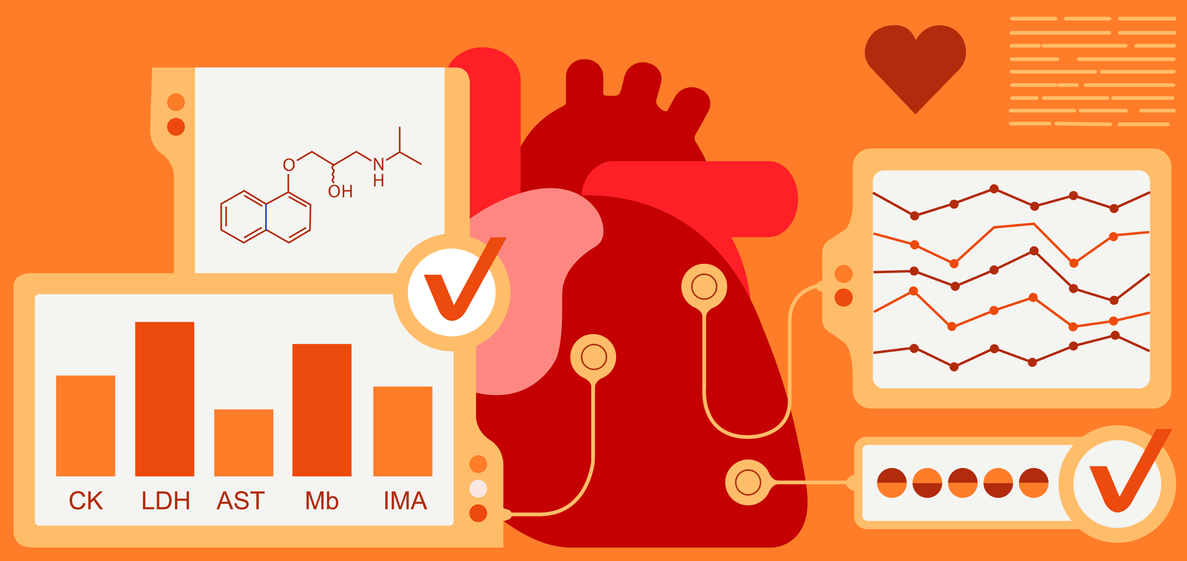
Support from Roche Diagnostics in the implementation of STRONG-HF

To support the implementation, Roche Healthcare Consultants helped establish three workstreams focused on clinical process and training, communications and change management, and data. To maintain momentum and accountability, they coordinated regular virtual and in-person meetings. These meetings addressed specific challenges, including localising the protocol to fit the local health economy, leading to a revised pathway and a better understanding of training needs for safe and confident delivery of STRONG-HF. The team used implementation science and change management techniques to prepare for a successful go-live by developing materials and events for staff and patients, including an adoption and communications plan and a comprehensive FAQ document.

According to Matt, they have now successfully implemented the principles of STRONG-HF in their centre and Healthcare Consultants have been instrumental in getting this over the line:

"The partnership we've had with Roche has really enabled us to get this project up and running in a timeline that we don't normally see for change in the NHS. When you are working in a system that is already highly pressurised and sort of fairly stretched, it's difficult to think to the future and think about different directions. Roche provided us with a package of professionalism, project management, and change management in a structured and well-thought-through manner"

Matthew Sunter, Lead Heart Failure Nurse, St George's Hospital



What are the next steps?

St George's, Liverpool and Swansea continue to enrol patients into their STRONG-HF pathway and are using the same set of data collection metrics to grow a pool of real-world evidence on the impact of local adoption of STRONG-HF and NT-proBNP monitoring.

As heart failure prevalence is likely to increase in the future due to an ageing population, improved survival from myocardial infarctions, and a higher prevalence of risk factors, Roche is committed to further implementing and expanding the STRONG-HF programme across the UK.

For more information, you can visit our website at https://diagnostics.roche.com/gb/en/article-listing/health-topics/cardiac/strong-hf-biomarker-led-post-acute-hf-treatment.html

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