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DOI:
10.1136/bmjopen-2021-060221

BMJ Open

Barriers and facilitators to implementation of a home-based cardiac rehabilitation programme for patients with heart failure in the NHS: a mixed-methods study

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To cite: Daw P, Wood GER, Harrison A, *et al*. Barriers and facilitators to implementation of a home-based cardiac rehabilitation programme for patients with heart failure in the NHS: a mixed-methods study. *BMJ Open* 2022;**12**:e060221. doi:10.1136/bmjopen-2021-060221

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (http://dx.doi.org/10.1136/bmjopen-2021-060221).

Received 21 December 2021
Accepted 29 June 2022

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ABSTRACT

Objectives This study aimed to identify barriers to, and facilitators of, implementation of the Rehabilitation EnAblement in CHronic Heart Failure (REACH-HF) programme within existing cardiac rehabilitation services, and develop and refine the REACH-HF Service Delivery Guide (an implementation guide cocreated with healthcare professionals). REACH-HF is an effective and cost-effective 12-week home-based cardiac rehabilitation programme for patients with heart failure.

Setting/participants In 2019, four early adopter 'Beacon Sites' were set up to deliver REACH-HF to 200 patients. In 2020, 5 online REACH-HF training events were attended by 85 healthcare professionals from 45 National Health Service (NHS) teams across the UK and Ireland.

Design Our mixed-methods study used in-depth semi-structured interviews and an online survey. Interviews were conducted with staff trained specifically for the Beacon Site project, identified by opportunity and snowball sampling. The online survey was later offered to subsequent NHS staff who took part in the online REACH-HF training. Normalisation Process Theory was used as a theoretical framework to guide data collection/analysis.

Results Seventeen healthcare professionals working at the Beacon Sites were interviewed and 17 survey responses were received (20% response rate). The identified barriers and enablers included, among many, a lack of resources/commissioning, having interest in heart failure and working closely with the clinical heart failure team. Different implementation contexts (urban/rural), timing (during the COVID-19 pandemic) and factors outside the healthcare team/system (quality of the REACH-HF training) were observed to negatively or positively impact the implementation process.

Conclusions The findings are highly relevant to healthcare professionals involved in planning, delivering and commissioning of cardiac rehabilitation for patients with heart failure. The study's main output, a refined version of the REACH-HF Service Delivery Guide, can guide the implementation process (eg, designing new care pathways) and provide practical solutions to overcoming common implementation barriers (eg, through early identification of implementation champions).

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The mixed-methods used (interviews and survey) allowed triangulation of data, increasing the robustness of the study findings.
⇒ The combination of sampling methods (opportunity sampling and snowball sampling) improved representativeness of the study sample.
⇒ A validated theoretical framework, Normalisation Process Theory, was used to guide data collection and interpretation.
⇒ The framework analysis procedure used both inductive and deductive analysis, preventing the forcing of emerging concepts into the themes of Normalisation Process theory.
⇒ The findings may be transferable to other UK home-based cardiac rehabilitation programmes but may not transfer well to healthcare services outside the UK.

BACKGROUND

Heart failure and cardiac rehabilitation

Heart failure is a complex, debilitating syndrome with significant health consequences that, due to an ageing population, advances in device and pharmacotherapy, and more widespread adoption of western lifestyle, is on the rise globally.[1] There are approximately 64.3 million people living with heart failure in the world[2] and one million in the UK.[3] Heart failure is associated with high healthcare costs, stemming particularly from hospitalisations[4] and is a significant global healthcare challenge.[1] Cardiac rehabilitation participation is an important part of heart

failure management, as it has been shown to increase exercise capacity and health-related quality of life, and reduce risk of hospital admission in patients with heart failure.[4] However, cardiac rehabilitation is greatly underutilised globally.[5] In Europe, less than 50% of eligible patients receive cardiac rehabilitation; the uptake is particularly low in patients with heart failure (with only 14% receiving it).[6] Offering alternative models of delivery, such as home-based programmes, can potentially improve the uptake of cardiac rehabilitation among this clinical population by reducing some of the patient-level barriers (eg, dislike of group sessions) and making it more accessible, for example, for patients who are housebound.[7 8]

Normalisation Process Theory

A lack of theoretical underpinning can lead to a failure in developing a comprehensive understanding of the implementation process,[9] as well as a failure of introducing evidence-based interventions into clinical practice.[10] The use of implementation models, theories and frameworks in published implementation research studies has increased in the last decade.[11] In this study, we used Normalisation Process Theory (NPT) to help understand the mechanisms of successful implementation.[12] NPT can be used to describe and evaluate different aspects of the implementation process, including barriers to, and facilitators of, implementation. The theory uses four main constructs (coherence, cognitive participation, collective action and reflexive monitoring) and 16 components (see table 1) to capture the work that healthcare professionals do to implement (or 'normalise') a new set of practices. The framework is sensitive to influences at the individual, community, organisational and system levels.[13]

Study aims

This study is part of a larger mixed-methods pragmatic implementation evaluation project.[14] The first aim of the current study was to identify barriers to, and facilitators of, implementation of the Rehabilitation EnAblement in CHronic Heart Failure (REACH-HF) programme using two different cohorts of healthcare professionals. The second aim was to develop and refine an implementation manual to inform the future implementation of the REACH-HF programme.

Table 1 Normalisation Process Theory (NPT)—constructs, components and definitions (based on the NPT Online Toolkit at www.normalizationprocess.org)

Constructs	Components	Definition
Coherence—the sense-making work	Differentiation	Whether the intervention is easy to describe to service providers and whether healthcare professionals can appreciate how it differs or is clearly distinct from current ways of working.
	Communal specification	Whether healthcare professionals have or are able to build a shared understanding of the aims, objectives, and expected outcomes of the proposed intervention.
	Individual specification	Whether individual staff have or are able to make sense of the work—specific tasks and responsibilities the proposed intervention would create for them.
	Internalisation	Whether healthcare professionals have or are able to easily grasp the potential value, benefits and importance of the intervention.
Cognitive participation—the relational work	Initiation	Whether or not key healthcare professionals are able and willing to get others involved in the new practice.
	Enrolment	The capacity and willingness of healthcare professionals to organise themselves in order to collectively contribute to the work involved in the new practice.
	Legitimation	Whether or not healthcare professionals believe it is right for them to be involved, and that they can make a contribution to the implementation work.
	Activation	The capacity and willingness of healthcare professionals to collectively define the actions and procedures needed to keep the new practice going.
Collective action—the operational work	Interactional workability	Whether healthcare professionals are able to enact the intervention and operationalise its components in practice.
	Relational integration	Whether healthcare professionals maintain trust in the intervention and in each other.
	Skill set workability	Whether the work required by the intervention is appropriately allocated to healthcare professionals with the right mix of skills and training to do it.
	Contextual integration	Whether the intervention is supported by the host organisation, management and other stakeholders, protocols, policies and procedures.
Reflexive monitoring—the appraisal work	Systematisation	Whether healthcare professionals can determine how effective and useful the intervention is from the use of formal and/or informal evaluation methods.
	Communal appraisal	Whether, as a result of formal monitoring, healthcare professionals collectively agree about the worth of the effects of the intervention.
	Individual appraisal	Whether individuals involved with (healthcare professionals), or affected by (patients), the intervention, think it is worthwhile.
	Reconfiguration	Whether healthcare professionals or services using the intervention can make changes as a result of individual and communal appraisal.

METHODS AND ANALYSIS

Study design and participants

We conducted in-depth semi-structured interviews and an online survey. To recruit participants for the interviews, we used opportunity sampling—inviting all trained REACH-HF Beacon Site practitioners (n=12) to participate, followed by snowball sampling—the initial interviewees were asked to identify other key staff involved in, or impacting, the implementation process. Participant recruitment continued until saturation in the identified themes was reached. The online survey invitation was sent to all healthcare professionals (n=85) who took part in the REACH-HF remote training.

Greene *et al* suggested five broad reasons for using mixed-methods. These include triangulation (employing different methods leads to verification of results), complementarity (results from one method clarify results from the other), development (results from one method inform the other method), initiation (discovering paradoxes and contradictions that can be used to reframe the research question) and expansion (expanding the breadth of inquiry—using different methods for different inquiry components).[15] In terms of the current study, the rationale for using mixed-methods was a desire to maximise the depth of data through triangulation, to understand different aspects of the implementation process and to identify unexpected factors influencing implementation (expansion). Different methods were employed sequentially with a small overlap between launches—this allowed the project to conclude within the available time frame.

The REACH-HF programme

REACH-HF is a novel cardiac rehabilitation programme for patients with heart failure and their caregivers, designed to be delivered in the patient's home.[16–20] The 12-week programme was co-designed with patients, caregivers and healthcare professionals; patient preference and acceptability were addressed extensively during the REACH-HF clinical trials and during the process evaluation of one of those trials. The REACH-HF team continues to work with patients, caregivers and healthcare professionals to refine the intervention further and create the best possible match between the intervention and its providers and recipients. The programme's clinical effectiveness (for improving heart failure-related quality of life) was demonstrated in a multicentre UK clinical trial and a decision model-based analysis confirmed its cost-effectiveness.[21–23] The multicomponent intervention consists of a heart failure manual, a choice of two exercise training programmes (chair-based and walking), a stress management programme, a progress tracker and a family and friends resource. The programme requires facilitation from a healthcare professional (most often a cardiac rehabilitation nurse or physiotherapist) trained to deliver REACH-HF.

Beacon sites

In January 2019, the research team appointed four cardiac rehabilitation services to become early adopter sites (the REACH-HF Beacon Sites) and deliver the REACH-HF programme to a target total of 200 patients between June 2019 and June 2020. The Beacon Site criteria, recruitment and set up processes are described in detail in the published study protocol (see online supplemental appendix 1).[14] Briefly, the Beacon Sites consisted of four well-established cardiac rehabilitation teams from diverse geographical areas (urban and rural) in England and Northern Ireland. Three healthcare professionals from each team attended a 3-day, in-person REACH-HF training course. Prior to their involvement with REACH-HF, the Beacon Sites mainly offered group, centre-based cardiac rehabilitation and one service excluded patients with a primary diagnosis of heart failure. There were no charges to patients enrolled to receive the REACH-HF programme and any additional cost associated with offering home visits, for example, travel costs were covered by the individual sites from their current budgets.

The participating Beacon Sites were given a great amount of autonomy regarding introducing the programme into the service and operationalising its delivery. This included which healthcare professionals to put forward for the training. In fact, some interviewed healthcare professionals volunteered for the training, whereas others were sent to attend. There was no compensation paid to the trained REACH-HF practitioners to participate in the Beacon Site project.

REACH-HF remote training

During the recent COVID-19 crisis, most group, centre-based cardiac rehabilitation programmes (the prevailing mode of delivery prior to the pandemic[24]) were suspended.[25] The challenges to service provision caused by staff redeployment and social distancing and shielding guidance led to a sharp demand for alternative models of delivery,[26] including home-based programmes.[27] To facilitate this, members of the REACH-HF research team adapted the 3-day face-to-face REACH-HF training into a 2-day remotely delivered format and offered it free-of-charge to interested cardiac rehabilitation teams. A total of 85 healthcare professionals from 45 National Health Service (NHS) organisations and four centres in the Ireland attended the REACH-HF remote training between May 2020 and September 2020.

Data collection and analysis

PD and CJG generated the interview topic guide (see online supplemental appendix 2) using all 16 concepts from the NPT. All interviews were conducted by PD (mainly, prior to the COVID-19 pandemic) via the telephone or face-to-face. Each participant was interviewed once (mainly, at the beginning of the implementation process). We were not able to repeat interviews or conduct focus groups, as stated in the protocol, due to the COVID-19 lockdown restrictions and temporary

redeployment of rehabilitation staff to support pandemic-related healthcare service delivery.[14] Audio recordings of the interviews were transcribed verbatim. The transcripts were redacted to remove any identifiable information and entered into NVivo (V.12) program for analysis.[28] The online survey (see online supplemental appendix 3) was based on the interview topic guide with additional questions about the REACH-HF Service Delivery Guide and consisted of a mixture of closed-response and open (qualitative) questions. The survey was conducted using the LimeSurvey online platform.[29] Qualitative data from the survey were entered into NVivo for analysis alongside the interview data.

Data analysis was conducted by PD, GERW and CJG following the procedures for framework analysis outlined by Ritchie and Spencer.[30] These included: identification of a theoretical framework suitable for the study (NPT), familiarisation with the data, indexing, charting, mapping and interpretation of themes. The analysis initially consisted of two rounds of independent coding of two transcripts by PD and GERW and in-depth discussions of emerging themes, moderated by CJG, between the rounds of coding. The resulting framework was then used to code the remaining data, with variations and extensions of the thematic framework added as new ideas emerged. To avoid forcing themes into a framework, our coding procedure allowed identification of emergent themes that were outside of the NPT; these were included in the study and were given the same weight of evidence in the final interpretation.

An implementation manual, the REACH-HF Service Delivery Guide (see online supplemental appendix 4), was developed following the initial qualitative interviews with NHS staff from the Beacon Sites (n=9). The draft guide was then circulated among one of the healthcare teams for comments and further development and refined following the consecutive interviews with the participating sites. The latest iteration of the Service Delivery Guide also incorporated data from the survey.

We used the Standards for Reporting Qualitative Research checklist to report the qualitative findings (see online supplemental appendix 5).[31]

Patient and public involvement

The REACH-HF intervention was co-designed with patients, caregivers and healthcare professionals; patient preference and acceptability have been addressed extensively during the REACH-HF clinical trials and process evaluation as detailed in the intervention development paper.[20] The focus of the current study was on implementation into routine service delivery, therefore, the research team worked closely with healthcare staff working at the Beacon Sites to discuss the feasibility of the study, selected outcome measures and the burden of participation. Additionally, the first draft of the REACH-HF Service Delivery Guide was shared with staff from one of the Beacon Sites to comment on its content, layout and completeness. All amendments and suggestions made by the staff (during interviews and when completing the survey) were implemented into the subsequent version of the guide.

RESULTS

Qualitative interviews were conducted between September 2019 and February 2021 with 17 healthcare professionals working at the Beacon Sites (site 1—six interviewees, site 2—six interviewees, site 3—four interviewees and site 4—one interviewee). All except two of the interviews were conducted before the COVID-19 pandemic. The average time between the REACH-HF training (ie, May 2019) and the 15 interviews conducted before the COVID-19 pandemic (ie, before March 2020) was 113 days. We interviewed six cardiac rehabilitation nurses, five physiotherapists/exercise physiologists/exercise instructors, three clinical leads/projects managers, two heart failure nurses and one consultant cardiologist. Of the 17 interviewees, 3 were male. The average management/cardiology/cardiac rehabilitation/heart failure experience of the interviewees who disclosed their employment seniority was 9.5 years.

From a different part of the Beacon Site project, during which we interrogated the routinely collected audit data, we know that cardiac nurses were the main source of referrals with the majority of patients enrolled on the programme following hospitalisation for heart failure.[32] Only a fraction of referrals came from primary care pathways (general practitioners, primary care nurses).

The survey invitation was sent to 85 participants on 25 February 2021. The survey was active until 8 April 2021 and the response rate was 20% (15 participants fully completed the survey and two partially completed it). All of the survey responses were gathered following the peak of the COVID-19 pandemic in the UK. Out of the 17 healthcare professionals who took part in the survey study, 7 were physiotherapists, 6 cardiac rehabilitation nurses and 4 heart failure nurses. The majority of respondents rated their knowledge prior to attending the training as 'advanced' in the four domains crucial for delivery of REACH-HF: cardiac rehabilitation—13, heart failure—11, exercise prescription—9 and person-centred communication skills—12. Prior to attending the REACH-HF training, all participants worked for services that offered cardiac rehabilitation to patients with heart failure. Eight healthcare professionals worked for services that offered home-based cardiac rehabilitation to cardiac patients. To preserve the anonymity of both participants and study sites, no other demographic or identifiable information were collected.

Barriers and facilitators to implementation

The study uncovered a wide range of general influences and a smaller number of site-specific factors positively and negatively affecting the implementation of REACH-HF (tables 2 and 3). Most of the identified barriers and facilitators mapped onto the existing NPT constructs. Factors that fell outside of the NPT framework are listed

Table 2 Barriers to implementation of REACH-HF

NPT construct	Barriers
Differentiation	
Communal specification	Confusion about patient criteria
Individual specification	Initial trial-and-error with operationalising the intervention
Internalisation	
Initiation	Lack of implementation plan
	Lack of champions
Enrolment	Routine of delivering group centre-based programmes
	Practitioners being away from core cardiac rehabilitation duties/team being stretched
	Low team morale and lack of enthusiasm for REACH-HF
	Challenging personal circumstances
	Poor communication with heart failure team
Legitimation	Initial hesitation about being part of project
Activation	Perception of REACH-HF in its current format as not implementable
Interactional workability	Additional time
	Additional cost
	Additional admin
Relational integration	Higher opinion of centre-based provision
	Negative opinion of REACH-HF resources (DVDs are outdated, technical problems, written resources are too lengthy)
Skill set workability (including REACH-HF practitioner's training)	Disinclination for lone working
	Disjointed working between cardiac rehabilitation and heart failure teams
	REACH-HF training not well-pitched to audience
Contextual integration	Lack of time allocation
	Lack of staff
	Staff redeployment due to COVID-19
	Commissioning structure (lack of commissioning of cardiac rehabilitation for heart failure patients)
Systematisation	Time required for evaluation
	Task of evaluation lies with management
Communal appraisal	
Individual appraisal	
Reconfiguration	
	Non-NPT barriers
Patient-level factors	Multimorbidity patients (frequent hospitalisations, not stable to exercise, additional time)
	Engaging with technology (lack of DVD players or internet, not being technologically savvy)
	Apparent lack of improvement following REACH-HF
	Expectations and preferences (lack of motivation, preference for group centre-based programmes, dislike of home visits)
Geographical factors	Size and type of patch (large catchment area, transport issues)

NPT, Normalisation Process Theory; REACH-HF, The Rehabilitation EnAblement in CHronic Heart Failure programme.

in the 'non-NPT barriers and facilitators' sections of each table. Online supplemental appendices 6 and 7 contain extended versions of tables 2 and 3, which include quotes relating to each construct.

Barriers and facilitators related to NPT

Coherence: the sense-making work

There was agreement between participants and across all sites about the purpose and value of the REACH-HF intervention. An initial process of trial-and-error at the beginning of the implementation process linked with operationalising the intervention, for example, developing delivery and/or administrative procedures, and some minor confusion about patient criteria/eligibility were present at all sites. Site 1 was the only site that had a very clear vision for the intervention from the outset; the targeted delivery of the programme at this site involved

Table 3 Facilitators to implementation of REACH-HF

NPT construct	Facilitators
Differentiation	Good grasp of difference between REACH-HF and usual service delivery
Communal specification	Good grasp of purpose of REACH-HF
	Agreement that REACH-HF adds value to service
	Initial dissemination of purpose and structure of REACH-HF
	Awareness of service gap
	Clear vision for REACH-HF
Individual specification	Clear procedures and increased efficiency
Internalisation	Good grasp of value of intervention to heart failure population
Initiation	Availability of champions (whole team, organisation, three REACH-HF practitioners, single REACH-HF practitioner)
	Identification of potential referrers/referral streams
Enrolment	Strong endorsement for REACH-HF
	Interest in heart failure
	Effective communication (within cardiac rehabilitation team, between cardiac rehabilitation and heart failure teams)
Legitimation	Feeling positive about involvement
	Feeling positive about challenge of introducing REACH-HF
	Being part of innovative team
Activation	REACH-HF part of service going forward
	Watchful waiting
	Implementing REACH-HF post-COVID-19
Interactional workability	Gaining balanced perspective of time involved in delivery of REACH-HF
	COVID-19 led to changes in service provision
	Good fit with service and with patient
Relational integration	More objective opinion of centre-based programmes
	Positive opinion of REACH-HF resources (written resources are just right, being able to use friends and family resource)
	Trust in intervention and each other
	REACH-HF practitioner's peer support
Skill set workability (including REACH-HF practitioner's training)	Preference for home-visits
	Close working with heart failure team
	Choice of REACH-HF practitioners (self-selection, personal attributes, training more than one individual, experiences of working with multimorbidity patients)
	Skills combination (cardiac rehabilitation, physiotherapy/exercise physiology and heart failure)
	Improvements to REACH-HF training (making it more practical, more emphasis on exercise component, input from previous implementers, shorter modular online training, having more in-depth pretraining reading around self-management approach, recommending pretraining course—the BACPR heart failure exercise or activity training course
Contextual integration	Protected time
	Management team is proactive (securing additional funding, redesigning service, offering flexible rehabilitation)
	Commissioning structure (being block contractor)
	Support from management
Systematisation	Planned, formal evaluation (by management)
	Reflective, informal evaluation (by REACH-HF practitioners)
Communal appraisal	Developing more balanced view of intervention and implementation process
Individual appraisal	Job satisfaction
	Continuous professional development
	Positive feedback from patients

Continued

Table 3 Continued

NPT construct	Facilitators
Reconfiguration	Fully home-based programme
	Fully remote delivery during COVID-19 pandemic
	Smoother enrolment onto programme
	Reduced home visits
	Home/centre hybrid
	Group centre-based programme
	Inspiration for better service delivery in general
	Amendments to REACH-HF resources (careful wording, simplified version of exercises, online resources)
	Non-NPT facilitators
Patient-level factors	Simplified version of exercises
	Overcoming technological issues
	Expectations and preferences (preference for, and motivation to, take part in home-based programme, being housebound)
Geographical factors	Size and type of patch (small catchment area, availability of transport)

.BACPR, British Association for Cardiovascular Prevention and Rehabilitation; NPT, Normalisation Process Theory; REACH-HF, The Rehabilitation EnAblement in CHronic Heart Failure programme.

offering it to patients who would not otherwise have been able to attend traditional/centre-based cardiac rehabilitation. Effective dissemination of the purpose and value of the REACH-HF programme among the wider team was an important part of the sense-making work at all Beacon Sites and a task of REACH-HF practitioners following the initial training.

Cognitive participation: the relational work

There were significant differences between the sites in terms of what or who was driving the implementation process forward. The identified champions included the organisation itself (site 2), a single practitioner (site 4) all trained REACH-HF practitioners (site 3) and the whole team (site 1). Participants were unanimous that an early identification of potential referrers, most often heart failure nurses, was an important pre-requisite for programme delivery—this was achieved easily at site 1 due to a close proximity between the cardiac rehabilitation and heart failure teams. A strategy for improving the relational work, highlighted by all participants, was effective communication within the cardiac rehabilitation team and between the cardiac rehabilitation team and the heart failure team.

Low team morale (also exacerbated by challenging personal circumstances) and a lack of enthusiasm for the intervention were identified at site 2 and site 4, respectively. On the other hand, participants at sites 1 and 3 expressed feeling positive about their involvement in the implementation of REACH-HF. Being part of an innovative team and enjoying the implementation challenges were particularly evident at site 1.

Another noteworthy difference between the sites was how NHS staff perceived the future of the REACH-HF intervention in their service. At site 1, there was a strong hope that REACH-HF would be part of the service going forward. At site 3, we observed a pattern of watchful waiting (a process of working out if REACH-HF can fit within the service delivery and whether it is sustainable). At site 2, there was a strong perception of the intervention in its current format not being implementable (mainly, linked with a large catchment area served by this service). Staff at site 4, were looking forward to re-engaging with the innovation post-COVID-19.

Collective action: the operational work

Interviewees were in agreement that operationalising REACH-HF into a service required additional time (eg, travelling and with patients) and additional cost (eg, the REACH-HF manuals and travel fares). Additional administrative tasks were identified at site 2 only; these were specific to the unique way staff working at site 2 were enrolling patients onto the programme, which included posting out the REACH-HF manual prior to the initial assessment.

Collective action can be positively or negatively influenced by the healthcare professionals' opinions of the innovation. We did not notice any patterns in the data or site-level differences relating to the REACH-HF resources; on occasions, what one person suggested as a negative, was a positive for another person. For example, some healthcare professionals enjoyed using the progress tracker and believed it allowed them to engage in a more meaningful way in goal setting and goal tracking during treatment, whereas others found the progress tracker to be a surplus part of the treatment. We identified the strongest collective endorsement for the intervention at site 1. A practical way of improving collective action (increasing the trust in the intervention and in each other) was to introduce regular (most often monthly) REACH-HF peer support/supervision sessions—these were spontaneously introduced and implemented by staff working at sites 1

and 3 and involved discussing implementation and/or clinical challenges linked with introducing REACH-HF programme into routine service delivery. The sessions were not supervised by the REACH-HF trainers or researchers.

Additionally, two 90-min videoconferencing peer supervision sessions were available to all REACH-HF trained facilitators. These were provided as part of the REACH-HF training package and chaired by the REACH-HF trainers and researchers. The purpose of those virtual meetings was to help embed the learning from the initial training and troubleshoot any implementation problems. The REACH-HF practitioners from three Beacon Sites were available to take part in the first peer support session in December 2019 and only one team participated in the second session in February 2021.

Two operational barriers relating to the availability of resources were consistent between the sites—a lack of sufficient time to implement REACH-HF and being understaffed. A lack of commissioning structure for cardiac rehabilitation for heart failure patients (in general, not just for the REACH-HF programme) was a barrier particular to site 2, whereas at site 1, the specific type of commissioning arrangement (being a block contractor) was identified as a facilitator, as it allowed more flexibility in how the service is delivered. Managers can positively impact barriers related to collective action by providing support to the implementers and being proactive—securing additional funding, redesigning the service and offering a flexible cardiac rehabilitation provision. The latter was done by adjusting the length of centre-based cardiac rehabilitation (typically 12 weeks) so it was tailored to patient needs and lifestyle (not all patients will require the full length of a set centre-based programme), which will free up REACH-HF practitioners to offer home-based rehabilitation to more complex heart failure patients.

Reflexive monitoring: the appraisal work

Within each site, various evaluation procedures were used to conduct the appraisal work. These ranged from ad hoc informal reflection by REACH-HF practitioners to formal, planned approaches using both patient-level and service-level data. Individual and communal appraisal (two important aspects of reflexive monitoring) resulted in a more balanced view of the intervention and the implementation process. For example, an acknowledgement that the time required to deliver the programme was overestimated at the beginning of the implementation process (the reduction in time needed was also linked with increased efficiency in delivery) or, that in time, it will be possible to secure referral pathways through developing links with heart failure nurses. Positive feedback from patients and increased job satisfaction were frequently quoted by the REACH-HF practitioners when commenting on appraisal of the programme.

Different levels of reconfiguration of the REACH-HF programme were suggested by the interviewees. These ranged from a fully home-based programme (suggested by participants at site 1) to a home-based/centre-based hybrid (at site 3) or adapting REACH-HF into a group centre-based programme (at site 2). At site 1, the programme was delivered fully remotely during the COVID-19 pandemic, using phone contacts and video consultations to facilitate the intervention. A more detailed overview of the barriers and facilitators relating to each of the 16 NPT components (which were subsumed within the four over-arching themes described above) can be found in online supplemental appendix 8.

Barriers and facilitators not related to NPT

Patient-level factors

Patient-level factors related to multimorbidity, issues with technology, and patient expectations and preferences. Interviewees were in agreement that patients with multimorbidity sometimes struggled to engage with the intervention due to frequent hospitalisations and not being stable or well enough to exercise. The impact of multimorbidity on patients' abilities to complete the programme was particularly evident at site 1, which targeted patients who were housebound and would not otherwise be able to engage in centre-based cardiac rehabilitation programmes. Many patients treated at this site were unable to attend baseline and end-of-treatment assessments at the clinic and/or had periods of no exercise. The availability of a smaller paper-based set of exercises was a suggested facilitator for managing more complex patients.

Some patients were unable to engage with the chair-based exercise programme due to not having access to a DVD player or the internet. Patients who were less technologically savvy (particularly older patients) needed additional support from staff to access the chair-based exercises. Managers and staff working at site 1 took steps to overcome technological challenges by purchasing and lending DVD players to patients who did not have them. Staff also helped to address technical challenges by inputting the chair-based exercises weblink into patients' devices during assessments or follow-up appointments.

Patient expectations and preferences also played an important part in the implementation process as they could hinder it (eg, a lack of motivation, dislike of home visits and preference for group-based programmes) or facilitate it (eg, motivation to engage with home-based programmes and a preference for receiving the intervention at home).

Geographical factors

A large catchment area for a cardiac rehabilitation service (over a vast rural sprawl) was reported as a significant barrier to implementation by all interviewees at site 2. Whereas at site 1, a more contained catchment area (in a dense urban environment) with good transport links facilitated implementation. This additional non-NPT factor is somewhat related to the NPT component of 'contextual integration', but as it extends beyond the organisational

focus of this construct's definition, we placed it outside of the framework.

Survey data

Following the REACH-HF remote training, and at the time of completing the survey (approximate median time—34 weeks), six (35%) healthcare professionals had delivered the REACH-HF programme. The barriers to implementation identified in the survey data were mostly consistent with barriers identified in the interview data. These included commitment to delivering traditional cardiac rehabilitation programmes (and a consequential lack of capacity to deliver alternative programmes), a lack of commissioning and funding/resources/capacity, and patients not taking up the offer or not having access to a DVD player/the internet to support the implementation of REACH-HF. Three additional barriers were identified in the survey: a lack of an implementation plan, a lack of champions in the service and staff redeployment due to COVID-19. The survey also uncovered a more nuanced impact of the COVID-19 pandemic. The forced changes to the delivery of cardiac rehabilitation during the COVID-19 pandemic were seen as a facilitator—some services embraced new technologies to enable more remote ways of delivering cardiac rehabilitation. However, in some services, the patient recruitment process was hindered by the redeployment of staff due to COVID-19. One participant also noted that the positive impact of COVID-19 on the team's capacity to offer alternative models of delivery was reversed as the service returned to its usual way of operating (ie, offering mainly centre-based programmes). The facilitators to implementation identified in the survey were closely aligned to those identified in the interviews.

The majority of survey participants (n=14, 82%) had read the REACH-HF Service Delivery Guide, which was included with the survey invitation. Of these, eight (57%) strongly agreed that it would be useful to have access to this implementation manual at the beginning of setting up the REACH-HF programme. Seven (50%) participants agreed that the length of the guide was just right and the same number agreed that the guide was easy to use.

Data from the survey, the successive interviews and feedback from one Beacon Site were used to refine the latest version of the REACH-HF Service Delivery Guide (see online supplemental appendix 4). The key changes included adapting phraseology throughout the document to suit the intended audience, improving/clarifying terminology used in the patient criteria and selection tool, adapting formatting of clinical pathways and adding modifications required to deliver the programme remotely, for example, during the COVID-19 pandemic.

Dynamic interactions between different components

Analysis of the data identified numerous interactions between the barriers and facilitators described above; several of those interactions are depicted in figure 1, the full matrix of the identified interactions can be found in online supplemental appendix 9. These interactions occurred both within and between NPT domains. The implementation process was also (positively or negatively) influenced by external factors, beyond the healthcare team. These included the COVID-19 pandemic and the resulting restrictions on personal movement and interaction. Factors relating to the innovation itself (eg, the REACH-HF resources) and to the REACH-HF training also played an important role in the implementation process.

We identified several distinct types of interaction between the model's components:

- Simple associations (denoted by a plain line in the diagram).
- Positive impact, when one component positively impacts another (green arrowed line).
- Negative impact, when one component negatively impacts another (red arrowed line).

An example of a simple association was feeling positive about the challenge of implementing REACH-HF and being part of an innovative team. An example of a positive impact interaction was having an interest in heart failure which led to a strong endorsement for REACH-HF. Another example was securing additional funding and thereby reducing the barrier of staff shortages. An example of a negative impact interaction was that shortcomings of the REACH-HF training led to a period of trial-and-error at the beginning of the implementation process.

Many of the interactions between different components followed a typical trajectory (ie, they were in some sense expected/predictable), for example, effective communication between healthcare professionals strengthened multidisciplinary working, and effective dissemination of the purpose/structure of REACH-HF dispelled confusion about patient criteria. However, there were also some unexpected interactions where an apparent facilitator also had a negative impact on implementation. One example of this was that having a clear recruitment target for the intervention at site 1 (offering it to patients who would not otherwise be able to attend centre-based programmes) led to an increase in patient-level barriers as multimorbid patients tended to be less technologically literate as their younger counterparts. Another example, was where a strong organisational push to implement the innovation (an organisation as the main champion) resulted in the team's hesitation/resistance to roll out REACH-HF at site 2. Lastly, a positive reconfiguration at site 2 (posting out manuals before the assessment session) led to patients starting the programme in a timely manner, but also increased the amount of administrative cost and burden placed on the team.

Although we were unable to repeat qualitative interviews, during the conducted in-depth interviews healthcare professionals reflected on temporal changes to their attitude to, and perception of, the work required to deliver the intervention. It is important to note that most identified barriers reduced with time and practice.

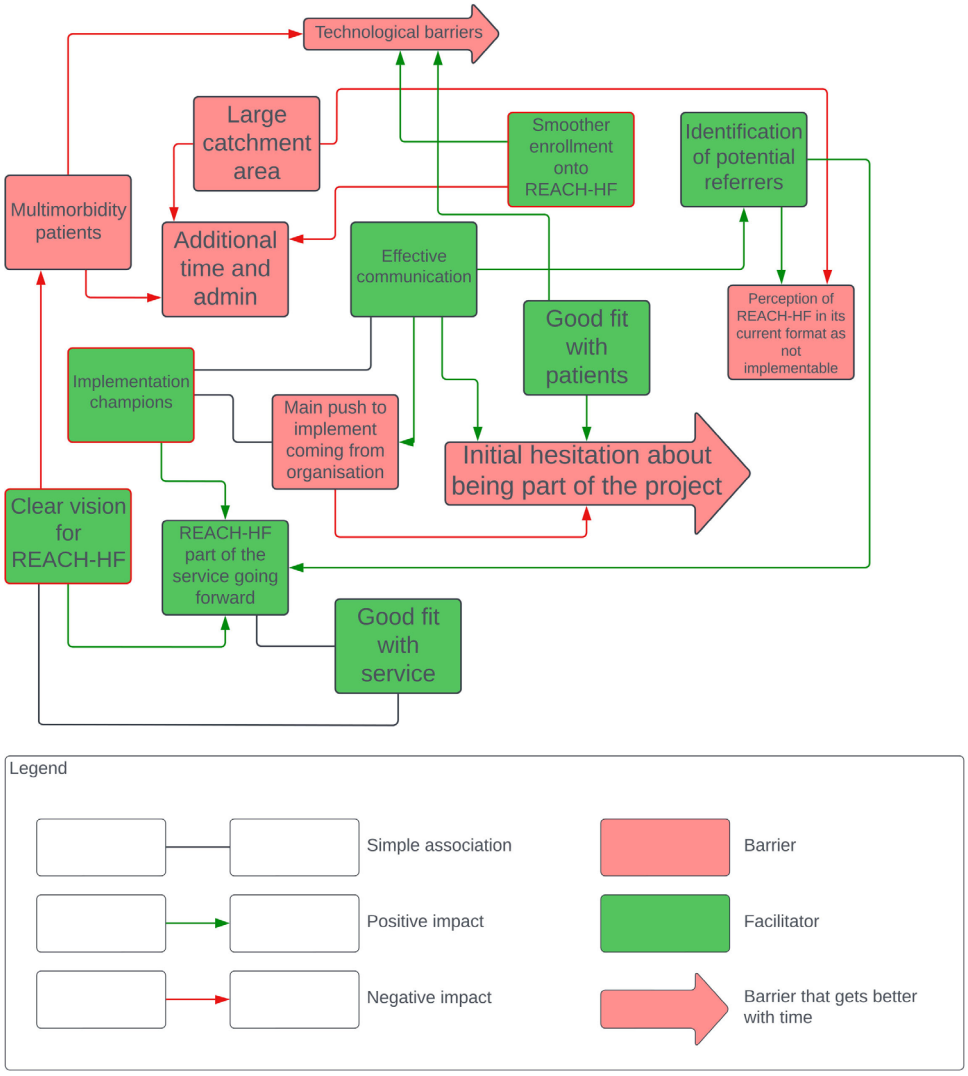

Figure 1 Dynamic interactions between model's components. REACH-HF, The Rehabilitation EnAblement in CHronic Heart Failure programme.

For example, initial trial-and-error was mostly replaced with new systems and efficiency. Other barriers subsided following evaluation when, for example, healthcare professionals developed a more realistic view of the time required to deliver REACH-HF and allocated resources accordingly. We did not observe any weakening in the relevance of facilitating factors over time.

DISCUSSION

Principal findings

We believe this to be the first study to investigate the implementation of a home-based cardiac rehabilitation programme in a variety of contexts (pre and during the COVID-19 pandemic). We identified a complex matrix of general and site-specific barriers and facilitators to implementation that interact and change over time. These influences occur on different levels: individual clinician (eg, having an interest in heart failure, a lack of enthusiasm for the intervention), the community of practice (eg, close working with the heart failure team), organisational (eg, availability of resources, a good fit between the intervention and the service) and the wider systems (eg, a lack of commissioning of cardiac rehabilitation for patients with heart failure). The most pronounced variations between the Beacon Sites included main drivers behind the innovation (ie, who instigated and was driving the implementation forward), varying levels of enthusiasm for delivering REACH-HF, perceived sustainability of delivery and the level of adaptation of the intervention.

The meaning of the study: possible explanations and implications for clinicians and policy-makers

The complexity[33] and adaptability[34] of modern healthcare systems is well-documented and widely accepted within the realm of implementation science and our study undeniably captured the complex and dynamic nature of the implementation process. By understanding the backdrop of barriers and facilitators affecting implementation, we were able to make recommendations for future implementers and for further development of the intervention and its training course (figure 2). For example, the study

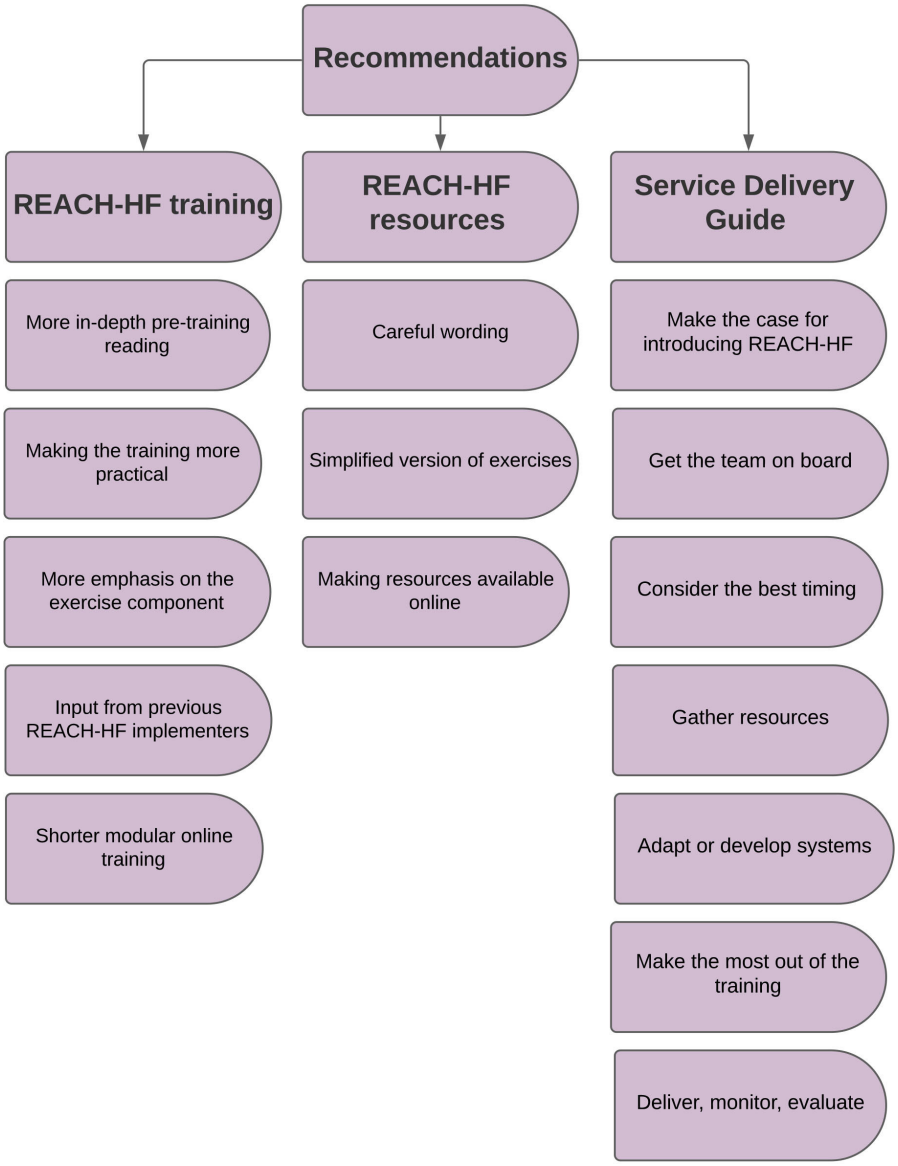

Figure 2 Recommendations for further intervention and training development, and future implementers. REACH-HF, The Rehabilitation EnAblement in CHronic Heart Failure programme.

highlighted the importance of choosing the best timing when introducing REACH-HF into a service or of a careful selection of staff to train in the intervention delivery. We also used the data to expand and refine the REACH-HF Service Delivery Guide, for example, by considering practicalities of introducing remote delivery. Some of the recommendations from the current study have been already put into action. For example, early adopters are now involved in delivering the REACH-HF training and the REACH-HF research team is in the process of digitising the healthcare professional training[35] and the intervention,[36] as well as adapting it for use in Denmark.[37] The study is of high clinical relevance, as it can provide healthcare professionals responsible for planning, delivering and commissioning of cardiac rehabilitation services valuable insight into the implementation process, as well as a pragmatic implementation manual. It is hoped that these tools/recommendations will guide the ongoing introduction of the REACH-HF programme into NHS and other healthcare settings, as well as promoting its sustained delivery.

The majority of identified barriers and facilitators to implementation of the REACH-HF programme are consistent with the wider implementation science literature on generic factors which can positively or negatively affect the implementation of new innovations.[38 39] The study provides a worked model of assessing implementation that can be used as an example in future implementation evaluation projects of different healthcare innovations.

REACH-HF service delivery guide

Following the initial interviews conducted for this study, and in collaboration with staff working at one Beacon Site, we created the REACH-HF Service Delivery Guide (see online supplemental appendix 4). This implementation manual is designed to support healthcare teams wishing

to add the REACH-HF programme to their cardiac rehabilitation service. The 18-page guide describes pragmatic solutions to overcoming implementation challenges encountered at the Beacon Sites and is designed to be used in conjunction with the REACH-HF Facilitator Training Pack. The guide can be used to help 'make the case' for introducing REACH-HF into a service, which is an important part of the implementation process. It also outlines the necessary practical steps for adding REACH-HF into a service, such as, equipment required, deciding the best timing for implementation, gathering resources and designing new care pathways. The guide highlights the importance of evaluation and lists some of the adaptations to delivery that took place at the Beacon Sites, including adaptations for fully remote delivery during the COVID-19 pandemic. The guide is publicly available through the National Institute for Health and Care Excellence Shared Learning Database.[40]

Strengths and limitations of the study

The main strength of the study is that it goes beyond the identification of barriers and facilitators to implementation to provide practical guidance for cardiac rehabilitation teams interested in offering the REACH-HF programme to their patients. Additionally, using two methods of data collection, at different time points and with different cohorts of participants, allowed data triangulation and enriched our understanding of the implementation process in different contexts and under different circumstances. Involving professionals from a large number of healthcare teams and using two sampling methods increased the representativeness of the study sample and relevance of the study's results. However, as in any relatively small scale study there is a possibility of a selection bias affecting the findings. Therefore, the results of the current study need to be interpreted taking into account the participant sample they were uncovered within.

The study has sound theoretical underpinnings in the form of the NPT, however, to avoid forcing emerging concepts into the pre-existing NPT components, we used a combined deductive/inductive analytic approach. There are two main limitations to the study. The first one is a deviation from the study protocol—due to the COVID-19 pandemic, we were not able to repeat the interviews later during the implementation process or to conduct focus groups. It is unclear if deviation from the protocol impacted the outcomes of the study. The second limitation of the study is its likely poor transferability/relevance outside of the UK healthcare system. The REACH-HF intervention was designed in collaboration with UK-based patients and healthcare professionals working in the NHS. Therefore, in its current format, the intervention is most compatible within the UK implementation context, for example, it requires a patient to have access to a DVD player or the internet. This poor transferability is particularly evident in low-income countries, where, due to small healthcare budgets, developing affordable models for the delivery of cardiac rehabilitation for heart failure patients is a priority.

Qualitative research, particularly with low participant numbers, is susceptible to response bias. In the case of our study, the interviewed healthcare professionals may have worried that their feedback would be seen by their employer or co-workers which could have led to socially desirable responses. To manage this dynamic and minimise the occurrence of the response bias, the interviewer had an exclusive research relationship with the interviewees and tried to promote honest responding. Interviewees were made aware during the informed consent procedure and at the beginning of the interview that their responses would be anonymised and their service location protected.

Unanswered questions and future research

The study was the first attempt to understand the process of implementation of the REACH-HF programme into routine service delivery. Further implementation data relating to different healthcare contexts are needed. In this regard, data are currently being gathered in the SCOT REACH-HF project involving six health boards in Scotland.[41] The growing knowledge of the implementation process in different contexts could be further expanded by exploring interactions between the innovation and the implementation context, for example, by investigating the 'plasticity of intervention components' (the adaptability of the intervention) and the 'elasticity of contexts' (rigidity/flexibility of the implementation environment).[42]

Conclusions

This study identified a wide range of barriers to, and facilitators of, implementation of the home-based REACH-HF cardiac rehabilitation programme across the UK. The study highlighted many interactions between different components of the model, including reductions in barriers over time, as well as interactions with the intervention itself and the quality of training. The main output of the study is a pragmatic implementation guide—the REACH-HF Service Delivery Guide, which the study confirmed to be a useful tool for cardiac rehabilitation services wishing to include the REACH-HF programme in their service provision.

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Acknowledgements We thank all NHS staff who are working at the Beacon Sites and staff who participated in the online survey for providing invaluable insight for the study.

Contributors All authors (bar GERW) contributed to the idea for the study and protocol development. HMD was instrumental in setting up the Beacon Sites. SBvB led the set up and recruitment process. STJM was overseeing the day-to-day management of the Beacon Sites. PD secured all relevant ethical approvals for the project, prepared all study documentation and acquired the data. PD, GERW and CJG analysed the data. CJG, JJCSVvZ, HMD, RST, PD and AH provided project supervision and oversight. PD drafted the manuscript. All authors provided critical revision of the manuscript for important intellectual content and approved the final draft for submission. The guarantor for the study was the University of Birmingham.

Funding This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors. PD's time is funded by a PhD studentship from the University of Birmingham.

Competing interests None declared.

Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not applicable.

Ethics approval The study (IRAS 261723) has received ethics approval from the South Central (Hampshire B) Research Ethics Committee (19/SC/0304).

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available on reasonable request. The datasets analysed during the current study are available from the corresponding author on reasonable request.

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Open access Protocol

BMJ Open

Getting evidence into clinical practice: protocol for evaluation of the implementation of a home-based cardiac rehabilitation programme for patients with heart failure

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To cite: Daw P, van Beurden SB, Greaves C, *et al*. Getting evidence into clinical practice: protocol for evaluation of the implementation of a home-based cardiac rehabilitation programme for patients with heart failure. *BMJ Open* 2020;**10**:e036137. doi:10.1136/bmjopen-2019-036137

► Prepublication history and additional material for this paper are available online. To view these files, please visit the journal online (http://dx.doi.org/10.1136/bmjopen-2019-036137).

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Received 02 December 2019
Revised 28 April 2020
Accepted 11 May 2020

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ABSTRACT

Introduction Cardiac rehabilitation (CR) improves health-related quality of life and reduces hospital admissions. However, patients with heart failure (HF) often fail to attend centre-based CR programmes. Novel ways of delivering healthcare, such as home-based CR programmes, may improve uptake of CR. Rehabilitation EnAblement in CHronic Heart Failure (REACH-HF) is a new, effective and cost-effective home-based CR programme for people with HF. The aim of this prospective mixed-method implementation evaluation study is to assess the implementation of the REACH-HF CR programme in the UK National Health Service (NHS). The specific objectives are to (1) explore NHS staff perceptions of the barriers and facilitators to the implementation of REACH-HF, (2) assess the quality of delivery of the programme in real-life clinical settings, (3) consider the nature of any adaptation(s) made and how they might impact on intervention effectiveness and (4) compare real-world patient outcomes to those seen in a prior clinical trial.

Methods and analysis REACH-HF will be rolled out in four NHS CR centres across the UK. Three healthcare professionals from each site will be trained to deliver the 12-week programme. In-depth qualitative interviews and focus groups will be conducted with approximately 24 NHS professionals involved in delivering or commissioning the programme. Consultations for 48 patients (12 per site) will be audio recorded and scored using an intervention fidelity checklist. Outcomes routinely recorded in the National Audit of Cardiac Rehabilitation will be analysed and compared with outcomes from a recent randomised controlled trial: the Minnesota Living with HF Questionnaire and exercise capacity (Incremental Shuttle Walk Test). Qualitative research findings will be mapped onto the Normalisation Process Theory framework and presented in the form of a narrative synthesis. Results of the study will inform national roll-out of REACH-HF.

Ethics and dissemination The study (IRAS 261723) has received ethics approval from the South Central (Hampshire B) Research Ethics Committee (19/SC/0304). Written informed consent will be obtained from all health professionals and patients participating in the study. The research team will ensure that the study is conducted in accordance with the Declaration of Helsinki, the Data Protection Act 2018, General Data Protection Regulations and in accordance with the Research Governance Framework for Health and Social Care (2005). Findings will be published in scientific peer-reviewed journals and presented at local, national and international meetings to publicise and explain the research methods and findings to key audiences to facilitate the further uptake of the REACH-HF intervention.

Strengths and limitations of this study

- This will be the first study to investigate the real-world implementation of a home-based cardiac rehabilitation programme in the UK and also to include the evaluation of the real-world clinical effectiveness of the programme.
- The study will use Normalisation Process Theory as a theoretical framework to guide data collection and interpretation.
- The qualitative findings will inform the development of an implementation manual for policymakers, planners, providers and commissioners of cardiac rehabilitation services for patients with heart failure.
- A possible limitation of the study is that the four centres that will be appointed to implement the REACH-HF programme are large, well-established cardiac rehabilitation treatment centres and might not be representative of the national cardiac rehabilitation landscape—a potential sample bias towards early adopters.
- This study may have limited generalisability outside the UK.

INTRODUCTION

Heart failure

Approximately 900 000 people are affected by heart failure (HF) in the UK.[1] Due to an ageing population, HF is becoming a

national healthcare challenge.[2] HF has a high impact on both patients and society; it can reduce exercise tolerance and health-related quality of life (HRQoL), increase the risk of mortality and unplanned hospital admissions and is associated with high healthcare costs.[3] There is also a considerable burden on the friends and family of people with HF.[4] Exercise-based cardiac rehabilitation (CR) programmes have been shown to enhance HRQoL in patients with HF and reduce unplanned hospital admissions.[3 5] With sufficient adherence, these benefits are consistently achieved in trial settings with both centre-based and home-based CR.[3] Although the National Institute of Health and Care Excellence (NICE) recommends that all patients with HF receive CR,[6] due to the frailty and poor health of this clinical population, as well as dislike of group-based exercise and practical constraints (eg, transportation), participation in centre-based CR remains poor.[7] Underutilisation of CR among this clinical population has been highlighted in the 2010 NICE guideline, with the uptake of CR being much lower than predicted and estimated at 5.3%.[8]

Rehabilitation EnAblement in CHronic Heart Failure

The Rehabilitation EnAblement in CHronic Heart Failure (REACH-HF) programme is a new CR programme for patients with HF and their caregivers, aimed at achieving better HRQoL in the comfort of the patient's home. The 12-week, facilitated, home-based intervention was co-developed with patients, caregivers and clinicians,[9] using an intervention mapping approach.[10] In recent randomised controlled trials (RCTs), REACH-HF resulted in significant clinical improvements in HRQoL and was cost-effective, with a cost falling within the current National Health Service (NHS) tariff for CR in the UK.[11 12] REACH-HF therefore provides an affordable, evidence-based, patient-centred alternative to centre-based CR. This provides a way to address the latest NICE guidance recommendation that patients with HF are offered 'a personalised, exercise-based CR programme in a format and setting (at home, in the community or in the hospital) that is easily accessible for the person'.[6]

Implementation science: negotiating the research-to-practice gap

Research and development within the NHS is world leading. However, the NHS falls short when scaling up well-evidenced innovations or good practice.[13] The spread of innovations and evidence-based interventions across the NHS and other healthcare systems is subjected to various challenges.[14] First, moving complex interventions from research settings to real-world clinical implementation is a slow process.[15] Some of the barriers slowing down this process include the characteristics of the intervention itself such as its usability or fit with the existing processes in the organisation. Beyond this, individual or organisational barriers include the attitudes towards change and the innovation itself, resources available, expertise, time and competing priorities.[16]

Second, following uptake, the same intervention does not always perform in exactly the same way across different organisations. For example, there may be differences in the characteristics of the people involved. In clinical trials, patients tend to be included based on predetermined criteria and such criteria are rigorously checked prior to study participation. However, in practice, a broader patient population may end up using the intervention. There may also be differences in the characteristics of the organisations delivering the intervention in terms of access to resources, staff and expertise, compared with those available in clinical trials. With these differences in population characteristics and access to resources, unplanned adaptations may occur to better fit the new context. This initially slows down the process of implementation and also means that the intervention is no longer delivered as it was under clinical trial conditions.[17] Such unplanned adaptations often result in the interventions initially failing to reproduce the results that are found within the context of RCTs.[18] With a varied and ever changing healthcare landscape, it is crucial to understand the full complexity of implementing innovations into real-world clinical practice.[19] It is particularly important to explore how much of the intervention can or cannot change (and in what ways) without jeopardising the benefits of the intervention.[20]

Healthcare evaluations and improvement projects often consider performance at the level of individual healthcare professional,[21] targeting the professional's knowledge, routines and attitudes.[22] However, there is a need for wider reaching system-level evaluations of the implementation process that also take into account community, organisational, system-level and policy-level influences.[23]

Overall, implementation science aims to examine the process of implementation of healthcare innovations, in particular, the barriers and facilitators, as observed in real-life clinical settings.[24] To narrow the research-to-practice gap, implementation scientists recommend that the process of implementation is considered and built into the intervention design and development, the context and systems of implementation are assessed during the implementation efforts and key stakeholders are involved in the intervention development stage through to dissemination, implementation and evaluation.[23]

Aims of the project

The current project aims to implement REACH-HF in four UK NHS CR services to (1) explore the facilitators of, and barriers to, implementation of REACH-HF in the existing UK CR services, (2) assess the implementation fidelity, (3) the extent and nature of any potential adaptations to the intervention content and how such adaptations impact on effectiveness and (4) compare real-world outcomes to the clinical trial findings.

METHODS AND ANALYSIS

Design

We will conduct a mixed-method implementation evaluation study using in-depth semistructured interviews with key NHS staff, analysis of pre–post intervention changes in routinely collected outcome data via the British Heart Foundation founded National Audit of Cardiac Rehabilitation (NACR) and a fidelity assessment using a checklist applied to recordings of provider–patient interactions.

In-depth semistructured interviews will be used to identify facilitators of, and barriers to, implementation. Audio recordings of REACH-HF clinical encounters will be used to assess fidelity. Quantitative data obtained from the NACR will be used to compare real-world outcomes to the clinical trial findings. Data gathered from all of the above study activities (interviews, fidelity assessment, patient outcomes) will be used to assess the extent and nature of adaptations to the intervention content and how such adaptations are associated with effectiveness.

Setting and site recruitment

The study will be conducted in four UK NHS CR centres (desirably from the four UK countries) which will be early adopters of the REACH-HF programme and known as 'Beacon Sites'. The opportunity to apply to become a Beacon Site will be promoted at national (UK) conferences and local meetings of CR practitioners. Interested CR services will be sent an information pack including an application form. Applicants will be asked to provide information on their NACR National Certification Programme for CR status (NCP_CR), number of referrals made to the CR service (for both cardiac patients and patients with a primary diagnosis of HF), whether the service is offering home-based programme, length of current programmes, number of programme completions, number of pre and post-treatment assessment completions, as well as to comment on willingness to engage in research and host site visits for other interested parties.

The NCP_CR is a national certification programme for CR issued jointly by the British Association for Cardiovascular Prevention and Rehabilitation (BACPR) and the NACR. The certification programme rates CR services on seven key performance indicators (KPIs). KPIs are the NACR measurable indicators based on the BACPR core components. Programmes need to meet at least four KPIs to be granted an amber status and all seven to be granted a green status (2019 NACR Quality and Outcomes report).

The sites will be recruited from across the UK using a two-stage application process (application form followed by panel interview for shortlisted sites). As an incentive, sites will be offered free intervention materials for the treatment of 50 patients (ie, the REACH-HF patient manual, the Family and Friends Resource, audio with relaxation techniques and chair-based exercise digital versatile disc (DVD)). In addition, the selected sites will be offered free training (including training manuals) for three health professionals to deliver REACH-HF, post-training support and formative feedback on performance. The 3-day training will be delivered by the Heart Manual Department (HMD), NHS Lothian in Edinburgh.

To be eligible, sites have to be:

- NACR electronically registered sites with high-quality status from the past audit period (green or amber status) operating in the UK.
- Committed to delivering REACH-HF to 50 patients over the 12-month Beacon Site project period.
- Able to release three healthcare professionals (or more) with relevant experience in CR and/or HF for 3 days training plus one self-directed pretraining day.
- Able to engage in research to evaluate performance (ie, recording some intervention sessions and staff participation in interviews).
- Willing to host site visits and/or share information and/or experiences with other interested NHS parties.
- Conduct baseline and post-treatment assessment of HRQoL using the Minnesota Living with Heart Failure Questionnaire (MLHFQ)[25] and exercise capacity using the Incremental Shuttle Walk Test (ISWT)[26] for all patients receiving the REACH-HF programme.

Study population

Healthcare providers: we aim to recruit up to 24 healthcare professionals. The total number will include the 12 health professionals delivering REACH-HF and other key NHS staff involved in the delivery, planning and commissioning of CR for patients with HF. To identify key staff involved in CR services, the study will use a combination of opportunity sampling (all available staff trained to deliver the REACH-HF programme) and snowball sampling (staff who are identified by the existing participants as having a key role in delivering or commissioning of CR).[27] This sampling strategy will be applied until saturation in the themes and concepts generated in the qualitative analysis is reached.

Patients: the study will include up to 200 patients with HF who are referred to the CR centres for rehabilitation and receive REACH-HF treatment. Out of the 200 patients, CR consultations of up to 48 patients (12 per site) receiving REACH-HF intervention will be audio recorded.

Intervention

REACH-HF is a home-based, health professional facilitated, 12-week CR programme supporting self-care in patients with HF, which has been codeveloped with patients, caregivers and clinicians. The programme is described in detail elsewhere[11 12 28–30] and is summarised below.

The programme consists of:

- The Heart Failure Manual for the patient provides information about HF to increase understanding of the condition and address common misconceptions, information about and strategies for managing the condition, and further information related to HF,

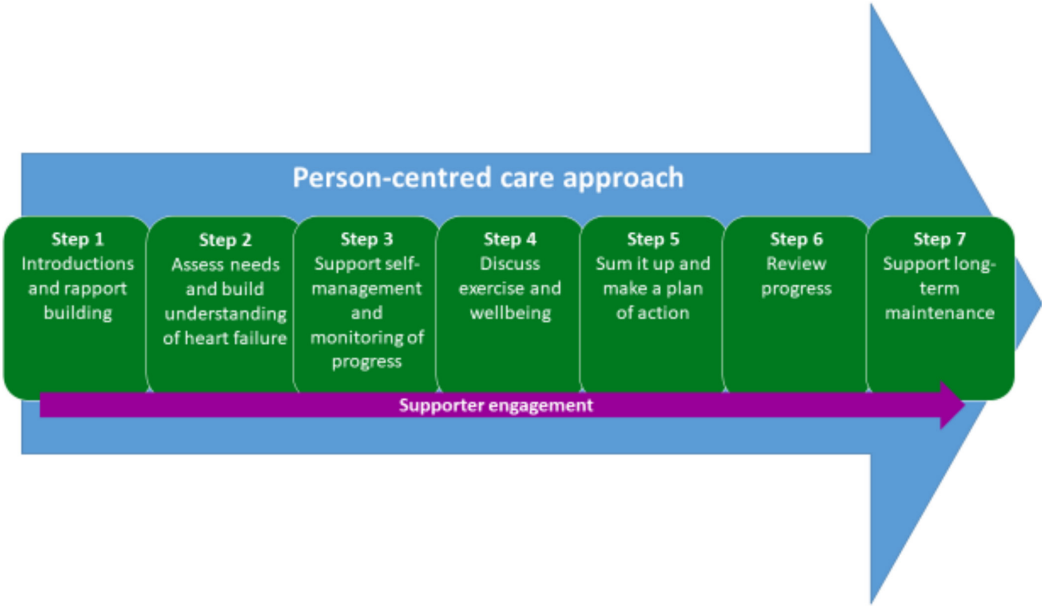

Figure 1 The seven steps of successful REACH-HF facilitation. REACH-HF, Rehabilitation EnAblement in CHronic Heart Failure.

such as lifestyle risk management, managing depression and anxiety and getting support from others.

- A choice of two exercise training programmes; a chair-based programme (available on DVD and online) and a walking programme. Patients are recommended to engage in exercise three times per week, in addition to general physical activity.
- A stress management programme, with relaxation techniques, provided in the manual and in audio format, to help cope with anxiety and depression.
- A progress tracker designed for the patient to facilitate learning from experience through self-monitoring of behaviour and symptoms—prompting help-seeking, where necessary.
- A family and friends resource to increase caregiver understanding of the condition, to enable them to support the patient in their self-care and to help them address their well-being.
- Face-to-face and telephone facilitation over 12 weeks by a health professional trained to deliver the REACH-HF programme.

Facilitator training

Three health professionals with CR and/or HF experience from each Beacon Site will attend a 3-day training course delivered by the HMD in Edinburgh. This training course will focus on the seven steps of successful facilitation of REACH-HF (figure 1) and include sessions on psychology, behaviour change, physical activity and exercise, engaging the caregiver and further content/interaction designed to bring all of the components together.

The Beacon Sites will determine which members of the CR team will attend the REACH-HF training. The main requirement for the healthcare professional is the experience of delivering CR and/or of working with patients with HF. The facilitators will likely be HF/cardiac specialist nurses or physiotherapists/exercise specialists with qualifications and/or experience in the delivery of exercise-based CR programmes.

It is expected that site identification, training and set-up will take approximately 6 months. Following the set-up period, the Beacon Sites will have 12 months to deliver REACH-HF to 50 patients, during that time, qualitative interviews and audio recordings of REACH-HF sessions for selected patients will take place. At the end of Beacon Site activity, a quantitative data download will be requested from the NACR and an interim download will be requested 9 months from the end of the study to allow piloting of data-cleaning and processing procedures (stopping short of analysis).

Measures and procedures

Qualitative interviews

In-depth semistructured interviews and focus groups with NHS staff to include REACH-HF practitioners (physiotherapists and CR nurses with experience in delivering centre-based CR, who had been trained to deliver the REACH-HF programme in a 3-day training course), service managers, clinical leads and commissioners. Interviews will take place at each Beacon Site (see online supplementary appendix 1 for the topic guide). Each identified staff member will, if possible, be interviewed twice (once at the beginning and once at the end of the data collection window) and one focus group will be held in each locality with identified study participants (at the midpoint of the data collection window). Interviews will

Table 1 Qualitative questions and their origins in the NPT construct and components

NPT construct	Construct's components	Interview questions
Coherence (sense-making)	Differentiation	Can you describe the REACH-HF intervention and how it differs from your usual way of working?
	Communal specification	What is your colleagues understanding of the purpose of the REACH-HF intervention?
	Individual specification	How does the intervention affect the nature of your work?
	Internalisation	In your opinion, what it the value of the REACH-HF intervention? To you? To your patients?
Cognitive participation (relational work)	Initiation	Who are the individuals (you can include yourself) that drive REACH-HF forward and get others involved? What are their roles? What are they doing to support the project?
	Enrolment	How did the team need to change in order to introduce REACH-HF?
	Legitimation	How do you feel about being involved in the REACH-HF project?
	Activation	What is the future of REACH-HF in your service? What factors can enable the integration of REACH-HF into a cardiac rehabilitation service?
Collective action (operational work)	Interactional workability	How easy or difficult has it been to integrate REACH-HF into your existing work?
	Relational integration	How has implementing REACH-HF affected working relationships within the team?
	Skills and workability	How do the skills of the staff delivering REACH-HF match the needs of the programme?
	Contextual integration	Was REACH-HF training sufficient to allow for successful implementation? If not, what other topics or skills could have been included? Are there enough resources available to support the REACH-HF programme? Are there any other barriers to delivering REACH-HF on your patch?
Reflexive monitoring (appraisal work)	Systematisation	Are you in any way evaluating effectiveness, usefulness or impact of REACH-HF on the service?
	Communal appraisal	Do your colleagues consider the intervention worthwhile?
	Individual appraisal	Do you consider it worthwhile?
	Reconfiguration	Can the REACH-HF intervention be easily modified and improved to suit your way of working? If yes, in what way?

NPT, Normalisation Process Theory; REACH-HF, Rehabilitation EnAblement in CHronic Heart Failure.

be either face-to-face or by phone. The development of topic guides for qualitative interviews and focus groups was based on 4 constructs and 16 subdomains from the Normalisation Process Theory (NPT) framework (table 1). The topic guides content may be amended depending on feedback from stakeholders and the first few interviews.

Two video-conferencing peer supervision sessions will be available to all REACH-HF trained facilitators, provided by the HMD, as part of the REACH-HF training package. The researchers will observe and take notes from each of these sessions.

Fidelity assessment

All REACH-HF CR treatment sessions (four–six contacts), both face-to-face and phone-based, of approximately 48 consenting patients (12 per site), will be audio recorded by the healthcare professionals delivering the programme. Each REACH-HF facilitator will be requested to audio record all treatment sessions for four patients with HF. The selection of which patients to include will be guided by the researchers, using a quasi-random process. Five months after the REACH-HF training, facilitators will be asked to invite all subsequent patients to take part in the study, until two willing patients with HF agree to have their treatment sessions recorded. Approximately 10 months after the REACH-HF training, an email will be sent to repeat the invitation and audio recording process for the next two consenting patients.

The quality of delivery (intervention fidelity) of the recorded treatments will be assessed by the researcher (PD) using the same fidelity checklist used in the original REACH-HF research study.[11] This will allow comparison with fidelity scores achieved in the clinical trial. The recordings for the first six patients will also be double scored and two researchers (PD and CG) will discuss any differences in their scores to agree and 'anchor' the

scoring process and minimise coder bias. If an agreement cannot be reached, a third reviewer (JJCSVvZ) will be appointed for arbitration.

The fidelity checklist is a 12-item checklist focused on identifying key delivery processes such as the use of a patient-centred communication style, making a plan of action and encouraging self-monitoring of progress (particularly with the exercise programme). The checklist uses the Dreyfus scale of clinical skill acquisition,[31] to rate clinical skills on a scale of 0–6 and is anchored such that a score of 3 or more represents adequate delivery quality for each item. Coding instructions are provided (online supplementary appendix 2).

REACH-HF facilitators will be asked to complete a brief self-rated fidelity checklist after each session they have recorded. This comprises questions about the same 12 main components of the treatment and allows the facilitators to rate the occurrences of each feature (absence, minimal, some, sufficient, good, very good, excellent) (online supplementary appendix 3). The main reason for including a self-rated fidelity checklist is that an independent observer rating is time-consuming/labour intensive, whereas a self-rating assessment might provide a pragmatic, lower cost alternative for checking delivery quality for use in real-world clinical practice.

Finally, for each patient opting into the study, age, sex, time since diagnosis and severity of symptoms will be recorded by the healthcare professionals delivering the REACH-HF intervention.

Quantitative

At the end of the Beacon Site project period, a report will be requested from the NACR team based on the University of York on:

- Number of referrals made to the Beacon Sites during the study period.
- Number of patients with HF enrolled on the REACH-HF programme (attending at least one session).
- CR attendance (average number of face-to-face and telephone sessions per patient).
- Number of patients completing the REACH-HF programme (in the clinical trial[11] patient adherence was defined as attendance at the first face-to-face contact with the facilitator and at least two facilitator contacts thereafter—at least one of which must have been face-to-face).

Summary data on key pre and post-programme measures will also be requested to enable comparison with changes in the intervention group observed in the clinical trial. These include HRQoL—determined using the MLHFQ and exercise capacity—determined using the ISWT. The MLHFQ consists of 21 questions that rate on a scale of 0–5 (where 0 is not at all, 1 is very little and 5 is very much) how different HF symptoms (ie, swelling of ankles and legs, shortness of breath or tiredness, fatigue and poor energy levels) prevent the patient from living as they would have wanted to during the 4-week period prior to the first CR session. ISWT is an externally paced exercise capacity test that can be administered in the field with minimal equipment and without medical supervision. The test has good test–retest reliability and it is an acceptable alternative to (widely used to assess physical fitness and functional capacity of cardiac patients) exercise test with ECG monitoring or the cardiopulmonary exercise test.[32] A recent study confirmed that a single ISWT is a valid, low resource, assessment of an estimate for physical fitness and functional capacity for CR patients.[33]

Data analysis

Qualitative data

Digital recordings of interviews and focus groups will be transcribed verbatim and any potentially identifiable information, such as individual or location names, will be redacted. The transcripts (Word documents) will be uploaded into NVivo software to help organise the data for analysis.[34] Illustrative quotes, that may be used in future presentations or publications, will be presented alongside pseudonyms to protect anonymity.

The transcripts will be analysed according to the principles of framework analysis outlined by Ritchie and Spencer[35] and using the four over-arching constructs of NPT (coherence, cognitive participation, collective action and reflexive monitoring) as an initial framework for coding the data.[36] NPT suggests general mechanisms that are associated with successful implementation. These include service providers' understanding of the new intervention and how it differs from standard practice, their motivation and attitude towards the healthcare innovation and the work they do to deliver and evaluate the intervention. NPT will provide a framework for generating questions for interviews and focus groups and analysing gathered data. See table 1 for more details on the application of NPT to the data collection.

Fidelity assessment

Implementation fidelity scores from the fidelity checklist will be collated at the level of the facilitator, the site and the total sample and presented using descriptive statistics (means, ranges) using the same analytic approach as the original REACH-HF trial.[11] Numerical data (0–6) from the Dreyfus scale of clinical skill acquisition will be converted into categorical (yes/no) data reflecting whether the session reached the adequate level of delivery (score 3 or above). Observer-rated treatment fidelity will be compared with self-rated fidelity from the post-session fidelity questionnaires completed by the REACH-HF facilitators at the end of each recorded session. The analytic approach to compare the two rating scales will be Pearson's correlation for continuous scores[37] and Gwet's first-order agreement coefficient (the AC1 statistic) for categorical ratings.[38]

The fidelity assessment data sample reflects the sample size used to assess fidelity in the original REACH-HF clinical trial. We require a minimum of four patient

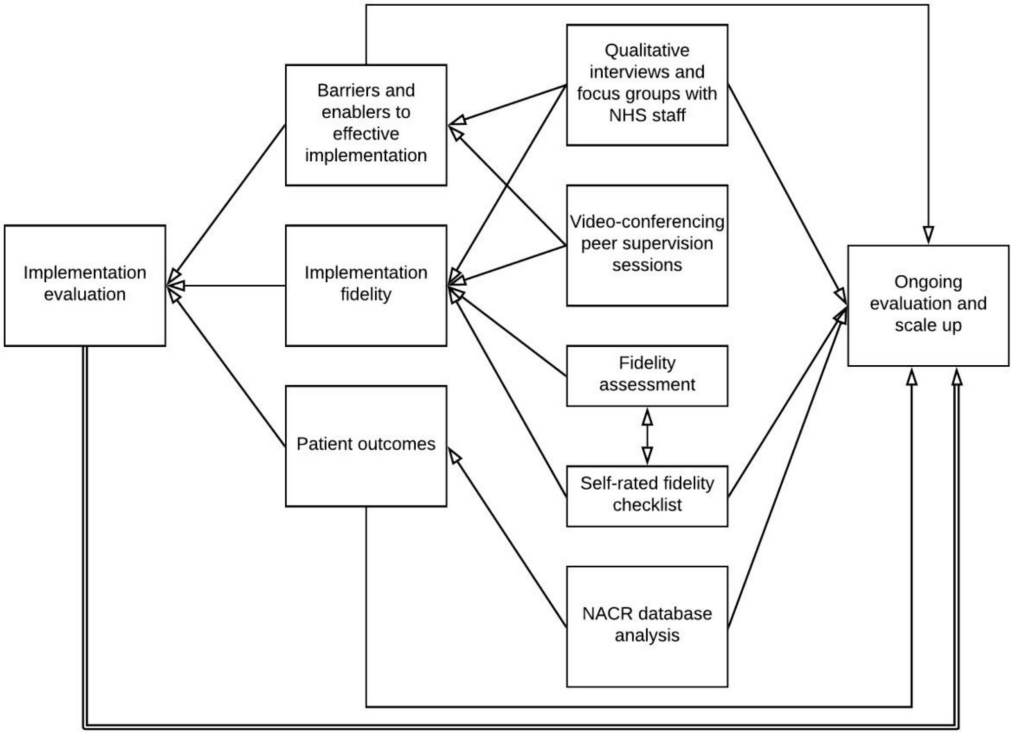

Figure 2 Beacon Site evaluation and embedded processes for ongoing monitoring. NACR, National Audit of Cardiac Rehabilitation; NHS, National Health Service.

recordings per facilitator to be able to assess variation in performance between staff and between NHS sites.

Quantitative outcomes

Changes from pre to post-treatment in outcome data (MLHFQ and ISWT) will be reported as mean scores with 95% CI within each Beacon Site. Mean change scores for patients receiving REACH-HF will be compared across Beacon Sites and also with the changes found in the REACH-HF trial. This comparison will take account of potential differences on patient characteristic and take due attention to the confidence intervals. Similarly, change scores for patients receiving REACH-HF will be compared with an aggregate change score from the NACR database for those who receive other forms of CR (primarily centre-based or digital CR). Subgroup analyses will be conducted by the NACR team to determine variations in uptake and outcomes within our REACH-HF cohort by site, sex and other characteristics of interest (eg, area deprivation index, rurality). Data on the number of patients treated, uptake and completion rates and session attendance, will be presented using descriptive statistics. Figure 2 illustrates the interactions between the study's aims and methods and how they link with the process of ongoing evaluation and scale-up.

Patient and public involvement

Patient preference and acceptability have been addressed extensively during the REACH-HF clinical trials.[11 12] Six patients with HF and four caregivers have been consulted and informed the design of the REACH-HF programme. Patient and public involvement in the proposed study has included involving a member of the public to read and comment on the content of the study invitation letter, participant information sheet and the consent form designed for the study. Additionally, members of all CR teams involved in the study were consulted during the process of setting up the Beacon Sites on issues such as the feasibility of the study, selected outcome measures and the burden of participation in the study. At the end of the study, the final report will be shared with NHS staff at the participating Beacon Sites, allowing them to use it for service evaluation, future service planning and sharing of good practice.

DISCUSSION

The research-to-practice translation gap is well documented. It is common that evidence-based interventions are not adopted into clinical settings and do not become routine practice. To narrow the translation gap, more insight is needed into mechanisms that allow for successful implementation of effective and cost-effective interventions. To advance the field, implementation theories and mechanisms need to be tested in real-world clinical settings.

The REACH-HF Beacon Site project is a multifaceted and interactive approach to a phased roll-out that aims to disseminate the multicentre trial findings, increase awareness of the REACH-HF intervention and explore replicability of the intervention in new contexts. At the time of writing this protocol, four Beacon Sites in Scotland have been established and will contribute further data on the implementation of REACH-HF.[39]

In line with earlier recommendations for implementation research, this study will open a channel of feedback between researchers and implementers (NHS staff), with a common goal of improved service delivery for patients with HF. This study will provide an insight into the translation of the REACH-HF clinical trial findings into real-world practice and an in-depth understanding of the implementation process in the context of current NHS provision. These findings will inform the future, larger-scale implementation of REACH-HF, offer guidance to policymakers, planners and commissioners of CR services, inform adaptations to the REACH-HF training package and intervention and facilitate adoption and spread of home-based CR for patients with HF in the UK.

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Correction notice This article has been corrected since it was published. The incorrect trial registarion number has been removed.

Contributors All authors contributed to the idea for the study. PD and SBvB drafted the manuscript. SBvB led the setup and recruitment of Beacon Sites. STJMcD is overseeing the day-to-day management of the Beacon Site project. PD secured all relevant ethical approvals for the project and prepared all study documentation. CG, JJCSVvZ, HD and RST are providing project supervision and oversight. PJD and AH will coordinate access to the NACR data. AH provided statistical analysis advice. PD will acquire and analyse the data for the study. All authors provided critical revision of the manuscript for important intellectual content and approved the final draft of the protocol for submission.

Funding This study/project was funded by the National Institute for Health Research (NIHR) (Programme Grants for Applied Research scheme (project reference RP-PG-1210-12004)). The views expressed are those of the authors and not necessarily those of the NIHR or the Department of Health and Social Care. PD's time is funded by a PhD studentship from the University of Birmingham.

Competing interests None declared.

Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not required.

Provenance and peer review Not commissioned; externally peer reviewed.

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Correction: *Getting evidence into clinical practice: protocol for evaluation of the implementation of a home-based cardiac rehabilitation programme for patients with heart failure*

Daw P, van Beurden SB, Greaves C, *et al*. Getting evidence into clinical practice: protocol for evaluation of the implementation of a home-based cardiac rehabilitation programme for patients with heart failure. *BMJ Open* 2020;10:e036137. doi: 10.1136/bmjopen-2019-036137.

This article was previously published with an error.

The paper was linked to an incorrect trial registration number, which has now been removed.

BMJ Open 2021;**11**:e036137corr1. doi:10.1136/bmjopen-2019-036137corr1

What are the barriers and enablers to effective implementation of REACH-HF?

Qualitative interview guide (initial draft*)

** The topic guide content may vary depending on feedback from stakeholders and the first few interviews*

Beacon site: I / II / III / VI *(circle as appropriate)*

Date of interview: _____

- **Welcome and housekeeping**
  Thank you for agreeing to take part in the study. The interview will last between 30 and 40 minutes. I will ask you a series of questions and I am really interested in your honest opinion on the subject matter. If you wish to stop at any point to take a break, let me know.

- **Informed consent**
  Thank you for reading PIS and completing the consent form. Is it ok if we start recording?

- **Interview questions**

NPT	Questions	Comments
1.1	Can you describe REACH-HF intervention and how it differs from your usual way of working?	
1.3	How does the intervention affect the nature of your work?	
4.3	Do you consider it to be worthwhile?	
1.4	In your opinion what is the value of REACH-HF intervention? To you? To your patients?	
1.2	What is your colleagues understanding of the purpose of REACH-HF intervention?	
4.2	Do they consider it to be worthwhile?	
3.2	How has implementing REACH-HF affected working relationships within the team?	
2.1	Who are the individuals (you can include yourself) that drive REACH-HF forward and get others involved? What are their roles? What are they doing to support the project?	
3.1	How easy or difficult has it been to integrate REACH-HF into your existing work?	
2.2	How did the team need to change in order to introduce REACH-HF?	
2.3	How do you feel about being involved in the REACH-HF project?	
3.3	How do the skills of the staff delivering REACH-HF match the needs of the programme?	

What are the barriers and enablers to effective implementation of REACH-HF?

3.4	Was REACH-HF training sufficient to allow for successful implementation? If not, what other topics or skills could have been included? Are there enough resources available to support the REACH-HF programme? Are there any other **barriers** to delivering REACH-HF on your patch?	
4.1	Are you in any way evaluating effectiveness, usefulness or impact of REACH-HF on the service?	
4.4	Can REACH-HF intervention be modified and improved to suit your way of working? If yes, in what way?	
2.4	What is the future of REACH-HF in your service? What factors can **enable** integration of REACH-HF into a cardiac rehabilitation service?	

- ***A few: service-level questions:*** *What is the catchment area for your service? What population do you serve?*

- **Ending & debrief**
  Thank you for taking the time to answer my questions. Is there anything else you would like to add? Or ask me about? I am going to switch off the audio recorder now. If any of what we spoke about affected you in any way we can have a debrief session now.

Survey questions, v2, 15.02.2021

The survey might take you between 10 and 20 minutes to complete (depending on how much detail you will go into when answering some of the questions).

You can complete the online survey regardless of whether you/your service have started offering the REACH-HF programme to your patients.

We will not ask you any identifiable information – your survey answers will not be linked to you or your service. Also, we will not share your answers with any other person or organisation (including your organisation).

By completing the survey, you agree to take part in the study.

Section A: About you

A1. What is your current job role?

A2. How would you rate your current knowledge and expertise in the following four domains?

	Novice	Intermediate	Advanced
Cardiac rehabilitation	☐	☐	☐
Heart failure	☐	☐	☐
Exercise prescription	☐	☐	☐
Person-centred communication skills	☐	☐	☐

Section B: About your service

B1. Before attending the REACH-HF training, did your service offer cardiac rehabilitation for patients with heart failure?

Yes ☐

No ☐

B2. **What are the reasons for not offering cardiac rehabilitation for patients with heart failure?**

B3. **Before attending the REACH-HF training, did your service offer home-based cardiac rehabilitation to any cardiac patients?**

Yes ☐

No ☐

B4. **What are the reasons for not offering home-based cardiac rehabilitation?**

Section C: Your thoughts about the REACH-HF programme

You can answer these questions regardless of whether you/your service have started offering the REACH-HF programme to your patients.

C1. **Since the REACH-HF training, have you used the REACH-HF programme at all?**

Yes ☐

No ☐

C2. **What are the reasons for not using the REACH-HF programme?**

C3. **How many patients have completed and are receiving the REACH-HF programme?**

Have completed ☐☐☐☐☐☐☐☐☐☐

Are currently receiving ☐☐☐☐☐☐☐☐☐☐

C4. **What has been your experience of implementing the REACH-HF programme so far?**

C5. **What helps with the implementation?**

C6. **What hinders the implementation?**

C7. **Is your service planning to continue offering REACH-HF?**

Yes ☐

No ☐

C8. **If no, why not?**

C9. **What would need to happen for you/your service to start offering the REACH-HF programme?**

C10. If one of the reasons for you/your service not offering the REACH-HF programme is the COVID-19 pandemic, are there plans to start offering the programme once the pandemic is over?

Yes ☐

No ☐

Maybe ☐

C11. If maybe, what factors are likely to influence that decision?

Section D: The REACH-HF Service Delivery Guide

The next few questions are about the REACH-HF Service Delivery Guide (a pragmatic resource that might help you/your service implement the programme).

The guide was attached to the survey invitation email and is available from: http://sites.exeter.ac.uk/reach-hf/reach-hf-service-delivery-guide/

D1. Have you read the REACH-HF Service Delivery Guide?

Yes ☐

No ☐

D2. If no, why not?

D3. Please indicate the extent to which you agree with each statement.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
It would be useful to have access to the delivery guide at the beginning of setting up the REACH-HF programme.	☐	☐	☐	☐	☐
The length of the guide is just right.	☐	☐	☐	☐	☐

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
The guide is easy to use.	☐	☐	☐	☐	☐

D4. Any other comments about the guide? What could be improved?

Section E: Your experience of the REACH-HF programme

If you have not started offering the programme please indicate what you believe will happen when you do.

E1. Please indicate the extent to which you agree with each statement.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
I believe that the REACH-HF programme differs significantly from my usual way of working.	☐	☐	☐	☐	☐
Other members of the team have a shared understanding of the purpose of the REACH-HF programme.	☐	☐	☐	☐	☐
Using the REACH-HF programme substantially affects the nature of my work.	☐	☐	☐	☐	☐
I believe that the REACH-HF programme has a substantial value to the patients.	☐	☐	☐	☐	☐
I believe that the REACH-HF programme has a substantial value to the service.	☐	☐	☐	☐	☐
There are key people (you can include yourself) who drive the REACH-HF programme forward.	☐	☐	☐	☐	☐
I believe that delivering the REACH-HF programme is a legitimate part of my role.	☐	☐	☐	☐	☐
I'm open to working with colleagues in new ways to use the REACH-HF programme.	☐	☐	☐	☐	☐
I will continue to support the REACH-HF programme.	☐	☐	☐	☐	☐
I can easily integrate the REACH-HF programme into my existing work.	☐	☐	☐	☐	☐
I have confidence in other people's ability to deliver the REACH-HF programme.	☐	☐	☐	☐	☐
Work is assigned to those with skills appropriate to the delivery of the REACH-HF programme.	☐	☐	☐	☐	☐
Management adequately supports the REACH-HF programme.	☐	☐	☐	☐	☐
There are sufficient resources available to deliver the REACH-HF programme.	☐	☐	☐	☐	☐
I am aware of reports/articles about the effects of the REACH-HF programme.	☐	☐	☐	☐	☐

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Other members of the team agree that the REACH-HF programme is worthwhile.	☐	☐	☐	☐	☐
I value the effects the REACH-HF programme has had on my work.	☐	☐	☐	☐	☐
I can adapt/modify the REACH-HF programme to suit my and/or the service way of working.	☐	☐	☐	☐	☐

E2. If you agree, that the REACH-HF programme differs significantly from your usual way of working, in what way?

E3. If you agree, that using the REACH-HF programme substantially affects the nature of your work, in what way?

E4. If you agree, that you can adapt/modify the REACH-HF programme to suit you and/or your service way of working, in what way?

Section F: Your thoughts about the REACH-HF training

We are interested in evaluating different ways of delivering REACH-HF training remotely.

F1. In your case, the training consisted of mostly pre-recorded lecture-style sessions with some group activities/break out rooms facilitated by a host and Q&A sessions with the experts at the end of each day.

	Definitely	Mostly Yes	Mostly Not	Not at All
Was this method of delivery sufficient for you to develop the skills required to deliver the REACH-HF intervention?	☐	☐	☐	☐

F2. How could we improve the training?

F3. Was the amount of live interaction provided enough for you?

- No, I would have preferred more live interaction tasks and discussion ☐
- Yes, the balance was about right ☐
- No, I would have preferred less live interaction tasks and discussion ☐

F4. How important are the following components for successful training?

	Not at all important	Slightly important	Neutral	Important	Very Important
Live lecture-style presentations	☐	☐	☐	☐	☐
Pre-recorded lecture-style presentations	☐	☐	☐	☐	☐
Large group activities (approximately 20 trainees) for general discussions and brain-storming	☐	☐	☐	☐	☐
Small-group activities (2-4 trainees) for practising delivery or discussing specific issues (like how the intervention might be integrated with your specific service), peppered throughout the pre-recorded presentations	☐	☐	☐	☐	☐
Engaging host	☐	☐	☐	☐	☐
Q&A sessions with experts at the end of each day	☐	☐	☐	☐	☐
Q&A sessions at the end of each pre-recorded lecture-style presentation	☐	☐	☐	☐	☐
Case studies	☐	☐	☐	☐	☐
Input from teams already implementing the intervention	☐	☐	☐	☐	☐

Section G: Thank you for taking the time to complete the survey!

G1. Would you like to receive a summary of our research report?

- Yes, please ☐
- No, thank you ☐

G2. **If yes, can you please send a blank email titled "study report" to the following email address: pxd891@student.bham.ac.uk or alternatively text "study report" to 0759 555 0720.**

Feel free to add any comments about the study or the survey itself into the comments box below.

G3. **Feel free to add any comments about the study or the survey itself into the comments box below.**

DELIVERY GUIDE

WHO IS THE GUIDE FOR?

NHS staff managing or providing cardiac rehabilitation services who wish to deliver the REACH-HF home-based cardiac rehabilitation programme for people with heart failure.

Contents

1. About this guide

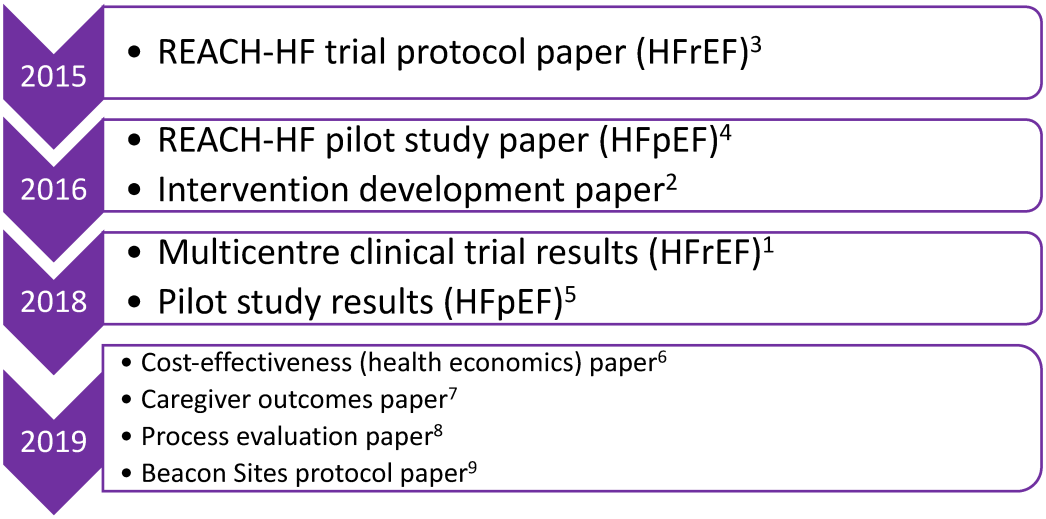
This service delivery guide is intended for teams that want to set up the Rehabilitation Enablement in Chronic Heart Failure (REACH-HF) home-based cardiac rehabilitation programme for people with heart failure within their existing service. This guide has been designed following interviews with healthcare professionals working in four National Health Service (NHS) cardiac rehabilitation centres in England and Northern Ireland in 2019. These 'Beacon Sites' were early adopters of the REACH-HF programme, piloting its roll-out in the NHS.

The guide builds on knowledge from the REACH-HF Facilitator Training Pack (part of the REACH-HF training course) but emphasises the practicalities of implementing the REACH-HF programme. Chapter one briefly describes the programme and outlines the advantages of home-based cardiac rehabilitation for people with heart failure. Chapter two outlines the necessary steps for adding REACH-HF into your service and for monitoring progress.

1.1. What is REACH-HF?

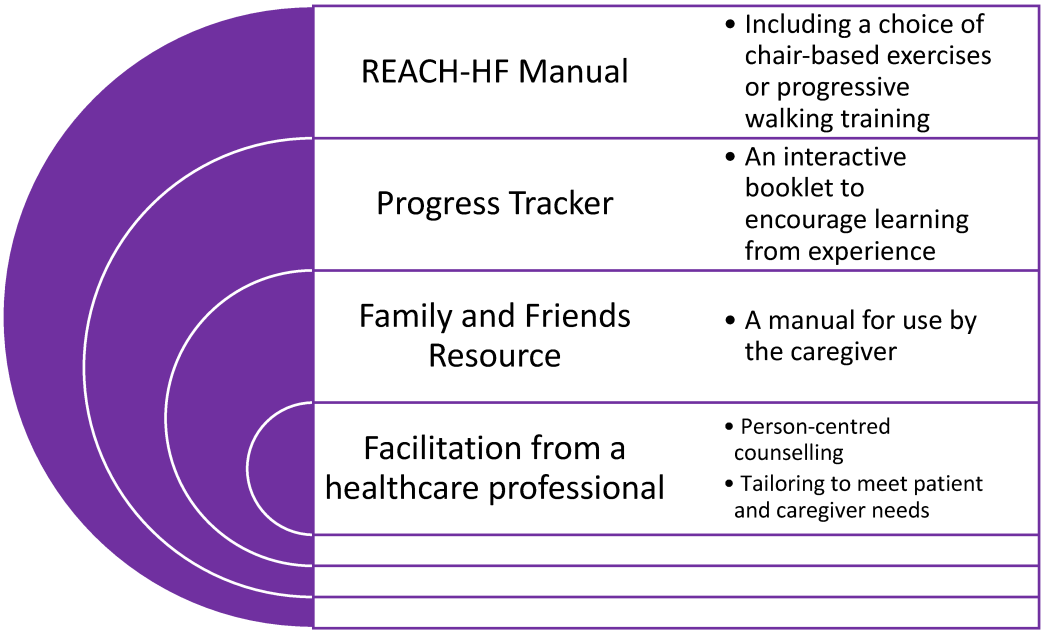
REACH-HF is a new home-based, evidence-informed cardiac rehabilitation programme for people with heart failure and their caregivers (family or friends), to help them manage their condition. The REACH-HF trial showed that the programme significantly improved the quality of life of patients with heart failure 12 months after the start of the programme[1]. The effects on quality of life (5.7 points on the Minnesota Living with Heart Failure Questionnaire) were similar to those found with centre-based programmes and over 90% of patients completed the programme.

The REACH-HF patient and caregiver materials are designed to be used with the support of a trained REACH-HF facilitator (typically, but not limited to, a specialist cardiac nurse or physiotherapist with prior experience in delivering cardiac rehabilitation). The programme, in its current format, was established in 2015[2]. Below is a brief publication history listing key scientific papers, outlining the evidence base underpinning the REACH-HF programme. You can access these papers in full on the REACH-HF website: http://sites.exeter.ac.uk/reach-hf/reach-hf-publications/



The programme has been designed to be delivered over 12 weeks, with a recommended three face-to-face contacts with a REACH-HF facilitator taking place in the REACH-HF participant's home, and follow-up telephone contacts in between. 'Real world' programme implementation, especially during the COVID-19 pandemic, has called for alternative modes of delivery. These have included: combined centre- and home-based delivery (e.g. baseline and end-of-treatment assessments conducted in clinics, with home visits and/or phone support in between) and an entirely remote delivery model, where all sessions (including assessments) were conducted by telephone.

The REACH-HF programme has four core elements:



1.2. Benefits and costs of home-based cardiac rehabilitation

Treatment of heart failure costs the NHS around £2 billion per year, with most of the cost associated with hospital admissions. Cardiac rehabilitation saves and improves lives, and reduces hospital re-admissions. Unfortunately, only 52% of cardiac patients take up the offer of cardiac rehabilitation. Uptake is even lower in patients with heart failure, with less than 20% being referred for cardiac rehabilitation, and even less (<10% overall) taking up the offer. The NHS Long Term Plan aims to increase the proportion of eligible patients with cardiovascular disease accessing cardiac rehabilitation to 85% by 2028, with a 33% target for people with heart failure.

The National Institute for Health and Care Excellence (NICE) has recommended that offering alternative modes of delivery of cardiac rehabilitation (for example home-based programmes) might reduce barriers to treatment for people that would otherwise not attend traditional centre-based provision. Offering home-based rehabilitation programmes, like REACH-HF, may therefore help to meet the ambitious aims of the NHS Long Term Plan. The ongoing need for a comprehensive, effective, and cost-effective home-based cardiac rehabilitation programmes became particularly apparent during the COVID-19 pandemic.

The health economics analysis of REACH-HF compared home and centre-based options and found the costs of home and centre-based delivery to be similar. The cost of the REACH-HF programme (estimated at £418 per patient including travel time, management and all NHS overhead costs) falls within the NHS England tariff of £477 per patient for cardiac rehabilitation. Our cost-effectiveness modelling suggested that the REACH-HF programme is a cost-effective addition to healthcare provision for people with heart failure (costing, on average, £1720 per quality-adjusted life year (QALY) gained). This is well below the typical threshold applied by NICE for approving the commissioning of clinical treatments in England (£20-30,000 per QALY).

1.3. What does REACH-HF look like in practice?

In the two out of four Beacon Sites which were already delivering a centre-based programme for people with heart failure, the REACH-HF programme was offered as an additional option, which enabled the choice of participation in either the centre-based rehabilitation programme or REACH-HF. This approach has several advantages. Some patients prefer to attend centre-based programmes. For example, they might not feel motivated enough to exercise by themselves at home, have safety concerns, or just enjoy getting out of the house every week and meeting other people with heart failure in a supportive environment. Others may struggle to attend the hospital or rehabilitation centre due to poor mobility, lack of transport or a busy lifestyle. Some feel uncomfortable in group situations and may prefer more individually-tailored advice. Since there are many reasons why patients may prefer centre-based or home-based rehabilitation programmes, offering a choice of models may improve adherence.

In some existing Beacon Sites, REACH-HF facilitators travelled to participants' homes for face-to-face contact sessions, while others delivered most face-to-face contacts (including initial assessments) at a rehabilitation centre. Services that continued delivering cardiac rehabilitation during the COVID-19 lockdown relied solely on remote delivery. Those services offered extended phone/video assessments, during which REACH-HF facilitators used the titration method (see training pack) for establishing patients' starting point for the exercise programme, followed by regular (weekly then fortnightly) review phone calls.

In some teams, home visits were delivered by a single facilitator, and in others by a pair. Our experience is that a single, trained and experienced facilitator can normally deliver the programme, although, for training purposes, it may help for more junior staff to be accompanied until competence is established.

During the early stages of delivery, REACH-HF facilitators may need to support the participant in using technology to access the chair-based and relaxation exercises (setting up the DVD player, using the DVD and/or relaxation CD, or setting up access to the online exercise videos). In the case of remote delivery, this process involves talking the participant through the set-up process over the phone.

To streamline the set-up process, and get participants exercising as soon as possible, some Beacon Sites decided to post out the REACH-HF resources to patients with their clinic invite letters. The usual clinic invite letter also asked patients to familiarise themselves with the REACH-HF manual and to try out the DVD or access the REACH-HF chair-based exercises via the web link. This initial investment (the cost of posting the manual) can save facilitator and patient time, as it helps the patient decide if the REACH-HF programme is right for them, as well as allowing them to start exercising straight after their assessment appointment. Patients that do not want to proceed with REACH-HF return the manual at their assessment appointment. In the case of remote implementation, facilitators from the existing Beacon Sites posted the REACH-HF manuals or delivered them to patients' homes in person (observing social distancing measures).

1.3.1. The REACH-HF Pathway

The REACH-HF participants enrolled in the programme typically receive five to six hours of clinical input delivered over 12 weeks. This includes a mixture of face-to-face and telephone contacts with at least one, but usually two or three home visits. Early Beacon Sites that did not have the capacity to offer regular home visits to all participants prioritised visits for participants who were frailer or had complex comorbidities (based on clinical judgement of support needs). The REACH-HF participants receiving exclusively remote delivery benefitted from the same amount of clinical input offered via an in-depth phone/video assessment, and weekly (at the beginning of the programme) or fortnightly (later in the programme) follow-up phone calls.

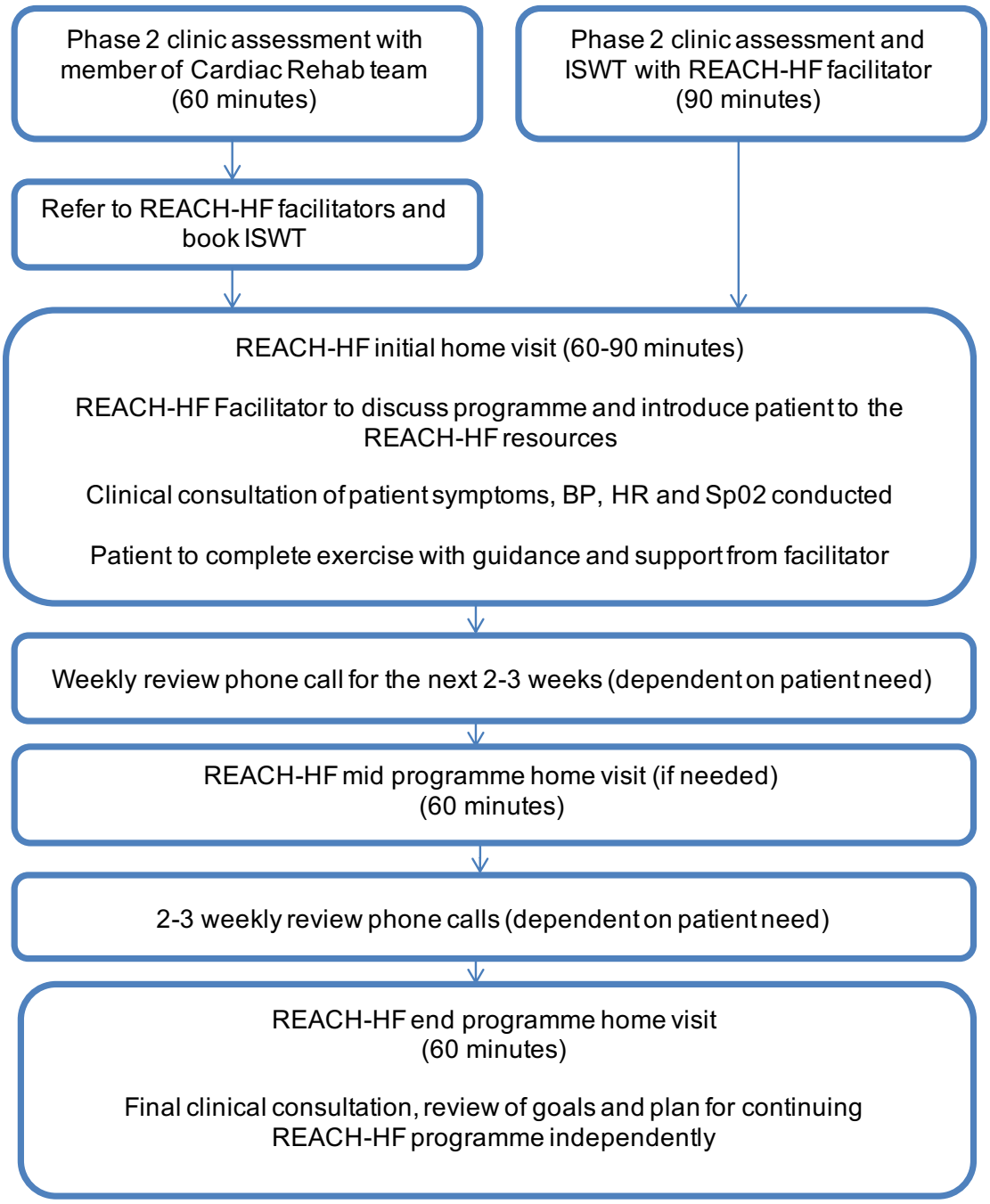
Feedback from the initial Beacon Sites highlighted that participants who were elderly, frail, or had comorbidities might require more face-to-face appointments to ensure adequate exercise monitoring and support. Some of these participants also struggled to attend centres for baseline and end-of-treatment assessments. Where an exclusively remote implementation model is used, such participants might require additional follow-up phone calls.

Below you will find a worked example of a standard REACH-HF pathway. Additional pathways adapted for remote delivery and combined delivery (social distancing and PPE) can be found in Appendix 1 and 2 respectively.

NHS
Wirral Community Health and Care
NHS Foundation Trust

Wirral Cardiovascular Rehabilitation

REACH-HF programme pathway



1.3.2. Equipment required

Below you will find a list of the equipment needed to deliver REACH-HF:

- ✓ Access to phone (or video appointment technology if applicable) and quiet/private consultation space.
- ✓ Several DVD players that can be hired out to participants who do not have a DVD player available and cannot access chair-based exercises on the REACH-HF web link.
- ✓ Equipment to conduct Incremental Shuttle Walk Test (if applicable): instructions and audio recording to conduct the test, scoresheets, audio device (CD/MP3 player/mobile phone/tablet/laptop), two cones, one measuring tape, 10m string and a stopwatch.
  Instructions and audio recording for the test can be purchased and downloaded onto a portable device (e.g. mobile phone/tablet/laptop) from University Hospitals of Leicester, see link below:
  https://www.leicestershospitals.nhs.uk/aboutus/departments-services/pulmonary-rehabilitation/for-health-professionals/incremental-shuttle-walk/
  Please note that exercise capacity can also be assessed using the 6 Minute Walk Test or the titration method (during remote delivery, or in cases where exercise capacity tests are not available).
- ✓ Services that routinely collect such measures might need to source: portable heart rate, pulse oximeter, validated blood pressure and blood sugar monitors (please note that none of these are compulsory for the successful delivery of the REACH-HF programme).

1.3.3. Does REACH-HF offer the right fit for your patient?

An important finding from the early Beacon Sites was the need for a good fit between patient and programme. The flowchart in Appendix 3 gives the criteria for accepting patients onto the programme and lists questions that can be used to find the best fit between the patient's preferences and the different cardiac rehabilitation options that might be available within your service.

2. Setting up REACH-HF

Introducing a new programme into any service is an opportunity to practice a whole-team approach to communication and decision-making. Teams that include and involve all relevant healthcare professionals, managers, and support staff in the roll-out of a new intervention avoid many teething problems and cope better with any problems that arise. So keep talking – start with discussing the big picture, such as reasons why there is a need to introduce home-based cardiac rehabilitation into the service. But also consider the details, such as who will be posting out the clinic appointment letters. Why not book a regular REACH-HF implementation team meeting? Successfully introducing REACH-HF into your service is a team effort!

2.1. Preparation phase

Careful preparation for the roll-out of REACH-HF is time well spent. This allows the organisation and the team to reflect on how they want to engage with the programme, and how things will have to change as a result of introducing REACH-HF.

The infographic below breaks down the set-up process into seven tasks.

REACH-HF SERVICE DELIVERY GUIDE

Home-based cardiac rehabilitation for patients with heart failure

PROGRAMME RESOURCES

- Heart Failure Manual
- My Progress Tracker
- Family & Friends Resource
- Chair-based exercises DVD
- Relaxation CD

IMPLEMENTING THE PROGRAMME

Below you will find the necessary steps for adding REACH-HF into your service and for monitoring progress. It is, of course, possible to work on more than one step at a time!

1) MAKE THE CASE

Introducing any new innovation starts with a need. A well-defined vision for the future service that includes the opinions of the wider team is a must. This 'mission statement' will become a driving force behind the innovation and help to keep everyone on the same page.

2) GET THE TEAM ON BOARD

Innovation is a team effort. Getting people on-board from the outset will create less resistance and tension during the roll-out. Having an appointed REACH-HF champion will help drive it forward.

Contact the REACH-HF team:
reach-hf@exeter.ac.uk

3) CONSIDER THE BEST TIMING

Timing is crucial in ensuring successful roll-out. Choosing the time to start wisely will reduce the burden of an additional workload on the individuals delivering the programme and the wider team.

4) GATHER RESOURCES

Introducing any new intervention requires resources - staff, time and money. When a new programme is introduced, the team will have to adapt to incorporate new working practices.

5) ADAPT OR DEVELOP SYSTEMS

Implementing any new intervention into a healthcare team requires designing new systems of work or amending the existing ones. Good planning of such systems will avoid frustration and problems later down the line.

6) MAKE THE MOST OUT OF THE TRAINING

The decision who to train is an important one. This will influence the early success of the programme and the enthusiasm and feedback from the initial roll-out will have a knock-on effect for future implementation.

7) DELIVER, MONITOR, EVALUATE

As the programme is rolled out, you can help it to develop and evolve by monitoring and evaluating progress. Evaluations can also be used to support the case for future funding.

Contact the REACH-HF team:
reach-hf@exeter.ac.uk

2.2. Delivery phase

Hopefully, the careful planning that went into the launch of the programme will result in a few obstacles during the delivery phase. The seven tasks involved in introducing the REACH-HF programme are described in more detail (with suggested discussion points and recommendations for each) in a table below.

1. Making the case for REACH-HF
Useful questions to ask: ❖ Why does the service need to implement home-based cardiac rehabilitation for people with heart failure? ❖ What cardiac rehabilitation is currently available for people with heart failure? ❖ Will REACH-HF be provided as an additional service or an alternative to existing provision (e.g. centre-based)? ❖ What are the benefits to patients of offering REACH-HF? What are the benefits to the service? ❖ How does the service want to respond to the NHS Long Term Plan in regards to cardiac rehabilitation provision for people with heart failure (see section 1.2)?
Recommendations: ➢ Prepare a good case for introducing REACH-HF into the service. ➢ Open communication with all relevant staff and incorporate the additional feedback into the final 'mission statement' document.
2. Getting the team on-board
Useful questions to ask: ❖ Are members of the team on-board with the programme? Do they see the value of REACH-HF? ❖ How much capacity does the service have? ❖ How is the team's morale? ❖ Is the team used to dealing with changes? Are they open and receptive to them? ❖ Has there been any recent clinical or administrative changes in how the service is being run or delivered? ❖ Who wants to be involved? Who should be involved? ❖ Who else, outside of your team, needs to be involved?
Recommendations: ➢ Keep the team spirits high and ensure that no animosity is directed towards the chosen innovators and/or the programme itself. Monitor staff morale and attitudes and address any resistance through discussion and actions to address any concerns. ➢ Make an honest assessment of the capacity available for the REACH-HF roll-out. Start at a level appropriate to the available resources. It's better to start small than to overstretch the service and fail. ➢ Low morale can be overcome by increasing communication between management and front-line staff in regular staff meetings and consultations and attempting to find out the causes of the resistance and apprehension. ➢ Evaluate how you have implemented changes previously and decide what worked well. ➢ Appoint REACH-HF champions.

- Appoint a REACH-HF team - a group of people that will be involved in the initial roll-out of the programme.
- Consider referral sources: e.g. hospitals, GPs, community teams. Identify referrers who can become REACH-HF champions.
- Heart failure nurses are an important source of referrals. For services that do not ordinarily look after people with heart failure, it is a good idea to bridge the gap and increase the interdisciplinary working between cardiac rehabilitation and heart failure teams. Consider identifying a heart failure nurse that will become a REACH-HF champion in the heart failure team. If the resources allow, consider training the champion heart failure nurse to deliver the programme and offer support to the REACH-HF roll-out team.
- Open a channel of communication between service managers, lead clinicians from cardiac rehabilitation and heart failure teams and the local specialist service manager.
- If there is no rehabilitation provision for people with heart failure, the cardiac rehabilitation team will have to work closely with the local cardiology consultants (to ensure safe clinical practice and ongoing support from senior clinicians).
- Consider a pathway for advanced psychological support and nutrition input if one is needed.
- Support from senior management is a crucial part of introducing a new intervention into the service, especially if additional resources will be required to get the project off the ground. Involve the local head of department in a strategic role. It will allow for smoother implementation and increase the chances of the programme being included in any future service plans.
- Does your NHS trust have a dedicated programme and transformation team? If so, it may be helpful to involve it in the initial set-up of processes and procedures. If such team is not available, the senior management team should take on this role.
- Ongoing consultations between managers and front-line staff are essential for a successful launch.

3. Considering & choosing the best timing

Useful questions to ask:

- Are there any current staff shortages (long-term sickness, study leave or recent redundancies)?
- Is it a good time during the year to introduce REACH-HF?

Recommendations:

- Following discussions with all the relevant staff (front-line staff, managers, clinical leads, HR) - decide on the most optimal timing to introduce the REACH-HF programme in your service.

4. Gathering the resources

Useful questions to ask:

- Who will pay for the REACH-HF training?
- Where will the additional staff capacity come from? Will new staff be recruited?
- Are there additional funds to deliver the programme on a day-to-day basis (cost of the manual and travel)?
- How will any potential gaps in resources be managed?
- Who will take on any additional administrative burden?
- Is the distribution of new tasks/workload perceived as fair and acceptable?

Recommendations:

- For existing staff that will be offering REACH-HF agree on the amount of the acceptable adjustment to their usual duties, or working hours.
- Create a plan to cover the cost of delivering the programme.
- Be realistic about the resources required to integrate REACH-HF with your ongoing service delivery.
- Add REACH-HF to an existing commissioning structure or create a new business case for the additional service delivery.
- Provide the team with opportunities to voice their concerns about changing tasks/workloads.
- Create a well-defined and realistic plan that accounts for changes in workload across the service.
- Communicate with the team about how the changes can be best managed.

5. Adapting or putting new systems in place

Useful questions to ask:

- From operational, clinical, and systems points of view, what needs to happen before the first REACH-HF sessions can be delivered?
- What is the NHS trust's policy and insurance for lone working (if applicable)?
- If applicable, will home visits be conducted by individuals or pairs?

Recommendations:

- Operational: identifying suitable assessment sites, identifying patients' cohorts and referral sources, agreeing which data to capture and record, agreeing on any key performance indicators, creating sufficient project plans and risk logs, as well as identifying roles and responsibilities (ranging from who will be delivering the new treatment to who will look after the additional administrative burden).
- Clinical: patient criteria need to be agreed and, for services not ordinarily looking after people with heart failure, communication with heart failure specialist nurses and consultants may need to be established.
- Systems: the IT department may need to adapt the patient record system. You may need templates for referrals and patient communications, as well as to capture the required clinical data, document REACH-HF assessments and clinical notes from the follow-up sessions. The REACH-HF facilitators may need a 'prompt system' for booking REACH-HF intake and end-of-treatment assessments. The REACH-HF facilitators may need to develop a diary system to keep track of home visits and follow-up phone calls, as well as the participants' progress on the programme.

6. Making the most out of the training

Useful questions to ask:

- Is it possible to upskill all staff who could deliver REACH-HF?
- What is the team's experience of facilitating self-management and exercise programmes for people with heart failure?
- Who is the most suitable to attend the REACH-HF training? Who has the most enthusiasm for the programme and the experience and capacity to deliver it?

Recommendations:

- Allow equal opportunity for members of the team to participate in the REACH-HF training.
- Create fair and transparent criteria and a rationale for the selection of individuals to attend the REACH-HF training.

- Manage any possible disappointments of individuals that were not invited – discuss opportunities for any future training or other ways for these individuals to stay involved in the REACH-HF project.
- Consider training a multidisciplinary mix of healthcare professionals – for example, including a community cardiac specialist nurse, an exercise physiologist or physiotherapist and a heart failure specialist nurse (with experience in exercise prescription). Having a broad skills-mix in the delivery team will help staff to support each other and address a wider range of patient needs.
- Consider setting up regular REACH-HF peer-to-peer learning sessions to allow the REACH-HF facilitators to discuss difficult cases, hone their skills building on their REACH-HF training.
- If exercise prescription experience is lacking for some staff, consider starting with the BACPR Physical Activity and Exercise in Heart Failure training course: https://www.bacpr.com/pages/page_box_contents.asp?PageID=836
- Choose staff that are motivated, enthusiastic and see the value of the REACH-HF programme.
- Allow enough time before the training to complete the pre-training learning reading/activities and enough time following the training to digest the new information. The newly trained staff could prepare a short presentation about REACH-HF to be presented to the whole team.
- Spend some time following the training discussing as a team how you see the practicalities of delivering the REACH-HF programme and what will work best in the contexts of your service.
- Ensure training is timely (avoid having a big gap between training and delivery) – delivering REACH-HF requires skills and these will diminish without practice.
- Once the programme is in place, use the knowledge and skills of experienced staff to help newly trained staff to learn/gain experience (e.g. using shadowing of delivery for the first few patients).

7. Setting up monitoring and evaluation

Useful questions to ask:

- How can the roll-out of the REACH-HF programme be monitored and evaluated?

Recommendations:

- Make time for reflection. Evaluate the process of the roll-out itself and involve all relevant staff.
- Collect regular feedback from the REACH-HF facilitators and the REACH-HF participants.
- Use national audit (NACR) data to evaluate patient outcomes and other key metrics (e.g. throughput, uptake, completion).
- Think about collecting different level data: participants' outcomes and feedback, enrolment and the popularity of the programme, treatment attrition and completion rates and facilitators feedback.
- If you do not ordinarily report to the National Audit of Cardiac Rehabilitation (NACR) – put a system in place to monitor participants' outcomes.
- Schedule regular review/feedback meetings to identify and address any concerns or barriers about delivering the service.

2.3. Maintenance phase

It is good to develop tools for evaluating effectiveness, usefulness, or impact of the new programme, as well as finding opportunities to reflect on the roll-out process itself. The maintenance phase is an ongoing process since the landscape of healthcare delivery is always changing, staff move on, and other innovations and ideas arise over time. Ongoing monitoring and feedback will help to keep REACH-HF working well as time goes on, and/or help it to develop and adapt to changes in circumstances.

To be able to maintain programme delivery, it is important to establish an ongoing funding stream. This may be a good time to present an updated service model to your Clinical Commissioning Group (CCG) or start considering ways of sourcing additional targeted funding (e.g. under the NHS Sustainability and Transformation Plans). Such targeted funding may start to be available from 2021 as the NHS is planning to allocate £28 million over five years to improve access to cardiac rehabilitation for cardiac patients. This is part of the NHS Long Term Plan to increase uptake of rehabilitation by patients with heart failure from 8% to 33%.

Thank you for taking the time to read this implementation guide. We hope you will find REACH-HF to be a useful addition to your cardiac rehabilitation service delivery. If you have any implementation problems, please do get in touch with your REACH-HF trainers or the REACH-HF team: reach-hf@exeter.ac.uk

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1. Dalal HM, Taylor RS, Jolly K, et al. The effects and costs of home-based rehabilitation for heart failure with reduced ejection fraction: The REACH-HF multicentre randomized controlled trial. European Journal of Preventive Cardiology 2018; 26: 262-272. DOI: 10.1177/2047487318806358.

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6. Taylor RS, Sadler S, Dalal HM, et al. The cost effectiveness of REACH-HF and home-based cardiac rehabilitation compared with the usual medical care for heart failure with reduced ejection fraction: A decision model-based analysis. Eur J Prev Cardiol 2019; 26: 1252-1261. 2019/03/20. DOI: 10.1177/2047487319833507.

7. Wingham J, Frost J, Britten N, et al. Caregiver outcomes of the REACH-HF multicentre randomized controlled trial of home-based rehabilitation for heart failure with reduced ejection fraction. European Journal of Cardiovascular Nursing 2019; 18: 611-620. DOI: 10.1177/1474515119850011.

8. Frost J, Wingham J, Britten N, et al. Home-based rehabilitation for heart failure with reduced ejection fraction: mixed methods process evaluation of the REACH-HF multicentre randomised controlled trial. BMJ Open 2019; 9: e026039. DOI: 10.1136/bmjopen-2018-026039.

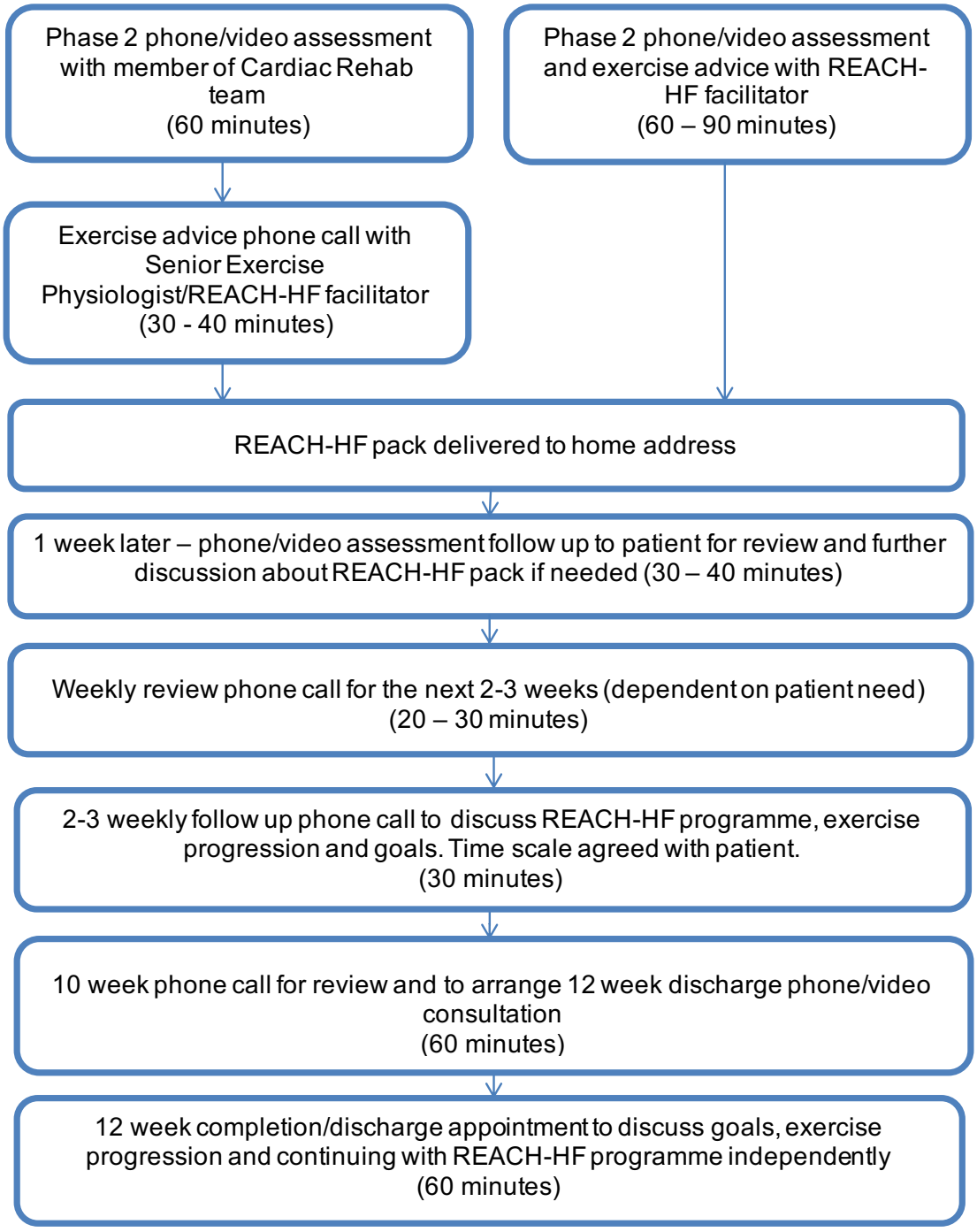
9. Daw P, van Beurden SB, Greaves C, et al. Getting evidence into clinical practice: protocol for evaluation of the implementation of a home-based cardiac rehabilitation programme for patients with heart failure. BMJ Open 2020; 10: e036137. DOI: 10.1136/bmjopen-2019-036137.

Appendix 1 – remote delivery pathway

NHS Wirral Community Health and Care NHS Foundation Trust

Wirral Cardiovascular Rehabilitation

REACH-HF remote delivery pathway

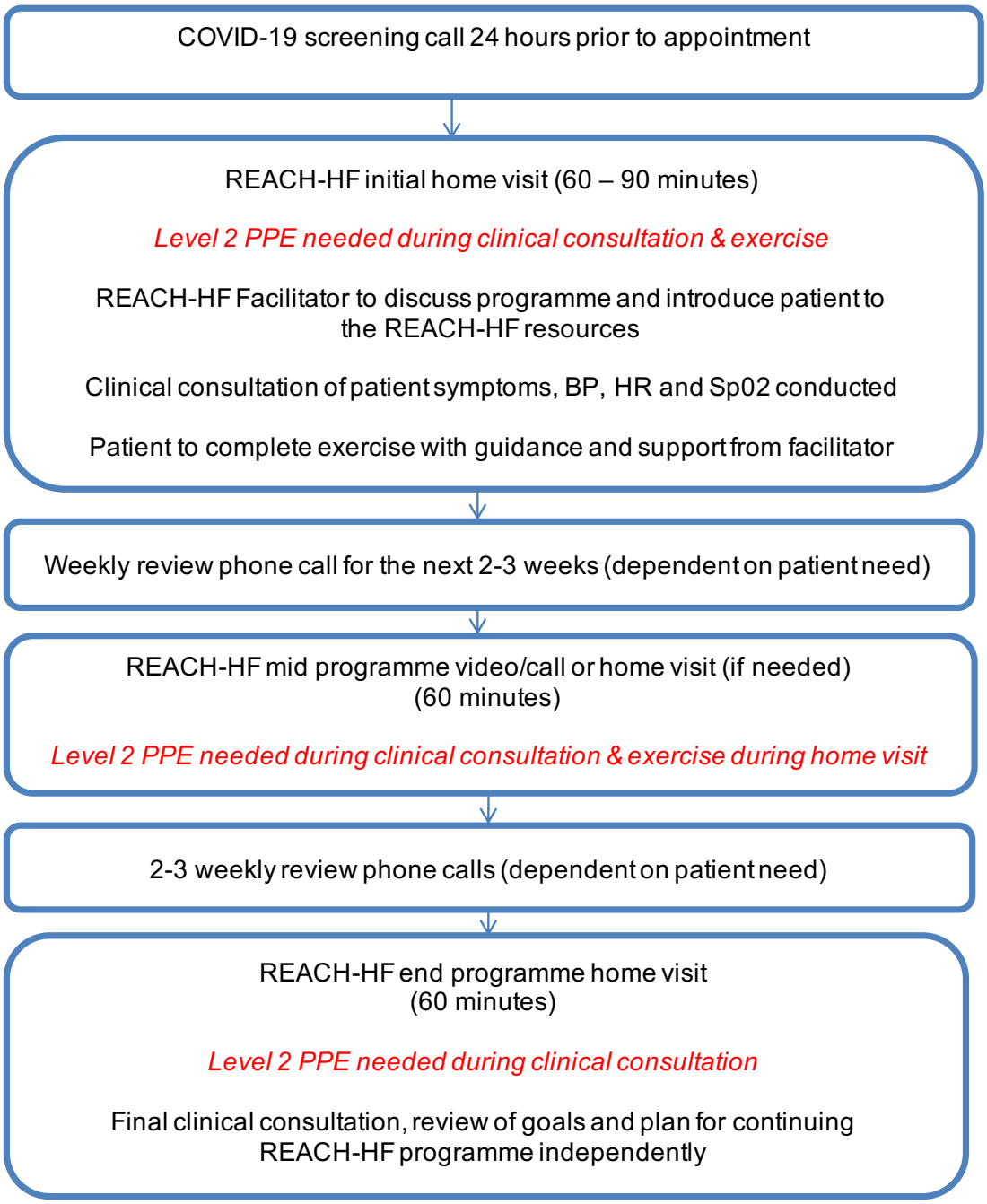


Appendix 2 – combined delivery pathway

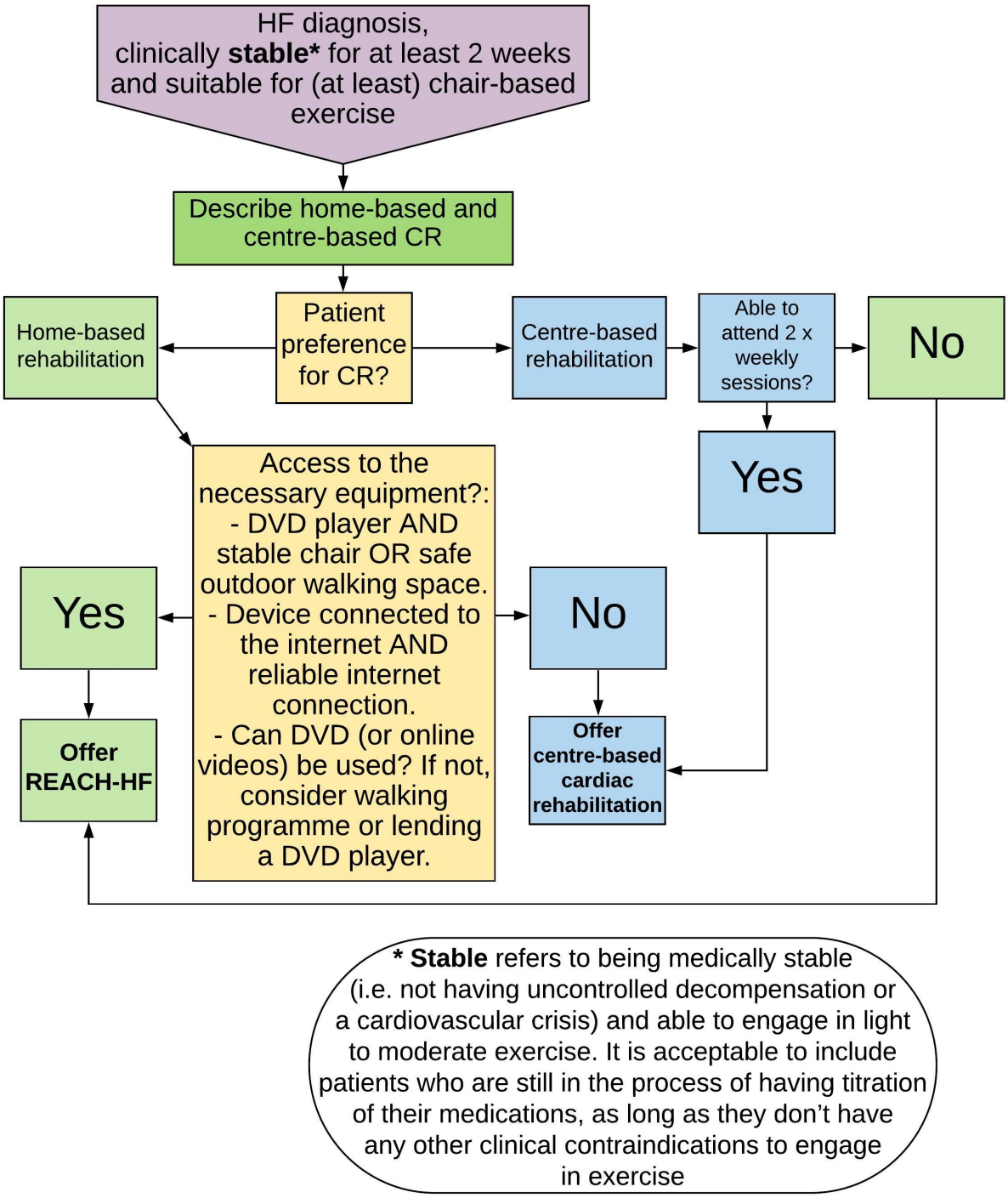
Wirral Community Health and Care NHS Foundation Trust

Wirral Cardiovascular Rehabilitation

REACH-HF combined delivery pathway (social distancing and PPE)



Appendix 3 – patient criteria and selection tool



	Standards for Reporting Qualitative Research (SRQR)*	
	http://www.equator-network.org/reporting-guidelines/srqr/	
		Page/line no(s).
Title and abstract		
	Title - Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended	1
	Abstract - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions	2
Introduction		
	Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	8
	Purpose or research question - Purpose of the study and specific objectives or questions	12
Methods		
	Qualitative approach and research paradigm - Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/ interpretivist) is also recommended; rationale**	10 & 12
	Researcher characteristics and reflexivity - Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability	34
	Context - Setting/site and salient contextual factors; rationale**	9
	Sampling strategy - How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale**	12
	Ethical issues pertaining to human subjects - Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	14
	Data collection methods - Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale**	12
	Data collection instruments and technologies - Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	13
	Units of study - Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	9

	Data processing - Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	
	Data analysis - Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale**	13
	Techniques to enhance trustworthiness - Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale**	13
Results/findings		
	Synthesis and interpretation - Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	14
	Links to empirical data - Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	Appendix 6 & 7
Discussion		
	Integration with prior work, implications, transferability, and contribution(s) to the field - Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	30
	Limitations - Trustworthiness and limitations of findings	32
Other		
	Conflicts of interest - Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	35
	Funding - Sources of funding and other support; role of funders in data collection, interpretation, and reporting	35
	*The authors created the SRQR by searching the literature to identify guidelines, reporting standards, and critical appraisal criteria for qualitative research; reviewing the reference lists of retrieved sources; and contacting experts to gain feedback. The SRQR aims to improve the transparency of all aspects of qualitative research by providing clear standards for reporting qualitative research.	
	**The rationale should briefly discuss the justification for choosing that theory, approach, method, or technique rather than other options available, the assumptions and limitations implicit in those choices, and how those choices influence study conclusions and transferability. As appropriate, the rationale for several items might be discussed together.	
	Reference:	
	O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. **Standards for reporting qualitative research: a synthesis of recommendations.** *Academic Medicine*, Vol. 89, No. 9 / Sept 2014 DOI: 10.1097/ACM.0000000000000388	

NPT construct	Barriers	*Quote*
Differentiation		
Communal specification	Confusion about patient criteria	*'Originally they, we didn't, it was because we didn't have a fair understanding of patient criteria' Site 1*
Individual specification	Initial trial-and-error with operationalising the intervention	*'I think, initially, because, obviously, you know, we didn't really know how to approach it, so there was a bit of a trial-and-error.' Site 3*
Internalisation		
Initiation	Lack of implementation plan	*'Lack of plan.' Survey participant*
	Lack of champions	*'Lack of 'drivers' in the service.' Survey participant*
Enrolment	Routine of delivering group centre-based programmes	*'We were, kind of, very stuck in, in moving with technology and now we realise we can do things differently.' Site 4*
	Practitioners being away from core cardiac rehabilitation duties/team being stretched	*'We're, we're taking, I suppose, people away from, what we would say is… their core responsibility across the two different services in order to implement something else.' Site 2* *'We were a bit stretched, incorporating [the REACH-HF] directly on top of the existing service.' Site 3*
	Low team morale and lack of enthusiasm for REACH-HF	*'The tensions that we're going on in the teams at the time and the kind of negativity that was particularly apparent in one team.' Site 2* *'Not everybody was fully on board with the concept or felt that patients that they have offered it to, didn't really want it or like it or, you know, or maybe, or maybe it was just down to the sometimes enthusiasm of different members of the team and using it.' Site 4*
	Challenging personal circumstances	*'There're also individuals... they have their own family, the work-life balance issues, so there have been some stresses associated with things outside of the project, but they can't help impacting on, on the delivery of the project.' Site 2*

NPT construct	Barriers	*Quote*
	Poor communication with heart failure team	*'I think, probably, where we fell down is, probably, that link and communication and making sure, maybe our heart failure colleagues have really a better understating of what we were doing and how we were doing it.' Site 4*
Legitimation	Initial hesitation about being part of project	*'Everybody wants to do a good job and not, not fail. You know, start something and not be able to finish it, so there's always been, you know, a difficulty, not wanting to start something that, perhaps, they thought they could not finish. Which is probably, why they were reluctant to take it on... not particularly wanted to do it in the first place.' Site 2*
Activation	Perception REACH-HF in its current format as not implementable	*'I don't think, we would be able to offer it in the current format, climate if it all was home-based.' Site 2*
Interactional workability	Additional time	*'I think, it does require more time on individual nurse bases.' Site 2*
	Additional cost	*'I think, it takes a lot more resources than our set programme and, obviously, for that reason, it would be more costly.' Site 2*
	Additional admin	*'The other thing I should say - there is a lot of admin work that is behind applying this programme, because we have to do all the letters, sent out the letters and book the appointments, so there is an awful lot of admin time.' Site 2*
Relational integration	Higher opinion of centre-based provision	*'I think, because the thing is, the problem that I've had, is because I've known what we've got here. I've been leaning towards here, but I think we do offer more and we have more facilities here. Because of the service that we give here, because we push them so much more. I think the level of exercise they are getting is better here than they do from the DVD.' Site 1*
	Negative opinion of REACH-HF resources	***DVDs are outdated*** *'Particularly with the DVD, I think, you know, that was, perhaps, is an outdated mode of communication. I don't think, it helped the practitioners in, in getting this off the ground.' Site 2* ***Technical problems*** *'The only issue, that we are having is the DVDs, it can be very*

NPT construct	Barriers	*Quote*
		frustrating when we are going out to patients and the DVD isn't working or it's not going onto the right level.' Site 1 ***Written resources are too lengthy*** *'But others, again, haven't really read it. So for some people, if there is just too much written word, you know, they don't look at it.' Site 2*
Skill set workability (including REACH-HF practitioner's training)	Disinclination for lone working	*'Others prefer to work as part of a team and set clinics rather than that, that lone working.' Site 1*
	Disjointed working between cardiac and heart failure teams	*'In our case heart failure team is spread over three different sites and working separately from us.' Site 4*
	REACH-HF training not well-pitched to audience	*'I think, a lot of what the training focused on was all… the behaviour change and motivational interviewing and that type of thing. And, I think, because of our background, we, kind of… Not that we knew it already, but we've got our skills, we've got our knowledge in those areas. And, for me, I, kind of, fell like it needed more – this is the booklet, this is what's in the booklet, this is what we want you to do at each appointment and I don't really think that was covered.' Site 1*
Contextual integration	Lack of time allocation	*'I'm not given set days to do the actual work. I've got to fit it in around. So it's a bit sporadic.' Site 1*
	Lack of staff	*'We haven't… we haven't recruited extra staff to deliver this extra service - we've done it from existing resources.' Site 2* *'Yeah, we've never got enough staff, we are always…we are a couple of vacancies down.' Site 1*
	Staff redeployment due to COVID-19	*'Many staff have been redeployed so hasn't been feasible to expand our current service.' Survey participant*
	Commissioning structure	*'As far as we are concerned here at ***Location 2*** care services, we don't deliver… we are not commissioned to deliver a rehab service for heart failure patients.' Site 2*

NPT construct	Barriers	*Quote*
Systematisation	Time required for evaluation	*'I, particularly, haven't [engaged in evaluation]. But it's, probably, a lot of time on top of that.' Site 1*
	Task of evaluation lies with management	*'I think more the manages are.' Site 1*
Communal appraisal		
Individual appraisal		
Reconfiguration		
Non-NPT barriers		
Patient-level factors	Multimorbidity patients	***Frequent hospitalisations*** *'I've got three patients on my caseload at the moment, who are all, kind of, doing REACH heart failure, and they've all, kind of, had their individual medical problems, that have stopped me from starting any exercise with them. So, one of them has ended back in hospital and the other one just wasn't feeling up to it at the moment. So it's that side of it as well. The patients that we tend to be getting through for REACH heart failure, tend to be the quite poorly patients and it can be quite difficult for them, kind of, getting them to a point where you can exercise.' Site 1* ***Not stable to exercise*** *'A lot of these patients, you know, have other health issues or they have an exacerbation of heart failure and there are times that their health, kind of, take over and they can't exercise for a few weeks, because they have a chest infection or a urine infection.' Site 2* ***Additional time*** *'Because it is a home programme, although not all patients need a lot of face-to-face contacts, I would say most of them, because of the average age of our patient group - they are above 70 and a lot of them are in their early 80s, early 90s, so they do need face-to-face contact, so it is more time-consuming in that respect.' Site 2*
	Engaging with technology	***Lack of DVD players or internet*** *'None of the patients managed to get the DVDs to*

NPT construct	Barriers	*Quote*
		work. And, I think, a few, actually, maybe dropped out for that reason - they don't have a DVD player or they don't have internet, or they have internet, but they are not able to use it, you know, they are more elderly patients, who live on their own. And, I think, they see it as too much of a challenge and, you know, we have had a few drop out after a few weeks of starting and, I think, that, that might be one of the reasons - just the technical issues.' Site 2 ***Not being technologically savvy*** *'And the IT issues, you know, we have had so many patients who had so many difficulties with the IT, you know, and maybe it is due to their age, because a lot of our patients are very elderly and I suspect it is.' Site 2*
	Apparent lack of improvement following REACH-HF	*'She was clearly fitter, more mobile. She's now got back to yoga classes and she's doing amazing, but when she came in to do the walk test, she was worse when she came back. But that's only because her daughter was with her and was saying, 'Oh, you can sit down now' and she was talked out of it. If the daughter wasn't there, she would have done more. On paper it looks like she has not done as well as I should have, but, without sounding rude, I didn't really care, because I know she has. So when I said 'on paper'… I know she has done better. But to be honest, that experience has been quite good because now, unless someone's really anxious and they need their partner or their daughter or son in there. We just say 'No, go and get your cup of tea, you sit outside' and let them do it on their own. So, it's all kind of worked in a way.' Site 1*
	Expectations and preferences	***Lack of motivation*** *'I have had a few patients, who haven't continued on REACH because they are not motivated to do it at home and do the video.' Site 2* ***Preference for group-based programmes*** *'They much rather go somewhere every week.' Site 2* ***Dislike of home visits*** *'For one lady – she didn't want us to come to her home.' Site 3*
Geographical factors	Size and type of patch	**Large catchment area** *'I think one of the main issues, I think, for us, is the fact that we are a rural county and, you know, the distance between patients from, perhaps,*

NPT construct	Barriers	*Quote*
		where the base of the service is to where the patients are is, is significant. You know, we're not an urban sprawl, where, perhaps, clinics are easily accessible a) by the patients and b) by the staff. Where you can park up and walk to the venue. For us, there is a considerable, kind of, half a day involved in setting up a clinic and making sure people get to the clinic, so, I think, from our perspective is geography – that's an element, most definitely.' Site 2 ***Transport issues*** *'Home visits are not always easy. And for another gentleman, he was really, quite a distance. We had like two, two different buses and, I think, it took us over an hour to get there and an hour to come back. So that was not a terribly good use of time.' Site 3*

NPT = Normalisation Process theory; REACH-HF = The Rehabilitation EnAblement in CHronic Heart Failure

NPT construct	Facilitators	Quote
Differentiation	Good grasp of difference between REACH-HF and usual service delivery	*'I suppose the main difference really is that we are going out into their homes.' Site 1*
Communal specification	Good grasp of purpose of REACH-HF	*'Most of the nurses, that I am supporting in heart failure and cardiac rehab, undoubtedly, understand the benefits of offering a rehab service to those patients who have heart failure.' Site 2*
	Agreement that REACH-HF adds value to service	*'It's just, it's kind of, added another thing to be able to offer patients. It's always going to be, it's always going to be good and have a benefit and have positive effects, when we've got something else that we can offer a patient who's sitting in front of us.' Site 1*
	Initial dissemination of purpose and structure of REACH-HF	*'One of the things that we did when we came back from the training was we, kind of, put together a little presentation that we took to the team meeting and just went through everything. All the referral criteria and everything that we do with them.' Site 1* *'So that's for us to try and, maybe go out and just see the [heart failure] service and promote REACH-HF.' Site 3*
	Awareness of service gap	*'So, you know, it's, it's been a long time coming. And the home-based is a good next step for that. Because we've got higher than average incidence of heart failure on the ***Location 1***.' Site 1*
	Clear vision for REACH-HF	*'I think, that's our main goal, really. Because, as I said, we see a lot of patients, who maybe other rehab services don't, so for us, it was about people who can't get to us, they're the ones that we wanted to get involved with REACH heart failure. We see the benefit of it for them.' Site 1*
Individual specification	Clear procedures and increased efficiency	*'We've got it more efficient now.' Site 3*
Internalisation	Good grasp of value of intervention to heart failure	*'Obviously, there are people who can't get in, to exercise and it is beneficial for them to do that. So, I, definitely, think, it's good for the patient to be able to take part in the*

NPT construct	Facilitators	Quote
	population	*cardiac rehab service when they cannot get out and about and build up their strength and their fitness and then they can start going out and become more independent and mobile.' Site 1*
Initiation	Availability of champions	**Whole team** *'It's the entire team.' Site 1* **Organisation** *'I think, I think… it's started probably… I think, the main factor would be the organisational factor to get involved. Because, I think, the organisation wanted this as part of a transformation work that is going on across the NHS. I think there was a significant amount of organisational... not pressure, but the organisation wanted it, essentially, it was a fait accompli [a thing accomplished and presumably irreversible] that we will do it.' Site 2* **REACH-HF practitioners** *'So driving it forward, I think, the three of us who done the training and who, you know, made this commitment to see it through and, you know, get the patients.' Site 3* **Single practitioner** *'Yeah, probably just me. Yeah, I would say, probably me. And, and actually, I suppose, L***, who trained after the three of us trained, probably would have been another person.' Site 4*
	Identification of potential referrers/referral streams	*'The entire, hopefully, community heart failure team. They are where we are getting the vast majority of our referrals, because they're the ones seeing these patients in their homes. So, yeah, all of them.' Site 1*
Enrolment	Strong endorsement for REACH-HF	*'But, yeah, definitely, there are people that they will see at assessment and they will be really eager to exercise, but can't get to one of our centres. And, yeah, the team will tell them how good the programme is and really promote it.' Site 1* *'So they've pretty much bought into it as well. Which is good, because that means that they are, sort of, including it in the… in the assessment they include REACH very openly, very easily as one of the repertoire of things that we could offer.' Site 3*
	Interest in heart failure	*'Well, I was quite excited, because I recently studied… I did the heart failure module and so I wanted to, kind of, put into practice the theory I've learnt on that.' Site 2*

NPT construct	Facilitators	Quote
	Effective communication	**Within cardiac rehabilitation team** *'It's always an agenda item on our meeting that we go through at every, at every, kind of meeting. Juts to bring up anything that we, that we need to.' Site 1* **Between cardiac rehabilitation and heart failure teams** *'We keep reminding them [heart failure nurses] that this is a, a good option for some patients who they might not otherwise think of referring to us, because they know that they're relatively house-bound, or that their situation wouldn't really follow the traditional rehab expectation.' Site 3*
Legitimation	Feeling positive about involvement	*'Good. Excited. I like new things. So I… I prefer to be busy so it doesn't bother me.' Site 1* *'We know we've got something new to do and we're actually quite enjoying doing it.' Site 3*
	Feeling positive about challenge of introducing REACH-HF	*'Yeah, so, I think, it's been… it's good to, to have something that comes in as a new challenge. Because, it's very easy just to carry on delivering… if you're busy and you carry on delivering the service in much the same way. It doesn't really challenge you to think to yourself and… how would we… or could we change it?' Site 3*
	Being part of innovative team	*'I think the facilitators were… the rehab team is not afraid of change. They've done so much change. You know, they've done bigger change projects. That we've, we've, you know, totally redesigned our rehab. We are always looting to, to… For ways to better our service and do things better.' Site 1*
Activation	REACH-HF part of service going forward	*'Hopefully, it's still, it's still there, and it's a…. It's another choice, hopefully, we'll still got it.' Site 1*
	Watchful waiting	*'I think it's going to be a decision... more about when we get through… up to the, the 50 patients. As asking the big questions… have we… can, can we do this in parallel with everything else that we are trying to do?' Site 3*
	Implementing REACH-HF	*'I think, with COVID actually so many people now are embracing novel virtual*

NPT construct	Facilitators	Quote
	post COVID-19	*approach.' Site 4*
Interactional workability	Gaining balanced perspective of time involved in delivery of REACH-HF	*'So, that's quite interesting as well, because we thought that was going to take us more time, but, I think, by that stage, we have settled into a process and a format, so we were more efficient ourselves in how we were doing it.' Site 3*
	COVID-19 led to changes in service provision	*'It's definitely, with COVID realised that, yeah, you know, we can do a lot more home-based stuff with people and we are probably getting better at it and seeing advantages of different types of programmes. I think, now [post COVID] that we can use cameras and, and go out to people virtually and talk to them and see them, that's, actually, it will make it less labour intensive. I think, in the future, you know, we don't actually having to leave the house, or wherever you are working to go to somebody's home and travel back.' Site 4*
	Good fit with service and with patient	*'[Implementing REACH-HF has been] dead easy, yeah, it has. It's slotted in well, because we haven't had to make any changes, because the patients would have been accepted anyway.' Site 1* *'I think, we were fortunate because we had our completely, sort of, open self-management style not a didactic, prescriptive rehab approach in our own programme anyway. So there was nothing hugely new in how we were asked to deliver it. You know, when we came up to, Edinburgh and… This, this sort of self-management, facilitation approach is our style, is exactly what, you know, what we're doing anyway. So, I think, we were lucky that, that didn't come as a huge shock.' Site 3*
Relational integration	More objective opinion of centre-based	*'The problem with the centre, if I'm honest, is, particularly people with heart failure, when they come to the class, or I shouldn't say just heart failure, people who are less mobile and slower, it takes a lot longer to, it takes a whole afternoon for them sometimes, like booking people in. Whereas, if you hand it them the exercises and they can do it at home, they can do it in their own time. It doesn't take the whole afternoon.' Site 1*

NPT construct	Facilitators	Quote
	Positive opinion of REACH-HF resources	**Written resources are just right –** *'Even when I look at the pack and I, you think that's a lot to read through. But, I think, they're written really well, so.... People read them at their leisure…' Site 1* ***Being able to use the friends and family resource*** *– 'I think, having that booklet that you can give them, to the family or the cares or the friend is really good to get them involved'. Site 1*
	Trust in intervention and each other	*'But in terms of the intervention, I think, that it works.' Site 1* *'We are a really good team, we work really closely together.' Site 1*
	REACH-HF practitioner's peer support	*'So, we've been discussing clinical and rehabilitation issues relating to the individual patients that we've got. In order that we can, you know, help and support each other… maybe on decision-making and or share the patients.' Site 3*
Skill set workability (including REACH-HF practitioner's training)	Preference for home-visits	*'I love it, I would say. I've had years of home visits and I absolutely love REACH, because it opens up a bigger picture of people's lives, which we don't see here. It's a wonderful relationship, because they are very motivated and we know them for a long time, we know them for at least 12 weeks. But with home visits… it allows for a different relationship and I love it, absolutely love it! ' Site 1*
	Close working with heart failure team	*'We've got such a good community heart failure team and, I think, that helps, having the team, you know, across the way from us, because, I've noticed, you know, we don't have to go to an acute setting to get that back-up from them. If we've got any concerns about a patient while they are here, then we'll just get the girls to come and have a look at them.' Site 1*
	Choice of REACH-HF practitioners	**Self-selection** *- 'I think the people that we've got doing it are de… definitely the best people for it. Definitely. They've put themselves forward for it. Yeah, and we knew that, that they're the best people to do it.' Site 1* ***Personal attributes*** *- 'I think, we've chosen well. I think, we've chosen three motivated practitioners, very competent. I think one individual needed something to increase her*

NPT construct	Facilitators	Quote
		confidence and to underline her ability within her role and the other two practitioners, they are very experienced, competent, motivated practitioners. So, I think, we've chosen well, which is why we are able to push on… push through the competent conscientious practitioners. So, I think, that was... what is important is, you know, is your rationale for who you've chosen to carry out the project in the first place. It's quite important and, I think, the decisions we have made and the people we've picked seems to be correct.' Site 2 ***Training more than one individual*** *– 'I think, that's why, it was clever and good that… there were three people that had to go on the training. Which made it a multi-disciplinary team approach, because it was, you know, our lead nurse, myself and then exercise instructor. And I think it's, I think it's really important that… for it to be… to be able to deliver you need a team. And for the training itself to [be delivered]… right from the outset, not to one individual. Because, it would be quite a burden on one person, I think.' Site 3* ***Experiences of working with multimorbidity patients*** *- 'I think, we're lucky because, we… J*** and I always believed that… I don't know that there are lots and lots physiotherapists involved in programme as heavily as I am. But we've always believed that for the multi-comorbidity patients and particularly those who are, the sort of, more complicated, like the heart failure patients. The… and the people that we're seeing are, you know, [are] much more still in their clinical stage, that our skillset of physiotherapists with line managing and leading exercise instructors in parallel with the nursing team, gives as a really strong ability to handle complicated patients. Site 3*
	Skills combination	***Cardiac rehabilitation, physiotherapy/exercise physiology and heart failure*** *'Yeah, I think, we were, kind of, selected based on our roles. So, obviously, my background is exercise physiology and we also have J***, who is a cardiac rehab nurse and R*** is a heart failure nurse. So, I think, having those three different roles work really well, because we all bring different things and can help each other. Myself, J*** and R*** meet up every four weeks, juts to have a chat about things. Kind of, we have a chat*

NPT construct	Facilitators	Quote
		about the patients that we are seeing any issues or concerns. And, I think, the fact that we've got the three different, kind of, roles, kind of, works really well. Because, all three of them [roles] are, kind of, what we need for REACH heart failure. So, I think, that all, all works really well together.' Site 1
	Improvements to REACH-HF training	***Making it more practical –*** *'I think, we just needed to know - this is how you do it, you either invite patients to clinics or you go to see them at home, you do the assessments. I think, it needed to be more practical, it needed to be brought back into more the practicalities of the reality of how you might implement it as a team, depending on the environment you are working, where you are, etc. I mean, you are going to have so many patients each and you are going to see them at home and you do this and do that.' Site 2* ***More emphasis on the exercise component*** *– 'So, I think, there wasn't enough emphasis on the exercise and what they actually wanted… Because when we have seen the DVD, we've seen it after the training. And there were a few questions about exercise that we all could have asked, which would have been more… Because that's what we are going to deliver.' Site 1* *'Because we didn't do the incremental shuttle walk test - we needed training on that and, really, I would have liked that as an example on the training and more specific guidance on how to do that test.' Site 2* Input from previous implementers – *'I think, as well it would have been good to have nurses on that training, who actually, you know, implemented this programme and share the difficulties they have had. It would be good to know, how did they overcome [technological issues], it would be good to know all that.' Site 2* Shorter modular online training *'I probably felt the training could have been shorter or… maybe elements of it now [post-COVID] probably are going to be delivered virtually as well, so that makes it easier for people to attend training. And maybe a little bit less on heart failure management, but maybe have a module, if there are people who are not knowledgeable at heart failure management. Maybe, it could be*

NPT construct	Facilitators	Quote
		more modular based or something that people could be… If they already have a certificate for something and they have done this before then maybe they could just have a shorter version of that and somebody doing a longer version.' Site 4 Having more in-depth pre-training reading around self-management approach *'I felt that, probably… If the teams that are choosing to do it didn't really have a, sort of, self-management approach, it might have been more useful to have a bigger, pre-course or pre-training, sort of, reading material and maybe some, sort of, exploring that with people before they, they went on the clinic. Site 3* Recommending pre-training course (the BACPR heart failure exercise or activity training course) – *'And, I think, there would have been some benefits since it is, it is a heart failure population to have looked at the established BACPR heart failure exercise or activity training course. Because that would have given anybody who is intending to go and expand their delivery of heart failure rehab, to've gone in already with a baseline of knowledge on activity, assessment and exercise prescription. Because, there are quite a lot of differences in… I mean, that's why, that course, that day course was set up. Because, there are a lot of concerns amongst people in rehabilitation, who are more the general rehab people, that they don't know how to manage the needs of the complex heart failure patients. And, I think, that would have been good. Because, it is quite a… I mean, I think, the 12 of us that were there, probably, would have said that it is, a quite… a big thing to go away with trying to, sort of, handle a new, sort of, functional capacity assessment, like an incremental shuttle walk test in the context of maybe not having confidence in some of the differences in the patients with heart failure versus the more regular traditional, just: bypass, graft and MI'. Site 3*
Contextual integration	Protected time	*'Now I have got a day a week, which makes things so much easier. Because you want to do... you want to, kind of, implement it as well as you can. So you know, you have to allow the time to do that. Site 2*
	Management is proactive	*Securing additional funding 'We have different income streams as well. So it's about, you know, how can we look at investing that income, you know, if we do, say, I've got*

NPT construct	Facilitators	Quote
		an opportunity to do some practice nurse teaching, not me - the team and there might be some money that comes in from that. So say if we get two thousand pounds from that, what do I do with that? Right, oh well, okay, I could get 40, which, you know. So it's about, just thinking more fluidly about how we could deal with that.' Site 1 ***Redesigning service*** *'We are considering how we can streamline cardiac rehabilitation and make it work better. We've just, we've looked at how we provide our service, to provide it better, leaner.' Site 1* ***Offering flexible rehabilitation*** *'So we can really, from the beginning, we can, we can try and gauge with, you know, conversation with the patient and their family or carers what's best for them. And make sure that we're able to deliver that and by doing that, we should be able to use our resources well. So somebody who is 45, who's had an MI in a PCI, you know, they, you know, I'd like to have some, some online learning mixed in with evening gym sessions, that kind of thing, not quite as labour intensive for the staff, or they might even go off and do their own exercise, but keep in touch with us by the phone. And then, then we have more capacity to do the more labour intensive home-based rehab. And then there's everything in between. So that's why it fits in nicely and it shows the breadth of the, the needs of patients, who attend any kind of long-term rehabilitation, really.' Site 1*
	Commissioning structure	***Being block contractor*** *'Because we are community-based centre, we are not tied to the hospital. So we've always been given, we are a block contractor, we've always been given a pot of money to do with what we will.' Site 1*
	Support from management	*'My boss, they will pretty much work around you, they allow you to have your own workload and try and fit it in without affecting my heart failure job. So the leniency has been amazing. So that helps.' Site 1*
Systematisation	Planned, formal evaluation (by management)	*'We will be. Yeah, that's part of the thing, we want to put something together for… we're going to audit it all and we want to put something together for BACPR conference next year. And we've got a newsletter as well, that we're, we're looking at*

NPT construct	Facilitators	Quote
		putting out for patients twice a year. So we're going to have to do something for that too.' Site 1 *'Yes, we are. Obviously, the first lot of data are not available yet, because we haven't completed the first 12 weeks. But, yes, we will be looking at the data so far for each cohort and see what it's telling us and what the benefits have been to the patients and will certainly use that in any business case or review of the service. Certainly, it will go into, kind of, KPIs, really, and the reporting structure. For example, how heart failure has been done this year and, yes, it will be used as a reference to have the benefits of it, definitely yeah.' Site 2*
	Reflective, informal evaluation (by REACH-HF practitioners)	*'I think probably as we go along. You are, kind of, reflecting on it all the time. I think, initially once we got over the "How do we do this?!", you know...' Site 2*
Communal appraisal	Developing more balanced view of intervention and implementation process	*'Obviously, that's taken our time away from the cardiac rehab programme that's here. But, again, because of the benefits for it, I think… I don't [think] that's a necessarily a massive, a massive negative.' Site 1* *'I think overall, you know, it's, it's positive… it's seen as a positive thing. Despite the, kind of, extra work that is associated with it.' Site 2*
Individual appraisal	Job satisfaction	*'And it can be really, it can really beneficial and can give you a really good job satisfaction to go out and see people and see what we are doing is really… is improving their lives.' Site 1*
	Continuous professional development	*'The exercise instructors see it as another, sort of, skill for them, more knowledge, to gain through the, sort of, structure of REACH, etcetera. So they're been quite positive, it's a personal development thing for them.' Site 3*
	Positive feedback from patients	*'Because the patients we see, the patients who are on the programme - they want to do it. They are, they are eager to take part and do something as well. So you are, kind of, working of the feedback you get from the patients. So they are eager to take part*

NPT construct	Facilitators	Quote
		and eager to do anything to improve their quality of life.' Site 2
Reconfiguration	Fully home-based programme	'We *wanted to try and keep it to, to similar as we were, kind of, told about it. I think our main thing was that, we didn't want to start bringing patients into the, into the centres for these things. We wanted to keep it as what we thought it was - a home-based programme, so we go to them rather than they come to us. And, you know, we shouldn't be integrating it into our traditional rehab. Because we've got the traditional rehab. You know, we should be using it for the purpose that it was designed for.' Site 1*
	Fully remote delivery during COVID-19 pandemic	*'Have adapted to COVID situation by offering more remote contact to patients and selective home visits. After being redeployed and working in Telehealth for the last 2 months, consideration has been given as to how we can possibly incorporate telehealth monitoring in the future to support monitoring of our REACH patients whilst they are on the 12 week programme. eg. Weekly pulse, BP, weight, Sats measures. Our exercise physiologist team members have adopted a TUG test to use as an exercise assessment tool within the home for REACH visits.' Survey participant*
	Smoother enrolment onto programme	*'Whereas now, we actually send the manual out to them before we see them. And we asked them to make sure they try the DVD and or get online and are able to access the website okay and are able to read. We ask them to familiarize themselves with the content and what the programme entails. So we do that now, so we are much more prepared. So, we send them out the invite letter and the manual two weeks before we see them, to give them a chance to look at it. And, actually, we have had a few, who then turn around and said "No, we don't want to do it", even before they get to the assessment which then, you know, it's better for them and us because it means we don't go through the whole assessment and the walk test and then they say, actually, it's not for them. So, yeah, and for some of the patients as well, we will ring them beforehand, because they have lots of health issues and we do as much of the assessment over the phone as well. Just so we can troubleshoot before we see them. And then they get started on the programme, I think, more smoothly.' Site 2*

NPT construct	Facilitators	Quote
	Reduced home visits	*'So it's evolved really, but we are, we are doing in, pretty much, in the style intended. We maybe don't have as many home visits.' Site 3*
	Home/centre hybrid	*'We are sort of, I think, I've said way back at the beginning, that… there are maybe ways that… we are refining it already. That we think may be useful and sometimes in life… is a little bit of a hybrid, that you end up with, something where you're, sort of, between people who really just absolutely can only manage to do this on their own at home and other people with whom they really do still want a little bit of coming to the hospital in inverted commas for their... to receive their care. It's try to make sure that the patient feels that they're getting the best deal, really.* So, we actually did try different styles in order to try and have a lesser impact on the one-to-one nature of things. We thought we could, maybe, be more efficient, if we had three to six people come for the introductory explanation of the resources and a more general nature of introducing programme. They all still had our highly individual assessment and one-to-one interview, but we tried to incorporate a little bit of giving the information out in a small group fashion, which actually, let those who were keen to have a look at those social contact to have that as well..*' Site 3*
	Group centre-based programme	*'In a group and do it with someone face-to-face and then they have got that social aspect of it as well and the opportunity to, kind of, get feedback or ask any questions. I think if we could also, kind of, modify version to heart failure patients in which we could invite them into a group. I think, it would be much more attractive and cheaper and easier to implement. I think you should be able to have, you know… either offer them a home-programme or a version of it in a group setting. It is something that I have discussed with my manager and, I think, she would like to be able to offer a version so we could include just heart failure patients in cardiac rehab.' Site 2*
	Inspiration for better service delivery in general	*'I suppose, it is looking at how we can adapt from, you know, what we've seen through REACH-HF and what we can provide to those heart failure patients. Perhaps, with a larger audience and it might be that we do that through an application on a tablet or*

NPT construct	Facilitators	Quote
		a smartphone or something.' Site 2
	Amendments to REACH-HF resources	***Careful wording*** *– 'So, the resources, maybe, maybe the chair-based programme… I had some thoughts myself that, maybe, they didn't necessarily need to be called chair-based, it could, perhaps, be lightly refashioned in the name.' Site 3* ***Simplified version of exercises*** *– 'Other people… they weren't, sort of, so much concerned about that, but they didn't actually want… such a big thing to deal with, they basically just wanted a much smaller set of exercises to do. So, we have, actually, talked a bit about whether it might be useful to have a supplementary illustrated booklet, with just provided a little synopsis of some of the exercises, a little bit like we do ourselves. Which for those who don't really want to labour through all the different levels or who simply don't have the wherewithal to, sort of, cope with doing that, they're quite keen on… when we give them a little illustrated booklet of exercise. They, sort of, latch on to that. Site 3* ***Online resources*** *– 'They just want to be able to access it, you know, on the tablet or the laptop. Because then people with visual impairments can make the print bigger.' Site 2*
Non-NPT facilitators		
Patient-level factors	Simplified version of exercises	*'In some of the patients, who are much more complicated maybe with rheumatoid arthritis and other co-pathologies, they've resorted back to not wanting to have a… too challenging a programme to follow. They want a more simple format of some exercises to do and to repeat. So, we had to resort, for some of them, and just giving them basic exercise leaflets again. Because of them not wanting to do the excer… the chair-based programme. And they haven't, maybe, been able enough to really take on the walking programme as their only activity plan, you know, they need some supplementary exercise.' Site 3*
	Overcoming technological issues	*'We've just purchased some DVD players as well, so that we can, kind of, go out if they haven't got a DVD player, we can loan them one.' Site 1*

NPT construct	Facilitators	Quote
		'A lot of patients we had in clinics they've got smartphones, so when we see them in clinics, we've actually download the website for them and save it onto their phone. So we are doing that as well. So we are becoming IT technicians as well.' Site 2
	Expectations and preferences	**Preference for home-based programme –** '*I think, obviously, going out into, into their home and being able to speak to them in their environment, where they are comfortable, with family, friend or carer that will, obviously, help them.' Site 1* **Motivation for home-based programme** – *'And I think they [patients] were motivated, they were. And that helps'. Site 1*
Geographical factors	Size and type of patch	***Small catchment area*** *'A much smaller geographical area, so it will be easier for them to manage.' Site 2* ***Availability of transport*** *'It might be easier with a better transport links.' Site 2*

NPT = Normalisation Process theory; REACH-HF = The Rehabilitation EnAblement in CHronic Heart Failure

1. Differentiation

All interviewed participants had a good grasp of the difference between the usual service delivery and the REACH-HF programme (differentiation); the most frequently quoted distinction between REACH-HF and prior service delivery was seeing patients in their homes.

2. Communal specification

Mostly, interviewees confirmed a good grasp of the purpose of the intervention amongst members of the wider team (communal specification). The participants were aware of a service provision gap and healthcare inequity affecting heart failure patients. There was agreement amongst participants that REACH-HF added important value to their services. Effective dissemination of the purpose of the intervention following the initial training was an important part of developing differentiation and communal specification. There was agreement between interviewees that the more people that know about the programme the better. Tasks associated with building the communal specification were seen as the responsibility of the REACH-HF practitioners who attended the initial training. Staff working at Site1 had a very clear vision for the intervention – offering it to patients who were not able to attend centre-based programmes. The only identified barrier linked to the communal specification was initial confusion about patient criteria.

3. Individual specification

Staff at all Beacon Sites spoke about a period of trial-and-error at the beginning of the implementation process when they were trying to make sense of the work and specific tasks required to deliver REACH-HF (individual specification). Over time the initial teething difficulties were mostly replaced with clear procedures and efficiency.

4. Internalisation

All participants had a good grasp of the value of the intervention concerning the heart failure

population (internalisation).

5. Initiation

There were differences between the sites in terms of who or what was driving the implementation forward (initiation). At Site 1 champions included the whole of the team. At Site 2, it was the organisation that was propelling the implementation forward. Incidentally, the strong organisational push at Site 2 resulted in a lack of buy-in from the REACH-HF facilitators in this site. At Site 3 the three REACH-HF facilitators were the main driving force behind the intervention, followed by a heart failure nurse running a community-based support group. At Site 4, initially, there was just a single individual who took on the role of a champion, this person was joined by a newly trained member of the team a few months following the initial training. All participants agreed that the potential referrers, most often heart failure nurses, were an important part of the initiation process.

6. Enrolment

Several different reasons were highlighted in the Beacon Sites when it comes to each team's capacity and willingness to implement REACH-HF (enrolment). The main barrier to enrolment was being in a routine of delivering group centre-based programmes, followed by the REACH-HF programme being implemented alongside the usual service delivery, leading to the team being stretched. Another barrier to enrolment was low team morale and lack of enthusiasm for the programme, albeit the two latter barriers got better with time.

> *'Now we are in a different place, so it's not quite as negative as it was first perceived.' Site 2*
>
> *'Change takes time with some people, some people move a little bit faster than others in accepting change and new ways of working.' Site 4*

One interviewee emphasised that enrolment can also be negatively impacted by healthcare

professionals experiencing challenging personal circumstances.

There was a very strong endorsement for the intervention amongst the wider team at Sites 1 and 3. The ability of staff to buy-in to the intervention was positively impacted by having an interest in heart failure and effective communication. The latter included communication within the cardiac rehabilitation team and between cardiac rehabilitation and heart failure teams. Poor communication, particularly with heart failure nurses, had a very detrimental effect on the implementation process at Site 4. Due to a lack of referrals, staff working in this site treated only a handful of patients and struggled to get the programme off the ground.

7. Legitimisation

Participants at Sites 1 and 3 felt very positive about their involvement in the REACH-HF project (legitimisation). We identified an initial hesitation about being part of the project at Site 2 (linked with a strong push from the organisation to implement the programme and a diminished capacity within the team), however the initial hesitation about being involved in the project got better over time.

A stronger legitimisation was linked with healthcare professionals feeling positive about the challenge. Being part of an innovative team and prior experiences of dealing with change were factors that can strengthen legitimisation. These were identified at Site 1 only.

8. Activation

Levels of activation varied between sites, ranging from hoping that REACH-HF would be part of the service going forward at Site 1, watchful waiting at Site 3, perception of the intervention in its current format as being not implementable at Site 2 and looking forward to re-engaging with the innovation post-COVID-19 at Site 4.

9. Interactional workability

Interviewees across the Beacon Sites were unanimous that offering REACH-HF required additional time and was more costly compared to group centre-based programmes (interactional workability). Interestingly, a participant at Site 4 concluded that these factors should not be the reason for not offering REACH-HF to patients.

> *'For the small number of patients that we've had, it probably was more labour intensive than we had anticipated, but, I think, we shouldn't use that as our reason for not delivering that type of programme.' Site 4*

Different reasons were attributed to the diminished interactional workability. They included offering REACH-HF to older frailer patients who might need additional support with exercise prescription and the use of technology, covering a large geographical area, and transport issues. An additional administrative burden involved in offering REACH-HF was identified at Site 2. This increase in administrative tasks was linked with a more elaborate way of setting patients on the programme, which included posting manuals before the assessment session and making sure that they were able to access the chair-based exercises in advance.

Over time, interviewees gained a more balanced perspective of the resources involved in delivering REACH-HF and they were able to justify offering REACH-HF despite the additional resources involved. The interviewee at Site 4 reflected on the impact of the COVID-19 pandemic and how the temporary change in service provision during this challenging time positively impacted the interactional workability of the innovation, as cardiac rehabilitation teams are now more open and able to engage with technology and use alternative models of delivery.

Additionally, interactional workability was improved when there was a good fit between the service and the innovation, and the innovation and the patient, for example, Site 1 was already accepting heart failure patients and staff working at Site 3 were used to using a self-management style of cardiac rehabilitation.

10. Relational integration

Trust in the programme and each other (relational integration) was linked with the interviewees' opinions of the REACH-HF resources. Some were negative, for example, perceiving DVDs as an outdated mode of communication, experiencing technical problems and perceiving the REACH-HF manual as too long. Some were positive, for example, perceiving the length of the REACH-HF manual as about right and appreciating the ability to involve a patient's family and friends in the programme with the friends and family resource. Trust in the REACH-HF intervention and the team was the most evident at Site 1.

Offering ongoing support to each other (a form of REACH-HF peer supervision) was seen as a way of improving relational integration in most sites. Interestingly, having a very high opinion of the established centre-based group programmes (a belief that they are safer and superior to home-based programmes) was a barrier to relational integration in the Beacon Sites. Developing a more balanced perspective on the centre-based provision had a positive impact on the relational integration, for example, acknowledging that complex multimorbid patients require additional support during centre-based classes and that attending such sessions creates an unnecessary burden on the individual.

11. Skills and workability

Interviewees were unanimous that the right people were trained and tasked with the implementation of REACH-HF in the Beacon Sites (skills and workability). Several important

factors for selecting individuals to undertake the REACH-HF training were identified. They included allowing self-selection, choosing individuals with positive personal qualities and experience of working with multimorbid patients, and training more than one individual. We also identified a preference for home visits as a potential facilitator and a dislike of lone working as a barrier. A skill combination of cardiac rehabilitation, physiotherapy/exercise physiology and heart failure was seen as the most potent mix for successful implementation. The proximity of relationship between a cardiac rehabilitation team and a local heart failure team was perceived as a potential barrier if it was lacking or a facilitator if it was a strong well-established working connection.

Interviewees across the sites were also unanimous that the training was not correctly pitched to the skills and experiences of healthcare professionals being trained/undertaking it. The suggested improvements to the training included making it more practical, more emphasis on the exercise prescription component, input from previous implementers, a shorter modular online version of the training, and having access to more in-depth pre-training activities.

12. Contextual integration

Interviewees reported varied levels of support and availability of resources in their services (contextual integration). The main barrier relating to contextual integration was a lack of time allocation. Being given protected time to deliver REACH-HF was a facilitator reported by most interviewees. Another consistent barrier to implementation reported across the Beacon Sites was being understaffed. The lack of staff was exacerbated by periods of sickness.

A lack of commissioning to deliver cardiac rehabilitation to heart failure patients was an

important barrier at Site 2, whereas at Site 1 the commissioning structure (a block contract arrangement) was perceived as a facilitator – being a block contractor allows more flexibility in how the service is delivered.

Support from the management was another facilitator related to strong contextual integration. Managers working at Site 1 were particularly proactive in trying to mitigate contextual integration challenges. This included securing additional funding, redesigning the service and offering flexible cardiac rehabilitation.

13. Systematisation

Different approaches to evaluation were reported between clinicians and managers (systematisation). The interviewed REACH-HF practitioners employed more reflective, informal evaluation techniques – the lack of time prevented them from engaging in more in-depth, planned evaluation tasks. These were seen as the responsibility of the management team. The interviewed managers and service leads used more formal approaches to evaluation (e.g. looking at key performance indicators or comparing patient data and outcomes).

14. Communal appraisal

Following the initial implementation challenges, most interviewees developed a more balanced view of the intervention and the implementation process (communal appraisal).

15. Individual appraisal

An increase in job satisfaction and continuous professional development were reported as facilitators relating to individual appraisal. Positive feedback from patients further strengthened the individual appraisal in all Beacon Sites.

16. Reconfiguration

The delivery of the REACH-HF intervention can be adapted to better suit the way services are run (reconfiguration). Interviewees described different levels of reconfiguration as follows – a fully home-based programme (suggested by participants at Site 1 only), improved enrolment process, offering fewer home visits, home/centre hybrid, adapting the programme to a group centre-based programme and using the REACH-HF project as an inspiration for better service delivery in general.

The Beacon Site project took place partly during the COVID-19 pandemic. Site 1 was the only Site that continued delivering the programme during the lockdowns; this period of forced reconfiguration (due to social distancing and shielding measures) meant that the programme was delivered fully remotely. This included offering longer telephone or video assessments and using the titration method to establish the baseline exercise capacity. Most of the staff from the remaining three sites were redeployed to the COVID-19 frontline.

Reconfigurations also included amendments to the REACH-HF resources. Suggested improvements involved adapting some of the wording in the manual (i.e. replacing chair-based exercises with a more neutral term), having a simplified paper version of exercises and making the manual available online.

Figure 1. Dynamic interactions between model's components