



EVALUATION OF IV DIURETICS PILOT FINAL REPORT FOR



August 2014

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EXECUTIVE SUMMARY

People living with Heart Failure, and whose symptoms of heart failure fail to improve using oral diuretics, would most likely be admitted to hospital to receive diuretic treatment intravenously.

UK health policy is shifting towards care being provided as close to home as possible. This is driven by the twin priorities of improving quality and cost-effectiveness. Given this emerging policy direction, the British Heart Foundation wanted to examine the potential to deliver intravenous (IV) Furosemide in the home (or close to home, with patients returning home each day). A number of factors were perceived to be significant barriers to this happening without some form of external support or intervention:

- ★ the very limited evidence base on the treatment's effectiveness and safety in a home setting
- ★ the lack of appropriate or sufficient community infrastructure
- ★ an absence of practical, proven examples of how to make the treatment work in practice, despite a variety of service development models being explored by individual NHS organisations

Therefore, BHF funded a pilot to enable a number of NHS organisations (listed below) to implement and evaluate community-based IV diuretics over a two year period:

- | | |
|---|--|
| ★ Aneurin Bevan Health Board | ★ NHS Greater Glasgow and Clyde |
| ★ NHS Ayrshire and Arran | ★ NHS Leeds Community Healthcare |
| ★ Dudley Community Services | ★ Nottingham Citicare Partnership |
| ★ South Durham and Darlington Community Health Services | ★ Nottingham West Consortium |
| ★ East Sussex Hospitals Trust | ★ Staffordshire and Stoke on Trent Partnership Trust |

These sites provide a mix of urban and rural settings, as well as a number of different delivery models.

Whilst the steering group for the pilot provided guidance on patient eligibility and dosing protocols which gave guidance on parameters for treatment, each site developed its own version of the protocol which was subject to local governance. Patients received either once or twice daily bolus dose, usually via peripheral IV line. Doses were usually stepped, and ranged from 40mg to 250mg.

Brightpurpose was commissioned to conduct an independent evaluation of the pilot, to capture learning and to evaluate whether the service could be delivered effectively in the home setting.

Purpose of the evaluation

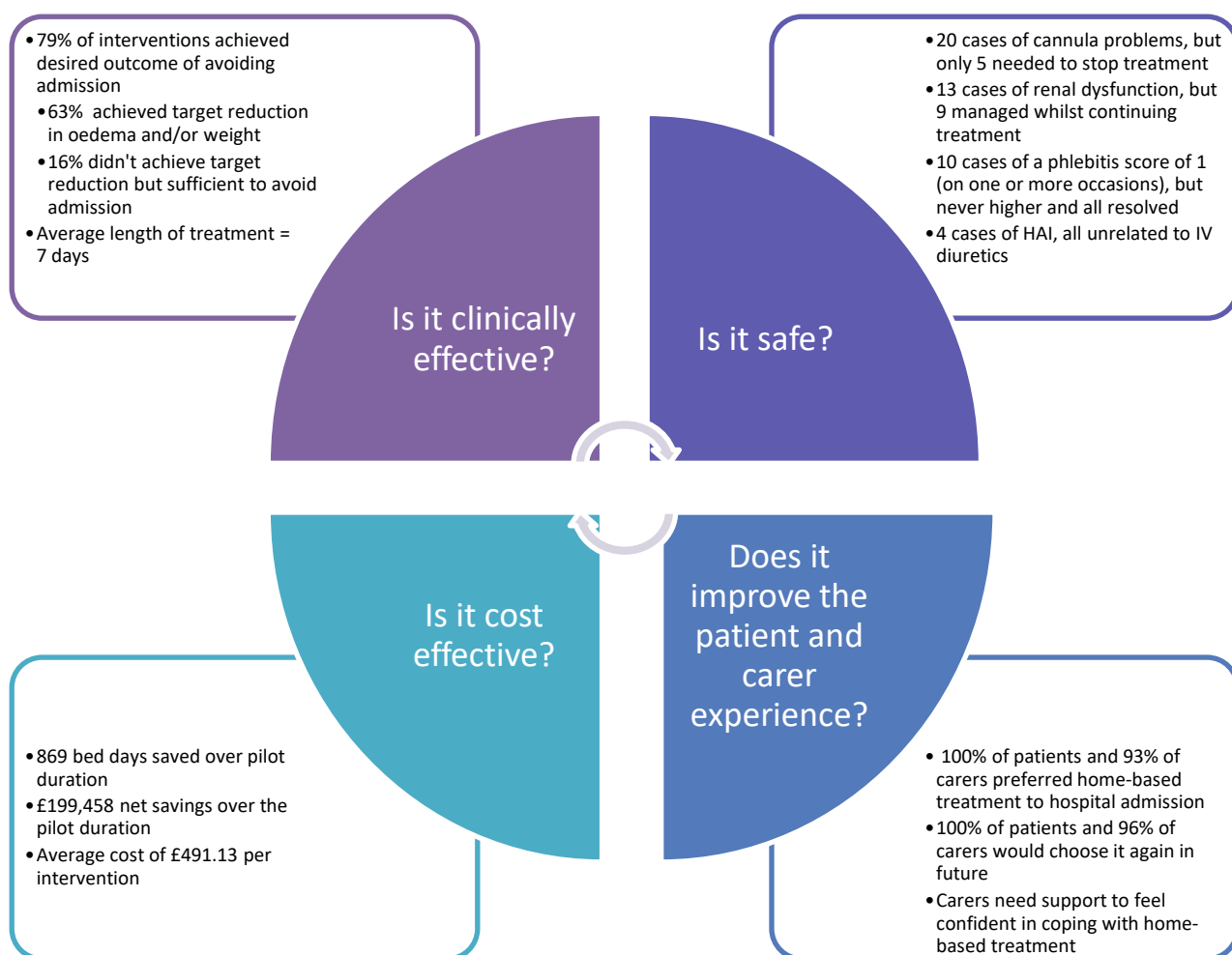
The evaluation of the IV diuretics pilot was a service evaluation, not a clinical trial. The core evaluation question was this: is home-based IV diuretics effective? The evaluation considered four components of effectiveness:

- ★ is it clinically effective?
- ★ is it safe?
- ★ does it improve the patient and carer experience?
- ★ is it cost effective?

In addition, the evaluation examined the sustainability of the service, the wider impacts and added value of the service (for example on the skills and knowledge of patients, carers and health care professionals), and the practical lessons for setting up an IV diuretics service in a home/community setting.

Is home-based IV diuretics effective?

126 IV diuretics interventions were administered during the pilot to a total of 96 patients. Our findings indicate that home-based IV diuretics is effective across all four components of effectiveness being evaluated:



Of the 26 interventions requiring admission:

- ★ eight were unrelated to either IV diuretics treatment or the home-based nature of the treatment

- ★ eight were as a result of insufficient response to IV diuretics – these patients were admitted for higher dose IV diuretics than would be possible under current home-treatment protocols
- ★ only one patient needed to be admitted because they were unable to cope with the treatment at home
- ★ nine were related to the effects of IV diuretics treatment such as renal dysfunction

27% of patients treated with home-based IV diuretics lived alone; this was unexpected and demonstrates the viability of delivering to people living on their own. However, support is required by carers, whether they live with the person being treated or not, to enable them to feel confident in being able to cope with home-based treatment.

Sustaining home-based IV diuretics

Whilst the pilot projects were set up as stand-alone home-based IV diuretics, they have naturally developed into integrated parts of wider heart failure care packages. These tend to combine provision of diuretic treatment by a number of methods and in a variety of different settings, to best meet the needs of each individual patient. Our findings indicate that this integrated approach is the route to sustainability.

Ten reasons to introduce IV diuretics in a community setting

8 of the ten pilot sites have continued (or will continue, once their funding period is complete) to provide home-based IV diuretics as part of their service to people with heart failure. There are compelling reasons to introduce and sustain such a service in that it:

- 1 aligns with the NHS policy direction of locating services as close to the patient as possible, and supports delivery of key outcomes such as the Cardiovascular Outcomes Framework
- 2 aligns with most patients' and carers' preferred place of care, and can be delivered to patients who live alone as well as those living with a carer
- 3 is clinically effective in the vast majority of cases
- 4 is safe, and appears to present no additional risks compared with in-patient IV diuretics; however, clinical governance arrangements need to be robust
- 5 avoids admissions in the vast majority of cases
- 6 is considerably less expensive to deliver than in-patient IV diuretics
- 7 encourages the development of an integrated approach to care
- 8 acts as a catalyst for proactive and holistic management of heart failure patients, including optimising treatment and ensuring wider care needs are assessed and met
- 9 improves patients' and carers' knowledge about heart failure and encourages them to manage the condition more effectively
- 10 further develops the skills competencies and knowledge of community Heart Failure Nurse Service teams and of other community based teams involved (eg district nursing)

Ten learning points for successful introduction of IV diuretics in the community setting

The pilot has generated a great deal of learning about what is required to set up and deliver a successful service:

- 1 dedicated resource is a significant enabler to developing and starting up the service (the pilot sites had a half time post and this was sufficient)
- 2 allow six months for the development and start-up phase – this includes defining and gaining agreement to protocols, raising awareness of the service and upskilling staff in the use of cannulas and pumps
- 3 community-based IV diuretics will not be right for every patient; consider integrating the service with other complementary services such as community-based subcutaneous diuretics, delivery of non-oral diuretics in ambulatory units or delivery of other community-based IV services such as antibiotics – this will also enhance the sustainability of the service
- 4 the average length of intervention was 7 days, but some interventions will take considerably longer (the highest length of a single intervention during the pilot was 32 days); this will need to be accounted for in terms of workload planning, logistics and capacity
- 5 a seven day service is not essential to provide an effective home based IV diuretic service; the majority of pilots delivered their service over a 5 day period with patients reverting to oral medication over the weekend
- 6 sharing roles and responsibilities for the service across the team can help minimise capacity challenges; where possible consider integrating with other teams to spread the load even further
- 7 the logistics of offering home-based IV diuretics in large rural geographies are more challenging than in the urban setting; a team approach is essential to make it a viable treatment option
- 8 do not be surprised if patient numbers aren't as high as expected – not all patients are suitable; in addition, in some cases, the comprehensive assessment to be considered for IV diuretics in the home will lead to some patients not requiring IV treatment, by having their oral diuretics optimised
- 9 given relatively low patient numbers, maintaining competence in cannula insertion can be a challenge; staff need to be regularly involved in delivery of the treatment to maintain competence, and where possible it is helpful to have back-up support that staff can call upon when they are having particular difficulties with inserting a cannula
- 10 the evaluation has not revealed an optimal dosage level, nor an optimal length of treatment; however it has demonstrated that higher doses (up to 250mg) can be administered safely in a home setting

1 INTRODUCTION

With an ageing population, more and more people are living with heart failure. One of the consequences of heart failure can be progressive fluid retention, which is usually treated with oral diuretics such as furosemide. On occasions, a patient's fluid retention becomes problematic and they stop responding to their oral diuretics; this results in increasing oedema and breathlessness. Intravenous (IV) diuretics may be needed to reduce the patient's fluid retention and breathlessness. In most parts of the UK, IV diuretic therapy currently requires an in-patient stay, and many patients who need IV diuretics have repeated and prolonged admissions for recurrent episodes.

Health policy throughout the UK is increasingly geared towards moving care away from hospital and closer to patient's homes. In particular the Department of Health's Cardiovascular Disease Outcomes Strategy describes an ambition for improved outcomes, stating that:

"improving outcomes is not just about reducing mortality, it is also about improving people's quality of life, their experience of care and the safety of that care. While improving quality of care, we also need to look at cost effectiveness, so that we can help reduce costs at the same time as improving quality"

Given this clear policy direction, the British Heart Foundation (BHF) wanted to examine the potential to deliver IV diuretics in the home (or close to home, with patients returning home each day). This was in response to a number of factors that appeared to be acting as barriers to home-based treatment:

- ★ the lack of appropriate or sufficient community infrastructure, which makes it challenging to deliver IV diuretics in the home
- ★ the limited evidence base on its effectiveness and safety, which can make it difficult for NHS organisations to build a business case to adopt such an approach

Consequently, BHF funded a pilot to enable a number of NHS organisations (listed below) to implement and evaluate community-based IV diuretics over a two year period. The funding has given them the opportunity to develop and test the approach and – if successful – embed it in everyday practice. The pilot has also given BHF the opportunity to strengthen the evidence base.

The pilot sites involved in the programme changed over time, with two sites withdrawing as a result of staffing and logistical issues. Those which completed or are in the process of completing their pilot projects are:

- ★ Aneurin Bevan Health Board
- ★ NHS Ayrshire and Arran
- ★ Dudley Community Services
- ★ South Durham and Darlington Community Health Services
- ★ East Sussex Hospitals Trust
- ★ NHS Greater Glasgow and Clyde
- ★ NHS Leeds Community Healthcare
- ★ Nottingham Citicare Partnership
- ★ Nottingham West Consortium
- ★ Staffordshire and Stoke on Trent Partnership Trust

A steering group for the pilot, made up of BHF staff and healthcare professionals (HCPs) with a specialist interest and expertise in heart failure, provided guidance on patient eligibility and dosing protocols. Whilst this guidance provided parameters for treatment, each site developed a locally-adapted version of the protocol which was

subject to local governance. However, there were a number of core aspects of the guidance which were fixed for all sites:

- ★ all patients must already be diagnosed with heart failure
- ★ diuretics must be administered intravenously (note some sites are delivering both IV and subcutaneous diuretics, but only IV administration is within scope of the evaluation)
- ★ patients may receive their IV diuretics in their home or another community setting, such as hospice day care or community hospital day care¹

As this was a significant service development, with the potential to be rolled-out widely if successful, BHF commissioned Brightpurpose to conduct an independent service evaluation of the pilot. The purpose of the evaluation was to capture the learning from each pilot site's development and implementation phases and to answer the following questions about effectiveness:

- ★ is it clinically effective?
- ★ is it safe?
- ★ does it improve the patient and carer experience?
- ★ is it cost effective?

In addition the evaluation examined the sustainability of providing IV diuretics in the community, and the impact of the service on improving the knowledge and skills of patients, carers and HCPs. The evaluation assessed the extent to which the service led to avoidance of hospital admissions, and this is reflected in the assessment of cost effectiveness.

A first interim report in 2012 looked primarily at the development and start-up phase, as pilots prepared to accept patients. A second interim report in 2013 assessed the emerging findings about the four components of effectiveness listed above, and reported on the practical learning points that could be taken from the pilot to date. This final evaluation report brings together the findings from all phases of the evaluation, including data collection up to the end of February 2014.

Some sites experienced significant challenges in getting their services up and running, so not all sites have developed at the same rate. Indeed whilst several have now reached the end of their funded period, others still have some months to go before their pilot funding ends. The evaluation period was extended to ensure the maximum possible data informed the final evaluation report whilst ensuring data and learning was still sufficiently current to influence policy and practice.

¹ Where patients receive their IV diuretics dose somewhere other than at home, they must be treated as a day patient and must stay at home overnight.

The diagram below provides a summary of our method used to deliver the evaluation. Each aspect is discussed in the following sections:



A phase of desk review was then undertaken to review all the relevant background information and documentation relating to the pilot. Following the desk review phase short telephone interviews were conducted with a representative for each site participating in the pilot, to introduce the evaluation and understand the background context and progress from each site.

2.2 Recruitment of expert panel

To assist with and inform the design of the evaluation we then recruited an expert panel, made up of staff working in the pilot sites. These staff volunteered to participate in a short-life virtual panel, to act as a sounding board during the design of the evaluation, by:

- ★ informing and reviewing questionnaires, interview proformas and monitoring tools for the evaluation
- ★ suggesting the best and most appropriate methods of engagement with staff, patients and carers
- ★ providing expert knowledge gained through their own experiences

2.3 Design of research framework

With input from the expert panel, we then designed the research framework. The research framework set out:

- ★ what we were evaluating (the key 'exam questions')
- ★ who we would consult with and how
- ★ sampling and segmentation – selection of case study and non-case study sites
- ★ topics for investigation with each group (including detailed topic guides and evaluation tools)
- ★ data monitoring and collection tools
- ★ an evaluation timetable

Patient and carer questionnaires were designed to assess their satisfaction with the service and the impact of the home-based IV diuretics service on their quality of life. Our initial intention had been to use validated tools to measure quality of life, such as the Modified Carer Strain Index and the SF12. However, a review of these and other potential validated tools revealed that many of the questions were not suited to assessing the impact of a short-lived intervention such as IV diuretics, especially against a backdrop of the patients' ongoing condition and the carers' continuing caring responsibilities, which would be very difficult to separate from the effects of the IV diuretics treatment. In addition, these tools did not necessarily ask the right questions to answer the evaluation questions. Therefore, with the agreement of the steering group, and subsequent validation of the approach by the NHS Quality, Innovation, Productivity and Prevention programme (QIPP), we created questionnaires that drew the most relevant questions from appropriate validated tools, supplemented by questions designed to answer specific evaluation questions.

2.4 Pilot research tools

We used the first case study site visit to pilot the research tools to ensure they were fit for purpose.

2.5 First phase fieldwork

Eight sites were selected as case study sites with the remaining sites being involved in lighter touch research. We explain what was involved in each of the following sections. All sites involved in the pilot sent the evaluation team a monthly return, which included anonymous data in relation to patients going through the pilot and details of their treatment process and outcomes.

As the pilot progressed, there was significant interest from other NHS organisations which wanted to implement community-based IV diuretics. The steering group agreed to share BHF's guidance with several other NHS organisations with the provisos that:

- ★ the guidance was still under evaluation

- ★ the organisations agreed to participate in the evaluation

Their involvement in the evaluation was limited to telephone interviews examining how they implemented the guidance and the learning from their experiences, and did not include assessment of patient data. These organisations were referred to as 'supplementary sites' in the report and included:

- ★ Phase 2 fieldwork
 - Berkshire Healthcare Foundation
 - Southern Health NHS Foundation Trust
 - Buckinghamshire Healthcare Trust
- ★ Phase 3 (final) fieldwork
 - South Eastern Health and Social Care Trust (NI)
 - Buckinghamshire Healthcare Trust
 - Southern Health NHS Foundation Trust
 - Berkshire Healthcare Foundation

2.5.1 Case studies

A member of the evaluation team spent a day on-site with each of the eight case study sites. During the visit they met with and interviewed:

- ★ the pilot lead
- ★ a range of staff involved in the set up and delivery of the pilot
- ★ local NHS leadership (service managers, lead clinicians, commissioners)

At one site we were also able to meet with the carers of two patients who had received IV diuretics at home

Detailed case studies for each site are can be found in appendix 1.

2.5.2 Lighter touch research

With the lighter touch research, the same key people at each site were interviewed and the same consultation tools used but the interviews were conducted by telephone rather than face-to-face.

2.5.3 Patient data collection

Alongside the fieldwork, we collated and analysed:

- ★ detailed patient monitoring records for every intervention, which provided data on dosage, symptoms, clinical signs, renal function, safety and outcomes
- ★ patient and carer satisfaction questionnaires

In some cases the data provided in the patient monitoring records was incomplete. In addition, some patients and carers did not complete the survey questionnaires.

2.6 Second phase fieldwork

The format for our second phase fieldwork was the same as in the first phase, however the focus of the questioning was on progress to date, learning, the extent to which the pilot was building capacity within other local services and how the service might be embedded beyond the funded period.

2.7 Final phase fieldwork

The format for our final phase fieldwork was slightly different to that of the first two phases. Whereas in the previous phases all case study sites were visited by a member of the evaluation team, this time, if the site had completed the pilot, telephone consultation was carried out with the lead staff. Where sites were still in their pilot funding period we visited them (regardless of whether they had previously been case study sites) as described in section 2.5.1. All other aspects of the fieldwork remained the same as in previous phases.

2.8 Analysis and reporting

We brought together all the findings and data from the previous stages of the evaluation for a team analysis session. Following the analysis session this draft report was produced.

2.9 Learning workshops

The evaluation team also facilitated a series of learning workshops, involving staff from all the pilot sites and the BHF steering group. The purpose of these workshops was to bring all the sites involved in the pilot together, to give them an opportunity to share their experiences and learning and discuss any shared issues or challenges. For the most recent workshop, an invitation was also extended to sites that had expressed an interest in the evaluation or in implementing IV diuretics in the community, so that they could learn from the experiences of the pilots.

2.10 Additional research

2.10.1 Subcutaneous diuretics

During the course of the evaluation, there was increasing interest in the use of subcutaneous diuretics in the community, as a potential additional option for patients where appropriate. BHF commissioned Brightpurpose to undertake a scoping study, to establish the scale of interest and current levels of implementation, and to examine the effectiveness of subcutaneous diuretics in a community setting. A separate report provides detailed findings, but relevant findings are also included in this report where appropriate.

2.10.2 Comparing IV diuretics in the home with delivery in the hospital

In order to be able to draw more meaningful conclusions about safety and effectiveness, it was important to be able to compare outcomes from home-based IV diuretics with similar treatments provided in the hospital setting. Whilst the cardiology specialist advisers on the evaluation team, and clinicians on the pilot steering group, were able to provide anecdotal evidence for this purpose, BHF also commissioned Brightpurpose to collect and analyse a small amount of comparative data from two NHS organisations. A separate report provides detailed findings, but relevant findings are also included in this report where appropriate.

3 PATIENT DATA PROFILE

This chapter looks at the patients who have been treated in the pilots and their backgrounds. This informs Chapter 4, which explores what we can determine about the effectiveness of the home-based IV diuretics pilot.

Throughout this report the data presented is for a small number of patients treated at different sites, each using slightly different methods of treatment. In addition, while patients were generally all very ill, they varied widely in age, severity of their conditions, co-morbidities, medications and tolerances. While the report explores the trends, impact and effectiveness of the different treatment modalities, it is important to understand that this research is a service evaluation and not a clinical trial. Due to the small numbers of patients treated using different methods, it is not possible to draw scientifically significant conclusions about which treatment models are most effective and why. This section presents trends and differences in the outcomes and experiences of different delivery models used. However, further exploration will be required to conclusively prove differences in outcomes due to treatment method.

3.1 Patient numbers

96 patients had received IV diuretics through the pilot between September 2011 and the end of February 2014. 19 patients received multiple treatments during the pilot. Details of one patient's treatments were archived following the patient's death and the intervention records have not been included. Therefore when we look at patient demographics and background $n=96$. When we look at clinical outcomes $n=126$.

The table below shows the spread of patients across the pilot sites:

Pilot site	Number of patients treated	Total number of interventions
Leeds	20	23
Dudley	19	23
Hastings	15	30
Aneurin Bevan	13	14
Ayrshire and Arran	10	11
Nottingham City	5	8
Durham and Darlington	4	6
Stoke	4	5
Glasgow	4	4
Nottingham West	2	2
All sites	96	126

83% of interventions were delivered within the patient's own home. Eight patients were treated in Community hospital day care units and four patients were treated between the community hospital day care centres and their own home. One of these patients was treated at a community hospital day care unit in Aneurin Bevan, and all other patients who received IV Diuretics treatments in community hospital day care centres were part of the Hastings pilot. Five patients were treated in acute hospital day care units and one patient was treated between the acute hospital day care unit and their home. All patients who received IV Diuretics treatment at acute hospital day care units were part of the Hastings pilot. A full breakdown of the location of patient treatments is provided in the table below.

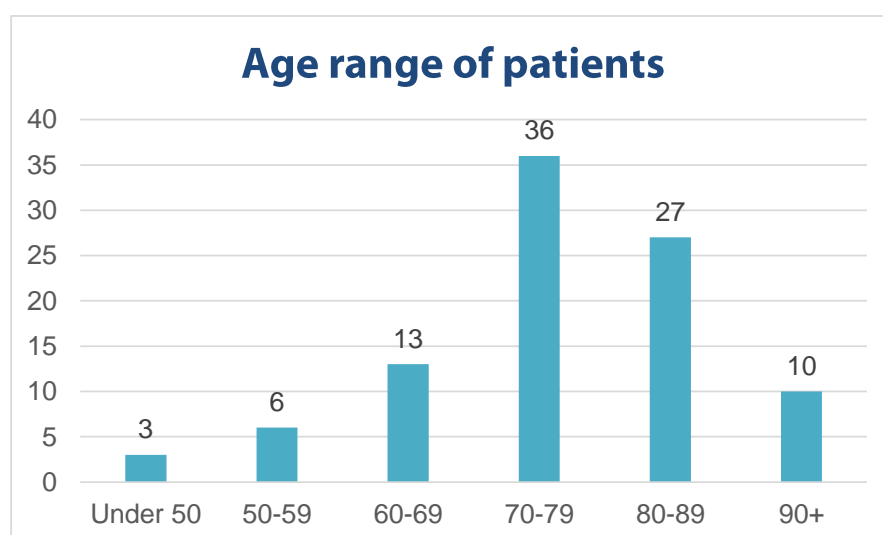
Location of treatment	Number of interventions
Home	105
Community hospital day care	8
Acute hospital day care	5
Mix of home treatment and Community Hospital Day Care	4
Home/residential care	3
Mix of home treatment and Acute Hospital Day Care	1

It is important to note that patients accessing day care services returned to their own home following treatment and in this way still freed up hospital bed spaces.

3.2 Patient age and clinical background

3.2.1 Age

The average age of patients treated on the pilot was 75. The table below shows the age groups most commonly treated were patients aged 70-79 and 80-89 highlighting that the majority of patients requiring IV diuretics treatments were older individuals.



3.2.2 Diagnosis and co-morbidities

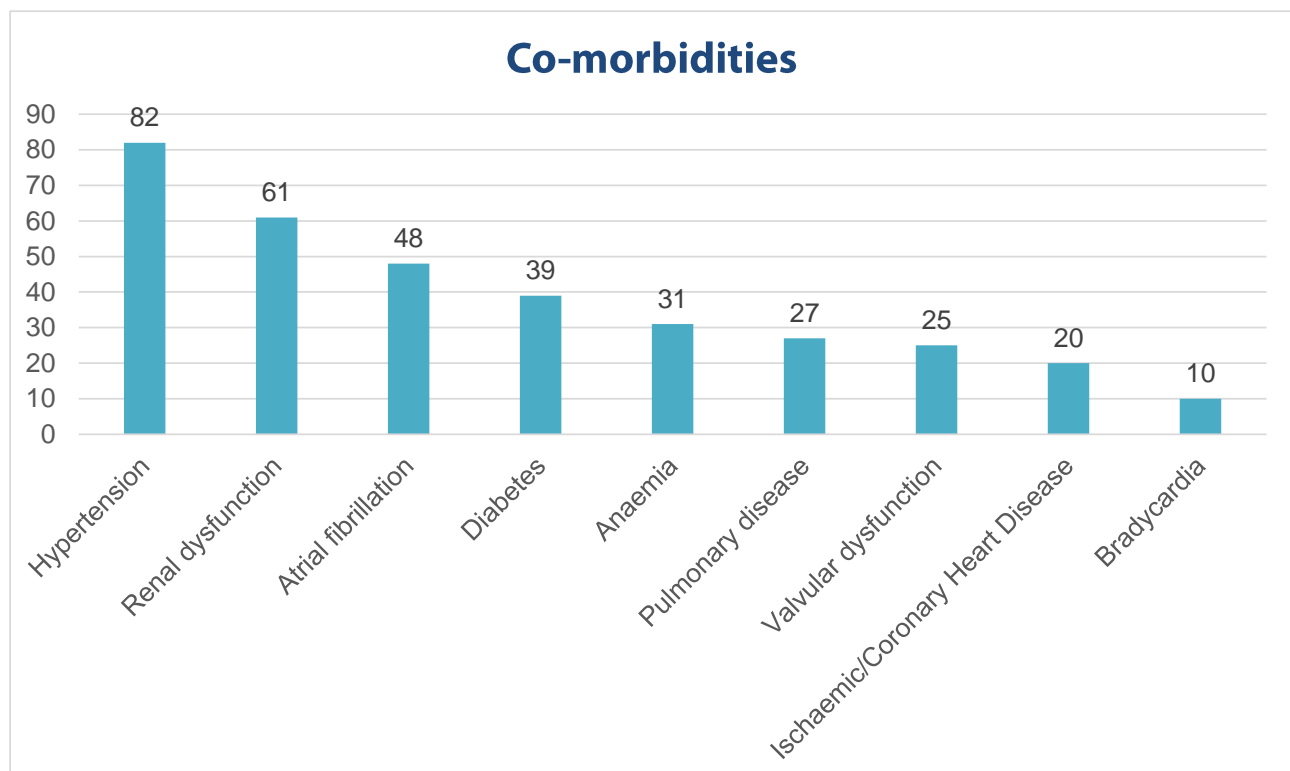
All patients had already been diagnosed with heart failure which was a condition of admittance to the pilot. 85 patients (89%) had confirmed left ventricular systolic dysfunction (LVSD). Of the ten patients (10%) that did not have LVSD, four had Heart Failure with Preserved Ejection Fraction (HFPEF). For one patient (1%), whether or not they had LVSD was not documented.

Staff also recorded the primary aetiology of the conditions of 92 patients (96%). 55% had ischaemic heart disease as their primary aetiology.

Aetiology	Number of patients
Ischaemic heart disease	53
Multiple	13
Valvular	8
Cardiomyopathy	4
Heart failure with preserved ejection fraction	4
Atrial Fibrillation	3
Hypertension	2
Right ventricular dysfunction	2
Arrhythmia	1
Pulmonary hypertension	1
Unknown	4

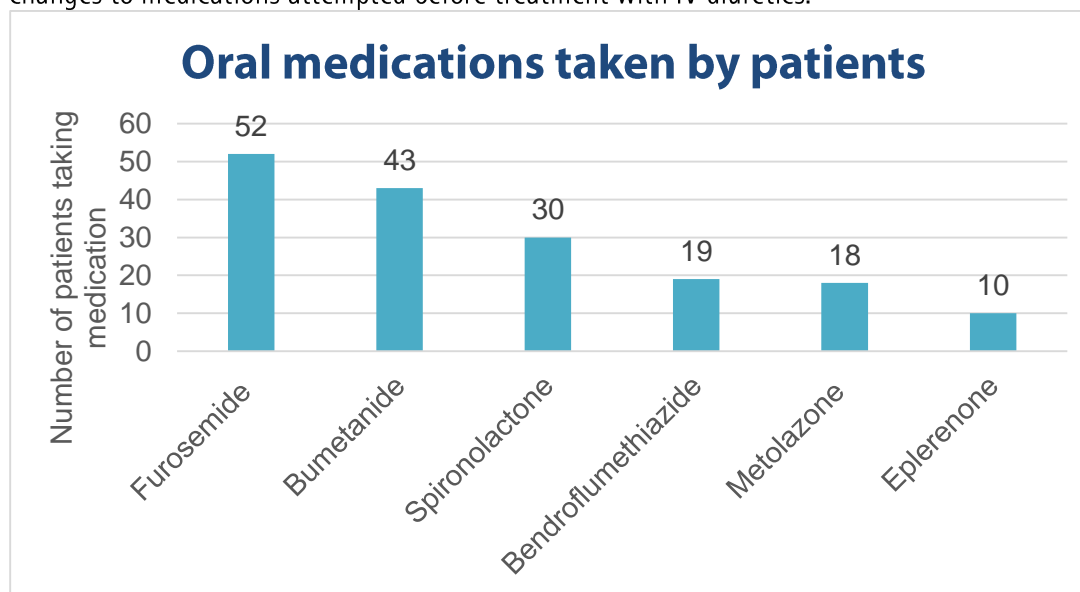
No further information is available for the four patients with unknown aetiology, as their medical records are no longer accessible by the pilot staff.

Almost all patients had a wide range of co-morbidities as might be expected in this patient group. These co-morbidities were additional to the primary aetiology detailed for each patient. The median number of co-morbidities was five per patient, highlighting that this group of individuals might be considered typical of heart failure patients in need of IV diuretics. Only one patient had no co-morbidities. The graph below shows the most common co-morbidities:



3.2.3 Baseline medications

The graph below shows the range of oral diuretic medications patients were receiving prior to their home-based IV diuretics treatment. Section 4.1.1 provides further details about the combinations of oral diuretics, and changes to medications attempted before treatment with IV diuretics.



Staff assessing patients were also asked to record whether patients were taking any form of β -Blockers, ACE Inhibitors, Angiotensin Receptor Blockers, Aldosterone Antagonists, or Ivabradine. They were also asked to identify whether these were being taken at an optimal dose or using maximum tolerable doses. The data shows patients were also taking a range of heart failure medications. The majority of patients were taking β -Blockers and ACE Inhibitors prior to treatment, as shown in the table below:

	β -Blocker	ACE Inhibitor	Angiotensin Receptor Blocker	Aldosterone Antagonist	Ivabradine
Number of patients taking each medication	66	58	15	54	6
Number using optimal dose	27	24	8	45	4
% using optimal dose	41%	41%	53%	83%	67%
Number using maximum tolerated dose	39	34	7	9	2
% Using max tolerated dose	59%	59%	47%	17%	33%

As a result of a range of co-morbidities and intolerances most patients in this group were in receipt of a wide range of medications, with dosing regimes that reflected their individual medication and personal circumstances.

3.2.4 Recent admissions

54 patients (56%) had been admitted for IV diuretics in the year prior to treatment. Most of these patients had been admitted either once or twice, however a small number of patients had been admitted more frequently, with one patient having up to seven hospital admissions in the previous year.

Number of hospital admissions in year prior to admission to pilot	Number of patients
0	42
1	34
2	8
3	9
4 or more	3

During hospital admissions the average length of stay was 10 days, however this varied widely for each patient, as did the reasons for their admissions, with some admissions being just four hours, while one patient was admitted for 48 days.

3.3 Patient demographics and social background

3.3.1 Gender

Across the pilot, 73 patients were male (76%) and 23 were female (24%). A greater number of males were treated at all pilot sites, with the exception of one site where an equal number of men (2) and women (2) have been treated to date. The reason that more males were treated than females may be due to patients' social circumstances. One of the key factors for deciding whether patients were eligible for home-based IV diuretics was whether they lived on their own or with family, and whether they would have support from others throughout their treatment. A greater proportion of females (45%) than males (21%) who were admitted to the pilot lived alone. In contrast 67% of males in the pilot lived with their spouse, while only 27% of females lived with their spouse. This may suggest that more males were considered eligible for home-based treatments, as a greater proportion lived with their family or could receive support while receiving treatment at home.

3.3.2 Home circumstances

The majority (70%) of patients lived with their partner or spouse or stayed with other family members (sons, daughters, brothers, etc.).

Pilot site	Number of patients treated
Lives with partner/spouse	54

Lives alone	26
Lives with partner/spouse and children	7
Lives with other family members	6
Lives in a residential home	1
lives in care home	1
Lives in rest home	1

One patient also had a disabled son at home with them.

Patients lived an average of 7.1 miles from their usual hospital. The shortest distance from their usual hospital for any patient was less than one mile, whilst the maximum distance was 30 miles from the hospital. Some of the sites covered larger more rural areas, whilst others covered populations in large urban areas. However, this is not clearly reflected in the average travel distance for patients on the pilot. It is interesting to note that the average distance from hospital was greatest in the most urban and most rural areas.

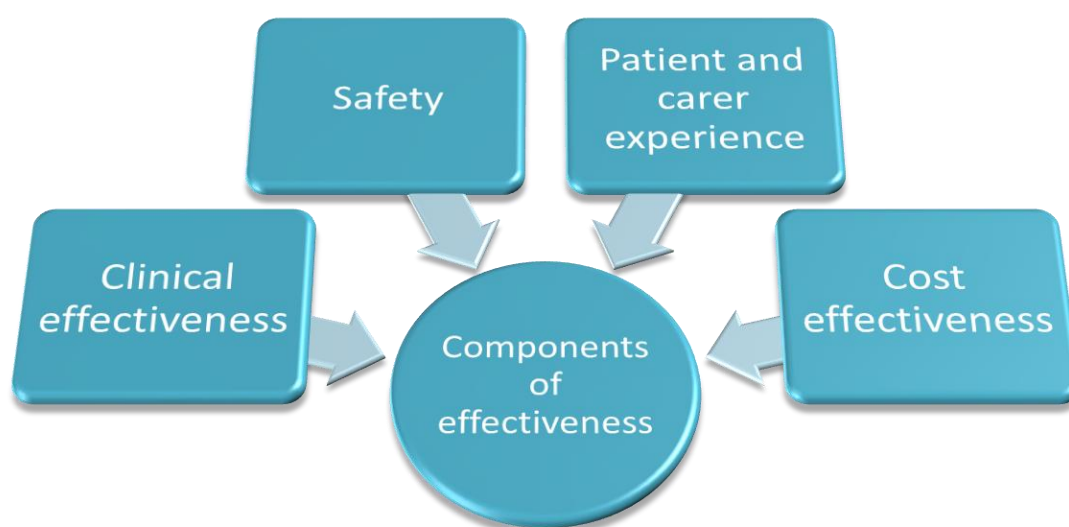
Pilot site	Average distance from hospital (miles)
Nottingham West	11.0
Ayrshire and Arran	10.5
Aneurin Bevan	9.8
Glasgow	8.6
Hastings	7.8
Leeds	6.1
Stoke	5.5
Dudley	5.5
Nottingham City	3.4
Durham & Darlington	2.0

4 PILOT EFFECTIVENESS

The ultimate question for this evaluation is this:

Is this pilot effective?

But what constitutes effectiveness? The evaluation breaks down effectiveness into four different components, as illustrated below:



Whilst in many respects these components are interconnected, we have examined them individually. We look at each component in turn below.

4.1 Clinical Effectiveness

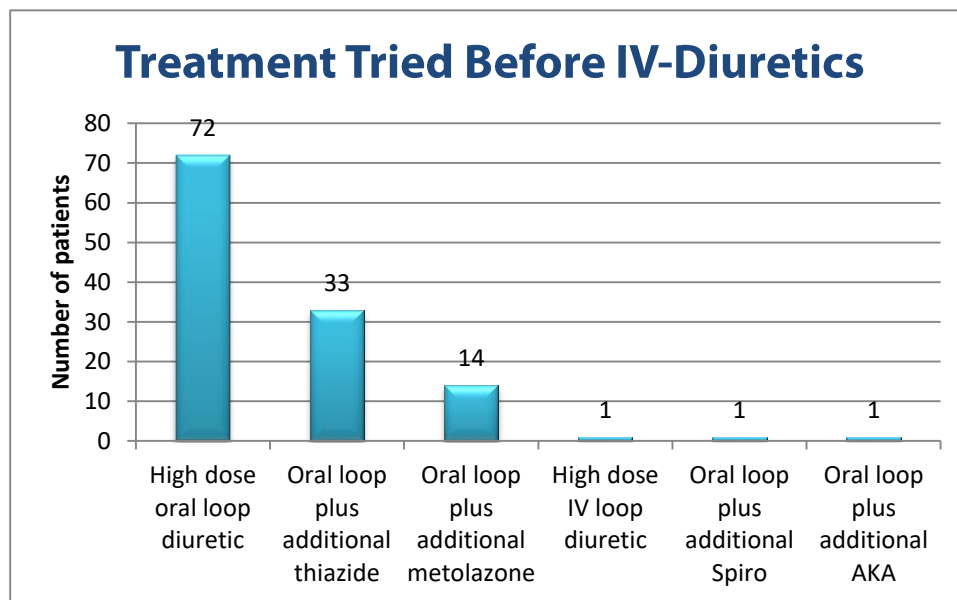
There are a number of factors that indicate clinical effectiveness:

- ★ reduction in weight
- ★ reduction in oedema
- ★ reduction in NYHA status
- ★ reduction in patient symptoms
- ★ maintenance of renal function.

4.1.1 Background context

The data set out in Chapter 3 shows that the patients treated in the pilot were not an unusually well or youthful group, but were relatively typical of heart failure patients who might need IV diuretic treatment. Most had multiple co-morbidities and most were in their 70s or 80s. Many patients had been admitted for IV diuretics, some on more than one occasion, in the previous year.

Prior to the decision to treat with IV diuretics, most patients' Healthcare Professionals (HCPs) had increased their doses of oral loop diuretics and/or added metolazone or thiazide, as shown below. However, in several cases the patients' HCPs decided not to add metolazone or thiazides and to go straight to trying IV diuretics, to avoid the side effects of these options.



4.1.2 Effectiveness of home-based delivery

100 interventions (79%) were completed at home or in the community, with 94 of these being delivered for the full length of treatment, and six interventions having to stop – but not requiring hospital admissions. It is important to note that some of these interventions were judged at clinically effective (achieving weight loss, resolution of symptoms and/or reduction in oedema) while others were not. More detail about the clinical effectiveness of interventions is provided in the following sections.

Clinical outcome	Number
Completed treatment at home	94
Hospital admission	26
Treatment stopped – no hospital admission required	6

Instances where patients' treatment had to be stopped included problems inserting the cannula, occasions where patients declined to continue and one instance where a patient's blood pressure was too low to continue treatment.

26 interventions (21%) ended with patients being admitted to hospital. The most common reasons for admission were renal dysfunction and a lack of response to IV diuretics in the home environment. In several instances patients faced complications which were not related to their IV diuretics treatment, but which meant that their treatment at home had to be ended and they had to be admitted to hospital. The table below provides a breakdown of the reasons for the 26 admissions.

Reason for admission	Number of patients admitted for this reason
Insufficient response to IVD	8
Renal dysfunction	4
Cellulitis (not related to IVD treatment, same patient)	2
Unable to cope at home	2
Positive cultures – admitted for IV antibiotics (not related to IVD treatment)	1
ICD activated (not related to IVD treatment)	1
Patient unwell, fatigued, and had urinary retention	1
Septicaemia (not related to IVD treatment)	1
Possible stroke (not related to IVD treatment)	1
Collapse related to HF (same patient on two occasions)	1
Hypotension	1
Patient admitted for scan by gastro team to see if they required abdominal tap (not related to IVD treatment)	1
Leg wound infected with MRSA (not related to IVD treatment)	1
Not documented	1

It should be noted that one additional patient was admitted to hospital for bradycardia but was only admitted to A&E and after being discharged from A&E was able to continue home-based IV diuretics treatment (which was successful).

Ultimate success of the intervention

Initially HCPs delivering treatment were asked to comment on whether the intervention had been clinically successful. Following the first interim evaluation report, HCPs were asked to break this down into components of clinical success identifying whether patients had achieved target weight loss, reduced oedema, and alleviated patient symptoms. We then collated this data to identify overall clinical success – where patients had achieved one or more of the three components of clinical success.

It should be noted that this data is subjective as HCPs may not have considered an intervention successful where weight loss or oedema reduction were achieved, but not to the extent they wished or required. In addition, some interventions may have been considered clinically successful even where treatment had to be stopped early or a patient had to be admitted to hospital, if they still achieved results in one of the clinical success areas.

For some interventions (six) it was not possible to identify the overall success of the interventions, as this was not recorded by staff. In some cases, key data, such as patient weight, was not recorded because of challenges in delivery, such as difficulties in weighing very ill patients in their home.

The success of the interventions against these criteria is reported below:

Was the intervention successful?	Overall success	Reducing the patient's oedema	Achieving target weight loss	Resolving patient symptoms
Successful	80	57	49	59
Not successful	40	52	59	40
Don't know	6	17	18	27

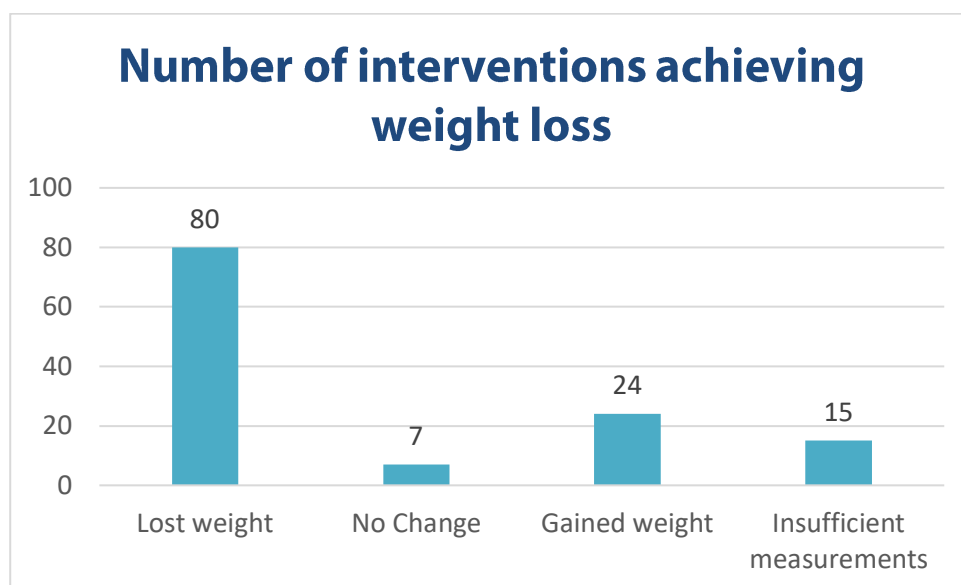
This suggests that 63% of interventions were clinically effective in at least one domain, either in achieving target weight loss or oedema reduction, or resolving the patient's symptoms.

In addition, a further 20 (16%) interventions did not achieve full success in any of the three domains, but the patient was not admitted. This can be considered a partial success, as the patient avoided an admission that would have been required had the IV diuretics not been administered at home.

Patients who had been admitted for IV diuretics in the previous year might be considered more unstable than those who had not, and therefore we looked at whether they had similar rates of positive outcome compared with patients who had not been admitted in the previous year. Our findings are not conclusive, due to the small numbers involved, but appear to indicate that there was only a small reduction in clinical success rates amongst patients with admissions in the previous year.

Weight loss

Weight loss data was unavailable for 15 interventions (12%), where the HCP was unable to weigh the patient or did not record patient's weight throughout the intervention.



Where weight loss was achieved, the table below shows the extent to which patients lost weight as a result of their IV diuretics interventions.

Number of interventions achieving weight loss	Mean weight loss	Median weight loss	Range
80	3kg	2.4kg	0.2kg to 15.4kg

In 24 interventions patients' final recorded weight was actually greater than the weight recorded prior to diuretics. The amount of weight gained during the treatment period varied from gains of 0.1kg to gains of 3.9kg, with the mean weight gain being 1.3kg.

Where patients lost weight as a result of the intervention, the average weight loss varied considerably across site, from an average weight loss of 6.2kg in Dudley to an average of 0.8kg in Nottingham West, as shown in the table below.

Site		Number of interventions	Number of interventions achieving weight loss	% of interventions achieving weight loss	Average weight lost
Durham	£	6	5	83%	6.2kg
Darlington					
Leeds		23	19	83%	3.7 kg
Dudley		23	16	70%	2.9 kg
Aneurin Bevan		14	5	36%	2.7 kg
Glasgow		4	2	50%	2.4 kg
Nottingham City		8	5	63%	2.3 kg
Stoke		5	1	20%	2.3 kg
Hastings		30	19	63%	2.3 kg
Ayrshire and Arran		11	7	64%	1.9 kg
Nottingham West		2	1	50%	0.8 kg

Reduction in oedema

Patients' oedema levels were measured on a subjective scale for grading oedema, with ratings from 0 to 3. The table below indicates the level of oedema associated with each grade:

Grade	Definition
0	Absent or unilateral
1	Mild: Both feet/ankles
2	Moderate: Both feet, plus lower legs, hands or lower arms
3	Severe: Generalised bilateral pitting oedema, including both feet, legs, arms and face

The table below clearly illustrates the severity of oedema which patients had prior to treatment across the pilot:

Starting oedema rating	Number of interventions
0	2
1	5
2	20
2.5	1
3	95
Not recorded	3

The highest proportion of patients (77%) began with an oedema rating of three – the highest possible level. This highlights that the vast majority of patients had severe fluid build-up which they aimed to alleviate through IV diuretics. Most of the remainder had moderate oedema levels to begin with, and only two patients began treatment with an oedema rating of 0.

The table below shows a breakdown of how patients' oedema scores changed as a result of the treatment.

Number of interventions achieving oedema reduction	Mean reduction in score	Median reduction in score	Number of patients with score reduction of 0.5	Number of patients with score reduction of 1	Number of patients with score reduction of 2	Number of patients with score reduction of 3
41	1.17	1	2	32	6	1

In 77 interventions there was no change in the patient's oedema rating, despite a loss of weight in many instances. In three instances a patient's oedema level went up during the treatment period.

Reduction in NYHA status

HCPs were asked to record patients New York Heart Association (NYHA) status before, during, and after treatment. The NYHA scale provides a simple way for staff to quantify the extent of heart failure, assigning patients to one of four categories based on how limited and symptomatic they are during physical activity in relation to breathing, shortness of breath and pain. The symptoms associated with each grade on the scale are highlighted in the table below:

NYHA Grade	Definition
I	No symptoms during ordinary physical activity (e.g. no shortness of breath when walking)
II	Mild symptoms during ordinary physical activity (e.g. shortness of breath when walking). Some limitations to physical activity
III	Significant limitations in physical activity, clear symptoms during even mild physical activity, e.g. (shortness of breath walking very short distances). Non-symptomatic only when at rest.
IV	Severe limitations in physical activity (e.g. may be bed bound). Symptomatic at rest.

Assessing symptoms is highly subjective and as a result HCPs sometimes had difficulty clearly defining which of the NYHA ratings applied to a patient. In some instances, HCPs indicated that a patient's NYHA ratings were somewhere between two of the rating values – e.g. recording it as I-II or II-III. The starting NYHA ratings for patients participating in the pilot are highlighted in the table below:

Starting NYHA rating	Number of interventions
I	0
II	4
II-III	5
III	70
III-IV	20
IV	26
Not recorded	1

This table shows that the vast majority of patients treated began with significant or severe limitations to physical activity, with 92% of patient starting with an NYHA rating of III or greater. This helps to highlight just how sick many patients were prior to the commencement of treatment.

The table below shows a breakdown of how patients' NYHA status scores changed as a result of the treatment.

Number of interventions achieving NYHA status reduction	Mean reduction in score	Median reduction in score	Number of patients with score reduction of 0.5	Number of patients with score reduction of 1
37	0.77	1	17	20

This shows that in about 29% of interventions the treatment supported patients to reduce their NYHA rating, reflecting increased mobility and less sign of symptoms during activity. This is an indicator that in some instances the treatment was supporting patients to become mobile where they had previously been limited due to fluid build-up. In some instances this allowed patients to do things they could not previously, such as going out for the day or playing with grandchildren. Feedback from patients indicates that these benefits can have a significant impact on patient's wellbeing and experience of the home-based treatment.

In nine interventions, patients who did not respond to the treatment became more symptomatic and increased their NYHA rating.

4.1.3 Delivery models

123 interventions (9%) were delivered using bolus doses. In three interventions a continuous dosing regime was used to treat patients. The only sites to use continuous dosing regimes were Durham and Darlington and Aneurin Bevan.

Delivery mode	Number of interventions
Bolus	123
Continuous	3

121 interventions (96%) were delivered using peripheral IV. Peripherally Inserted Central Catheter (PICC) lines were used during three interventions; two based in Aneurin Bevan and one treating a patient at the Hastings pilot. In addition, on two occasions Durham and Darlington faced difficulty with inserting cannula and if problematic the patient required to be admitted for an out-patient procedure at the local hospital to fit mid-lines to allow them to deliver the IV Diuretics.

Route for delivering IVs	Number of interventions
Peripheral IV	121
PICC	3
Started on peripheral IV then moved to midline	2

83 interventions (66%) were delivered using a once daily treatment; this was largely dictated by staff capacity. Some sites began by trying twice daily models, but changed once daily treatments instead, again because of staff capacity. At one site, two interventions were initially delivered as twice daily, but switched to once daily part way through the intervention.

The number of treatments per day across the pilot is illustrated in the table below:

Number of times IV diuretics delivered per day	Number of interventions
Once	83
Twice	41
Started as twice then moved to once daily	2

The table below shows the treatment models used by the different pilot sites.

Site	Number of interventions delivered once daily	Number of interventions delivered twice daily	Number of interventions which started to be delivered twice daily then switched to once daily
Hastings	20	10	
Leeds	19	2	2
Aneurin Bevan	11	3	
Ayrshire and Arran	11		
Durham & Darlington	6		
Stoke	5		
Glasgow	4		
Nottingham City	3	5	
Dudley	2	21	
Nottingham West	2		

Pilots using a twice daily delivery model would sometimes deliver only a single treatment on the first day (after the patient's assessment), and would commence twice daily treatment the following day. There were also occasions where patients mistakenly took their oral diuretics despite being on IV diuretics; in these cases treatment was reduced to once daily if the patient was normally receiving twice daily IV diuretics, or a day of IV diuretics was skipped if the patient was on once daily treatment.

Dosing

The doses used varied widely across the pilots, from patients receiving 40mg to patients receiving numerous treatments of up to 250mg. In one instance a patient was treated with bumetanide as the patient was thought to be allergic to furosemide (based on a previous IV furosemide treatment in hospital). However this isolated instance was not clinically successful. The table below details the range of start and end doses of IV furosemide given to patients across different pilot sites.

Site	Starting dose	End Dose
Aneurin Bevan	40-160mg	80-160mg
Ayrshire and Arran	100-250mg	200-250mg
Dudley	80mg	80-120mg
Durham & Darlington	200-240mg	160-240mg
Glasgow	100mg	200mg
Hastings	80-200mg	40-240mg
Leeds	40-240mg	80-240mg
Nottingham City	40-120mg	40-120mg
Nottingham West	80mg	80mg
Stoke	40-240mg	80-240mg

The strategy for applying dosing varied within sites as well as between sites. Often the starting dose a patient was given was established through consideration of the oral dose they received prior to treatment. In addition, some doses were tailored to the individual being treated, for example, based on the patient's previous track record of response to oral and IV diuretics treatments.

There was little consistency in the dosing regimen used across the different pilot sites, and it is therefore not possible to identify differences in clinical outcomes arising from variation in doses given. The table below

highlights the distribution of fixed and stepped dosing schemes across sites and, when combined with the different dosing regimen, highlights the variation in dosing models across the pilot.

Site	Fixed dose	Stepped increase	Decreased dose at treatment end
Aneurin Bevan	12	2	
Ayrshire and Arran	3	8	
Dudley	21	2	
Durham & Darlington	3	2	1
Glasgow		4	
Hastings	17	10	3
Leeds	9	12	2
Nottingham City	6	2	
Nottingham West	2		
Stoke	4	1	

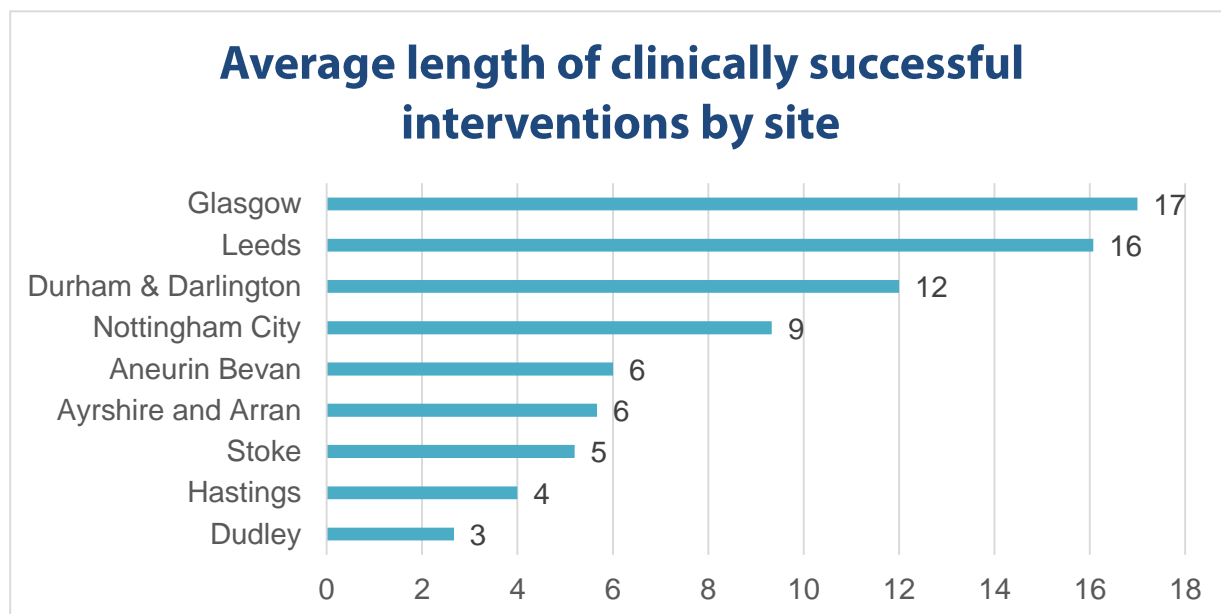
In 77 interventions (61%) the dosage patients received was fixed and in 43 interventions (36%) the dosage was gradually increased in line with the patient's condition and requirements. In the remaining six interventions (5%), the treatment doses given at the end of treatment were actually lower than the doses given at the start of treatment.

Site	Fixed dose
Fixed dose	77
Gradual increase	43
Decreased dose at treatment end	6

Length of intervention

When the original guidance for the IV diuretics pilot was drawn up, it did not set a maximum number of days for the intervention. However, there was an expectation amongst pilots and the steering group that patients would receive IV diuretics for only a handful of days. While this has happened at some sites, the length of intervention has varied widely, both within some sites as well as between sites. The average length of intervention across the pilot is seven days, however this has varied from a single day to 32 days of treatment.

The chart below illustrates the variation in the average intervention duration required to achieve clinical outcomes by site.



The chart highlights the extent in the variation in treatment length between different sites. With the limited number of responses and a number of different variables at play from different delivery models, it is not possible to conclude whether the length of treatment impacts on the success or quality of the clinical outcomes achieved. Anecdotal evidence suggests in this pilot that there is huge variation between the needs of individuals. For some patients, a short treatment can be insufficient time to achieve the desired reduction in weight and oedema while for other patients a short sharp 'blast' can be highly effective.

Correlation between clinical outcomes and delivery model

The evaluation was tasked with exploring how:

- ★ length of intervention impacts on weight loss
- ★ dosage affects weight loss and length of intervention
- ★ delivering a seven day service affects length of intervention

On average, interventions which HCPs had categorised as clinically successful (eg achieving target weight loss, reduction of oedema or resolution of symptoms) lasted eight days. For interventions which HCPs had not categorised as being clinically successful, the average length of treatment was five days.

The data does not show a correlation between the amount of weight lost during interventions, the length of intervention and/or dosage. A small number of treatments delivered over very long periods of time (approximately one month) achieved the greatest weight loss. However, some short treatments were also very successful in achieving weight loss. Variation in factors such as dosing protocols and patient start weight make it impossible to isolate whether intervention length was a major factor in weight loss.

Some sites delivering a five day service saw weight loss over short periods of time, but did not continue IV diuretics treatments after the weekend, as patients had continued to lose weight when they switched back to oral diuretics over the weekend.

4.2 Safety

Closely allied to clinical effectiveness is safety. In this section we look at the complications and safety issues experienced during the IV diuretic interventions. In particular, we look at how complications were managed and the extent to which patients experienced ill effects as a result of the IV diuretics intervention.

When looking at patient safety it is important to note that many of the challenges encountered at home were problems which might also be encountered by patients in hospital. Similarly, patients being treated at home had a range of co-morbidities (as would also be the case for patients being treated in hospital) and many of the complications were not related to the IV diuretics treatment.

The table below shows the complications encountered by pilot sites:

Complication	Number of interventions where complications occurred
Cannula problems	20
Renal dysfunction	13
Staff capacity issue	2
Cellulitis (not related to IVD)	2
Hypotension	2
Unable to cope at Home	2
Patient took oral dose so had to miss an IVD treatment	1
Diarrhoea	1
Increase in ascites	1
Staphylococcus (not related to IVD)	1
Positive cultures - admitted for IV antibiotics (not related to IVD)	1
MRSA (not related to IVD)	1
Chest infection (not related to IVD)	1
Bradycardia (not related to IVD)	1
Possible stroke (not related to IVD)	1
Hypoglycaemia (not related to IVD)	1
Blistering/Skin loss (not related to IVD)	1
ICD activated (not related to IVD)	1
Septicaemia (not related to IVD)	1

The table highlights that the most common challenge faced was inserting cannula in patients and renal dysfunction. Comparative research with patients with a small number of patients given IV diuretics treatments in hospitals showed that these were also the most commonly encountered problems in the hospital environment. Though a number of patients encountered infections at home (staphylococcus, MRSA, chest infections, septicaemia, etc.) it is important to note that staff reported that these were not caused by the home-based nature of the treatment, but by other factors, and in some instances it was possible to continue treatment.

4.2.1 Problems with cannula

Problems with cannulas were the most common complication encountered as part of treatment. These were generally very easily dealt with where HCPs re-sited the cannula and resumed treatment. In five interventions (25%) treatment had to be stopped due to cannula problems.

For some patients cannulas were particularly difficult to insert, and some staff reported multiple failed attempts at this procedure. Patients sometimes knocked the cannula out – in a small number of cases this happened

multiple times. Staff occasionally found it difficult or impossible to site the cannula which could prevent treatment from going ahead or considerable increase the time required for delivery. In one instance three staff were required to successfully site a cannula on a patient who proved particularly difficult. In another intervention one staff member took four attempts to successfully insert a cannula. Cannula insertion can thereby take up a lot of staff capacity, which impacts on their ability to deliver treatments.

Sometimes cannulas could be challenging for patients too, and in two instances patients declined further treatment after their cannula was knocked out and staff faced difficulty re-siting it.

In Durham and Darlington, staff dealing with patients where it proved difficult to insert a cannula had patients fitted with midlines through an out-patient procedure at the local hospital. Staff reported that this was a much more secure way for staff to deliver IV treatments, and they did not have to worry about cannula challenges.

Challenges with cannulas have been experienced across the lifetime of the pilot, not just in the early days of a project when using cannulas is relatively new to the team.

4.2.2 Stability of renal function

Most patients who had a successful outcome from their treatment tended to have relatively stable renal function throughout the intervention, considering their condition and co-morbidities. All patients' renal function levels were monitored closely during their IV diuretic treatments, with measures taken (usually on a daily basis) for potassium, sodium, urea, creatinine and EGFR. In most interventions patients' renal functions remained within the normal ranges. However, during 13 interventions, renal function was a complicating factor in patients' treatment.

In four interventions patients had to be admitted to hospital as a result of renal dysfunction. The other interventions were able to manage the renal function and continue treatment, though some treatments were unsuccessful, and in some cases patients had to be admitted to hospital due to other factors (see section 4.1.2).

Amongst those experiencing renal dysfunction, two patients had urinary retention and four had a drop in potassium levels. For patients that experienced a drop in potassium levels this was generally managed by administering Slow-K, Sando-K or Spironolactone and did not prevent patients from continuing with their IV diuretics treatment.

4.2.3 Blood pressure

Patients' blood pressure was also routinely recorded throughout treatment. For all but one patient, blood pressure remained stable enough for them to continue to receive treatment. One patient had to stop treatment due to low blood pressure, but did not have to be admitted to hospital; the intervention was therefore considered a success from a social perspective even though symptoms were not fully resolved.

4.2.4 Phlebitis

A common problem with IV treatments is phlebitis around the cannula site. Patients' cannula sites were checked every time the IV diuretic was administered and a total of 461 measurements were taken across the programme sites using the Visual Infusion Phlebitis Score. Of these, just 20 (4%) scored a phlebitis rating of one (where patients displayed either slight pain or redness near the IV site), spread across nine patients across the sites.

Four patients had phlebitis scores of 1 on multiple occasions and six patients had just a single isolated phlebitis issue. On all other occasions, patients' phlebitis scores remained at 0, indicating a healthy IV site. Those who had phlebitis scores of 1 were often those who staff had difficulty with inserting cannula and this was often resolved by re-siting cannula.

4.2.5 Healthcare associated infections (HAI)

One patient was admitted to hospital for Methicillin-resistant *Staphylococcus aureus* (MRSA), and three others with other infections. However all of these were unrelated to the IV diuretics treatment.

4.3 Patient experience

This section draws together findings collated from patients' feedback provided through surveys administered by healthcare professionals and by one-to-one interviews conducted by members of the evaluation team.

One-to-one interviews were conducted as part of the pilot site visits conducted during the second and final phase of the evaluation. This included interviews with:

- ★ five patients during the second interim evaluation period (February/March 2014)
- ★ four patients during the final evaluation period (February/March 2014)

When possible, and appropriate, patients were asked to complete a short survey about their experiences of participating in the pilot. HCPs did not consider it appropriate to ask some patients about their experience. For instance, where a patient was admitted to hospital for care or where a patient was entering the final stages of palliative care.

The survey focussed on a number of key areas of the patient experience:

- ★ satisfaction with the home-based IV diuretics service
- ★ reasons for patients' engagement in the pilots
- ★ comparison of the home-based treatment to hospital treatments
- ★ confidence in the home-based treatment
- ★ the difference that home-based treatment made to the patient
- ★ the difference that home-based treatment made to the carer
- ★ the difference that home-based treatment made to the patient's family

55 patients (57%) completed the survey. The largest number of patient respondents were from Leeds, Dudley and Hastings, reflecting the larger number of patients treated at these sites.

Site	Number of respondent patients
Leeds	11
Dudley	11
Hastings	10
Aneurin Bevan	6
Ayrshire and Arran	4
Stoke	3
Nottingham City	3
Durham and Darlington	3
Nottingham West	2
Glasgow	2

4.3.1 Hospital vs. home

All patients who completed the survey found home-based treatment preferable to hospital admission.

The feedback from patients surveyed includes patients who were treated in their own home and patients who received treatment in day care, returning to their own home afterwards. This latter group represented a much smaller proportion of patients, but it is important to note that they too indicated that they preferred this to hospital admission:

“Having been both in hospital and had day treatment, it is far less disrupting for my daily routine. Plus one to one attention both in the unit and at home, from such caring, qualified, professional staff; it is a great boost to my self-esteem and sense of isolation.”

Patients indicated that they got a wide range of personal benefits from staying at home including:

- ★ being able to stay with loved ones
- ★ convenience and minimal disruption to day-to-day life
- ★ giving them time to do what they want
- ★ being comfortable and relaxed rather than stressed
- ★ being happier

“I just feel more relaxed, more in control – able to just be me”

Being able to spend time at home with the people they cared for was also often extremely important to carers, especially where the patient was very unwell or approaching the end of their life. Being treated at home meant patients' friends, family and carers could visit them throughout the treatment period and this was often greatly valued.

“I know I’m living on borrowed time, so every day is a bonus. I don’t want to spend time in hospital – I want to be at home with my wife”

Two patients commented that that they felt there was a reduced risk of infection from receiving the treatment at home, which was one factor which made home based treatment preferable to them.

“[Having treatment at home] stopped me worrying about what infections I might pick up being in hospital”

In addition to the benefits of staying at home, patients also indicated that home-based treatment was preferable to hospital-based treatment as it avoided a range of unwanted challenges associated with hospital stays, including:

- ★ admissions processes
- ★ limited visiting hours and access to friends and family
- ★ uncomfortable beds and overnight stays
- ★ hospital food
- ★ lack of privacy
- ★ constant activity on the ward – getting woken up at all hours

During interviews, some patients indicated that being admitted to hospital could be a disruptive process, involving a lot of preparation and time to collect all the things from their home that they would require in hospital. Staying at home allowed patients to avoid this admission and the disruption associated with it.

“It was important not to have the upheaval of preparing to go into hospital”

“I was much happier not having to struggle getting to the hospital”

For some patients, home-based IV diuretics treatments were preferable to treatments in hospital because of the rapport patients developed with the staff delivering treatments; they reported that in hospital they had less consistency of staff contact, as staff shifts rotated regularly meaning they received support from different staff members.

“In hospital treatment is passed from one nurse to another and, with respect, too much paperwork gets involved”

“It’s always the same staff at home and you develop a relationship, you feel much more comfortable asking questions and feel like they understand you”

A small number of patients were receiving treatment to help them to manage their condition while they waited for surgery or transplant. One of these patients indicated it was extremely helpful for them to manage their health with their condition in the run up to the surgery.

“The service provided has helped me keep the best health I can, given my current health issues and in prep for my impending surgery.”

4.3.2 Engaging in the pilot

Patients were asked to rate how satisfied they were that they had all the information they needed to make a decision about participating in the pilot. Patients were asked to select how satisfied they were from the following options:

- ★ very satisfied
- ★ satisfied
- ★ neither satisfied nor dissatisfied
- ★ dissatisfied
- ★ very dissatisfied

45 patients (83%) were very satisfied and 8 patients (15%), were satisfied that they had all the information they needed to make an informed decision about whether they should try having their IV diuretics treatment at home rather than in the hospital. One respondent (2%) indicated that they were neither satisfied nor dissatisfied that they had all the information.

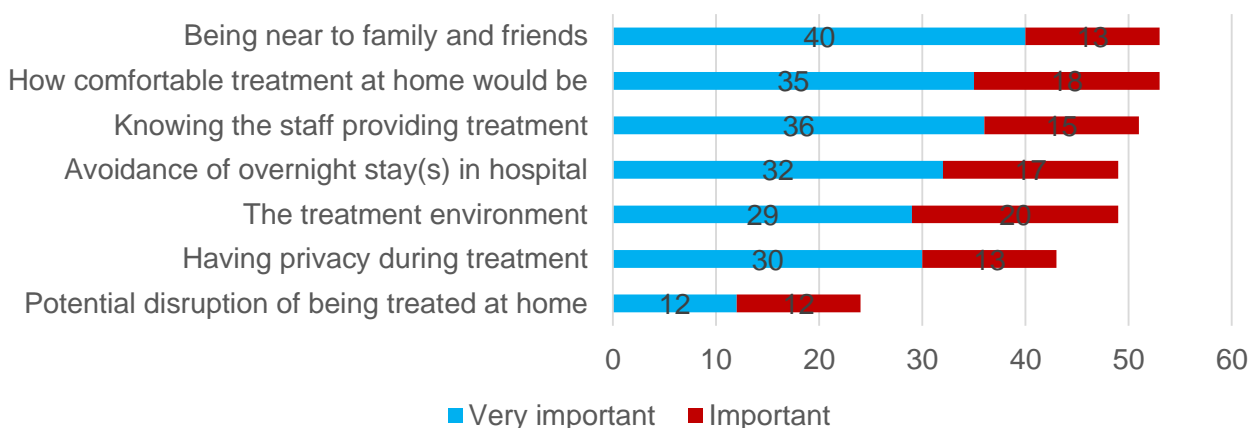
“Everything the nurses promised actually happened - like clockwork”

The most important factors in patients' considerations to opt in to the home-based IV diuretics pilot were:

- ★ being near to family and friends
- ★ knowing the staff who would be treating them
- ★ knowing they would be comfortable in their home environment
- ★ avoiding the disruption of hospital stays
- ★ being able to have privacy during treatments.

The chart below shows the relative importance of all these factors in helping the patient decide to have IV diuretics at home.

Importance of factors considered when joining the pilot



Whilst patients felt it was important that they knew the staff who treated them, there were also a number of characteristics that patients often cited as being important in the staff who treated them. These characteristics included staff being:

- ★ friendly
- ★ approachable
- ★ informative and easy to talk to about conditions and treatments
- ★ understanding of their condition and home circumstances

“The nurses were always very polite. They respected your home and would always ask before going anywhere in the house, even just to wash their hands”

“I could talk to the nurses and family about any problems. The nurses kept me informed about my progress”

4.3.3 Patient overall satisfaction

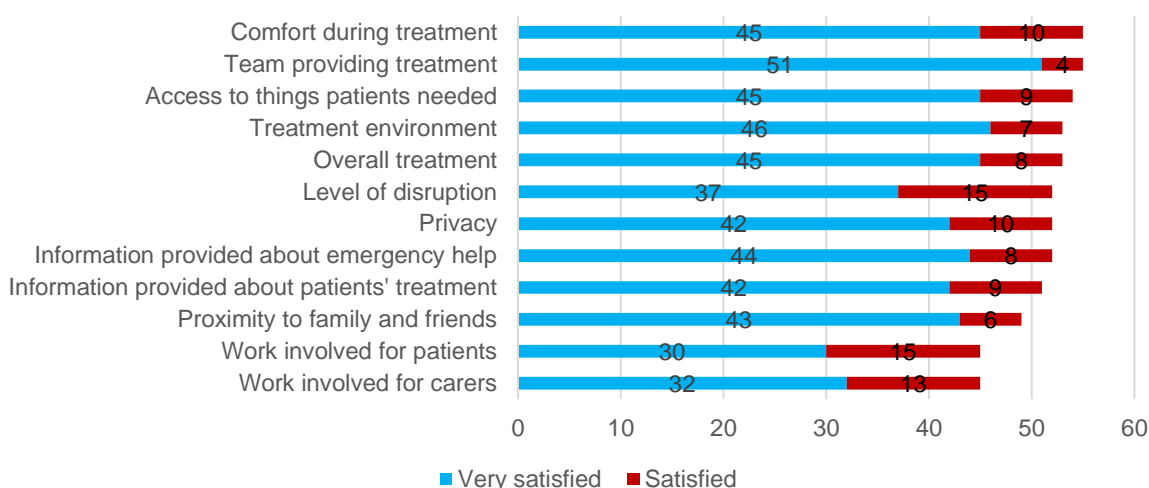
We asked patients about how satisfied they were with the overall service they received. 53 respondents (96%) indicated they were satisfied (15%) or very satisfied (82%).

“It was less stressful and could not find a fault with the treatment”

“In all aspects treatment was first class”

Patients showed high levels of satisfaction across all components of treatment. The level of satisfaction for each of the components of patients' treatment is highlighted in the chart below:

Patients' satisfaction with components of care



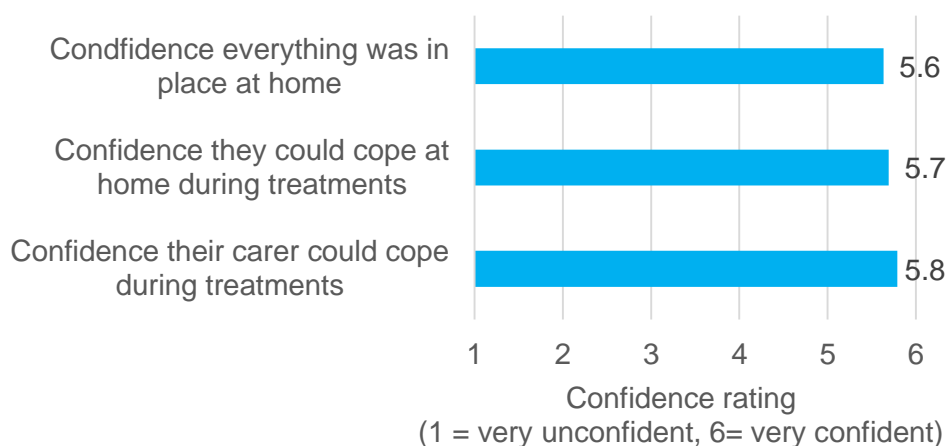
Only one patient showed dissatisfaction with any aspect of treatment; the information provided to them about their treatment. However, they were satisfied with other components of the support they had received, including their overall treatment. This nevertheless highlights the importance of keeping patients well informed throughout their treatments to create the best possible experience for them. Many respondents indicated that they benefited from speaking with staff during their treatments, as they gained a better understanding about their condition.

“Getting to know and trust the medical staff allowed for a better, thorough understanding of how and why treatment was administered. Also improved understanding of condition and care needs”

4.3.4 Confidence

Almost all patients were confident that they and their carers could cope whilst having their treatment at home, and that everything they required for treatment was in place. To quantify this, patients were asked to rate their confidence on a scale of 1 (very unconfident) to 6 (very confident). The chart below shows that on average, patients were very confident in all aspects of treatment.

Average patient confidence rating



“The nurses giving me the treatment always filled me with confidence”

“I never at any time felt less safe just because I wasn't in hospital – the nurses always worked with such confidence which gave me the confidence too”

In one instance, a single patient rated their confidence at '1' in all aspects, indicating they were very unconfident about the treatment. This patient gave no indication for their lack of confidence, but was satisfied with the treatment and indicated they preferred this treatment to hospital treatment. They would have it again if they

required further IV diuretics. This suggests that even when patients are not confident, treatment can still be successful, and patients can still have very positive experiences of treatment.

4.3.5 Perceived benefits for carers and families

In addition to the benefits to themselves from staying at home, patients also cited many benefits to their carers, friends and family. Many of the patients felt that having the treatment at home actually helped their partner by allowing them to stay at home as well.

“She was much happier with me at home”

“it means my family aren’t having to come into the hospital to visit me, it’s much easier for them to come to my house”

Some participants indicated that their carers were happy with the support not only because it allowed carers to see the patients easily, but also because they were reassured by the quality of care that patients were receiving.

Five patients indicated the home-based nature of the support had not made any difference to their family and one patient indicated that they did not have any immediate family and a further three patients indicated this was not applicable to them. However most patients indicated home-based treatment was better for their family. Patients indicated it made it easier for them to visit and the family could be reassured that they were receiving dedicated care within their house.

“They felt I am being looked after in a thorough way and that this can only improve my length of life chances”

In a small number of cases patients indicated that having the treatment at home meant that their family or carers were exposed to the treatment and engaged with staff. This could impact on their knowledge of the patient's condition. Some patients indicated they felt this was better because their family got information from healthcare professionals straight away.

“The only downside was that my wife found out just how poorly I was. I hadn’t told her because I didn’t want to worry her, but in talking to the nurse she found out the real story. But she could ask lots of questions, and now understands better what we’re dealing with”

4.3.6 Would they do it again?

All patients completing the survey indicated that, if they needed IV diuretics treatment again, they would choose to have it at home rather than in hospital.

Their main reasons for this were:

- ★ home-based treatment was less disruptive for themselves, family and carers

- ★ patients could enjoy home comforts
- ★ patients received excellent clinical care
- ★ staff were friendly and understanding

“It was less stressful and could not find fault with the treatment”

4.4 Carer experience

This section draws together findings collated from carers' feedback provided through surveys administered by healthcare professionals and by one-to-one interviews conducted by members of the evaluation team. One-to-one interviews were conducted as part of site visits to the pilot sites conducted during the second and final phase of the evaluation. This included interviews with:

- ★ six carers during the second interim evaluation period (February/March 2014)
- ★ three carers during the final evaluation period (February/March 2014)

When possible, and appropriate, carers were asked to complete a short survey about their experiences of participating in the pilot. In some instances it was not possible to contact the carer following the treatment of patients, or healthcare professionals considered it inappropriate to ask carers for feedback – for example, where the person they cared for had recently died, or where the carer was struggling to deal with a patient's worsening condition.

The survey focussed on a number of key areas of the patient experience:

- ★ satisfaction with the home-based IV diuretics service
- ★ carer experiences and circumstances during the patient's treatment
- ★ challenges faced by carers during the treatment
- ★ reasons for patients engagement in the pilots
- ★ comparison of the home-based treatment to hospital treatments
- ★ confidence in the home-based treatment
- ★ the difference that home-based treatment made to the carer
- ★ the difference that home-based treatment made to the patient
- ★ the difference that home-based treatment made to the patient's family

The carer's experience is equally important in understanding whether the pilot is effective, as they provide the care and support to the patient who is being treated, not only during the IV diuretics intervention, but every day. 45 carers completed the survey. The largest numbers of carer respondents were from the Dudley, Leeds and Aneurin Bevan pilots.

Site	Number of respondent carers
Leeds	11
Hastings	8
Dudley	7
Aneurin Bevan	6
Ayrshire and Arran	3
Durham and Darlington	3
Glasgow	3
Nottingham West	2
Stoke	1
Nottingham City	1

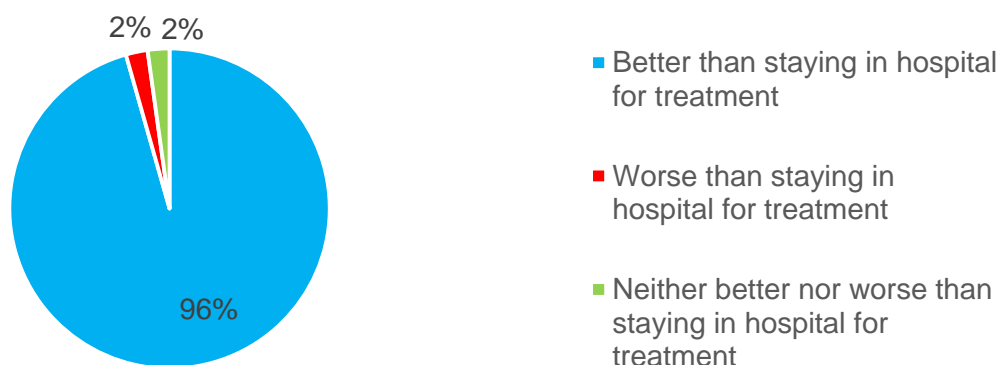
One patient's daughter also sent a letter to one of the pilot sites describing the impact of the treatment on her father, her mother (carer) and the rest of the family.

4.4.1 Comparison with hospital treatment

43 of the 45 carers (93%) responding to the survey indicated they felt that the treatment for the person they cared for was better than being treated in hospital.

“He was more relaxed and it took away a lot of stress and anxiety, as if he had been in hospital, I would not have been so at ease”

Carer's perspective of home-based treatment versus hospital treatment



Those who indicated that they felt it was better than staying in hospital reported that this was because:

- ★ the person they cared for didn't have to wait for treatment as they did in hospital
- ★ the person they cared for had access to home comforts
- ★ the person they cared for had time and independence to do what they want
- ★ the person they cared for avoided trauma associated with hospital stays and admission
- ★ the person they cared for could carry on with their family life
- ★ they avoided transport and parking issues
- ★ they could visit, and be with, the person they cared for whenever suited them both

“Not having to wait for the treatment like you do in hospital made it less stressful and you could carry on with your family life”

Carers indicated that having the treatment based at home was more convenient, both for them and for the patient. They were reassured to know that the patient was able to enjoy home comforts rather than being in a hospital bed.

“It's less stressful for the individual and it's done in a familiar environment and that helps”

They were also reassured about the patient's condition, as they were able to be with them at all times. They were constantly aware of their condition, rather than having to wait and worry at home, visiting only at specific times as they might in hospital.

It was important to some carers that they did not have to travel to see the person they cared for, and they also did not have to pay for parking. The feedback from three of the carers interviewed really emphasised the toll that the travelling can have and the impact of the 'lost time'.

“I would have felt very tired if having to travel to hospital”

“Much easier to come and be in attendance rather than spend time travelling to and from hospital”

In addition to travel times, access to transport was challenging for some carers. Some carers didn't have access to a car, or were distant from the hospital. This meant they would have had to access public transport or find someone to help them get to and from the hospital.

“It would be less stressful for me as I am elderly myself and sometimes have to take two buses to visit the hospital”

Many carers emphasised the difference having the treatment at home made not only in avoiding the challenges of securing transport and spending time travelling, but with saving them both time and money. They could do other things with the time and didn't have to pay for fuel, public transport, or parking.

“More freedom to carry on with daily chores and activities and saves money on parking costs”

“It was much more convenient and I wasn't restricted to hospital visiting times and the costs involved”

Feedback from carers suggests that having the treatment at home was reassuring for them as they knew the person they cared for was receiving dedicated treatment in a place they were comfortable.

“It made a great difference for him to be in the comfort of his home and much easier too”

Some carers also indicated it was much easier to get questions answered by the nurses providing the treatment at home compared with when they were seeking answers from hospital staff.

Some patients treated during the pilot were extremely eager to stay at home, and some had even declined admission to hospital. For their carers the home-based treatment was sometimes very reassuring – putting carers at ease that the patient was receiving the treatment they required despite refusing to go into hospital.

“Made a lot of difference because he was refusing to go to hospital”

Many carers indicated that they were pleased or reassured to know their loved one was receiving care within their home, especially where this included one-to-one nurse visits.

“[The person I care for] doesn't like hospitals and benefitted from dedicated specialist nurses care”

One respondent said they felt it was about the same as staying in hospital, indicating that it was just a difference in the environment in which it was being delivered and that this was more palatable to the patient.

“Because the level of treatment would be the same it's just a change of environment, which would be better at home”

One respondent indicated that they felt it was worse than staying in hospital. In this instance treatment was discontinued because the patient was weak and the carer did not want to see the patient in this weakened condition again and therefore felt hospital treatment may be more appropriate. This was purely due to the patient's condition, rather than the treatment, and the carer indicated that if the patient had been better then home-based treatment would have been preferable.

“If he had not become more unwell then home situation would be preferable”

4.4.2 What is required of carers?

There is a lot required of carers when the person they care for is being treated at home. The tasks and challenges encountered most and least by carers during patients' treatments are listed in the table below:

Tasks undertaken and challenges faced by carers	% of carers doing these tasks
Being available 24 hours a day	86%
Keeping him or her comfortable	82%
Help with dressing	68%
Contacting the doctor or nurse for treatment needs	68%
Help with washing or bathing	67%
Helping him or her get in or out of bed, chair or couch	64%
Helping him or her get into a comfortable position in bed	60%
Monitoring his or her condition	62%
Helping with his or her treatment	53%
Helping him or her to take medications	52%
Arranging for someone to stay when I go out	49%
Not being able to go out and participate in activities that I enjoy	47%
Driving him or her wherever he/she needs to go	46%
Learning how to give medication	41%
Help with using the toilet, bedpan or commode	35%
Monitoring his or her injection site	28%
Having to take time off work	14%
Feeling lonely	14%
Wanting to share problems or issues with others in a similar situation	14%
Not having enough money to cover our expenses	13%

The table highlights that 38 of the 44 respondent carers (86%) indicated that they had to be available 24 hours a day while the patient was being treated, but most reported that this was manageable and none reported that this was extremely challenging for them. Carers were asked to rate how easy or difficult each of the 'tasks' were on a scale of 1 to 6, where 1 was 'very easy to manage' and 6 indicated it was 'very difficult to manage'. Only four carers rated the difficulty in being available 24 hours per day at 4 or more.

The vast majority of carers rated the difficulty level of the most common tasks at 3 or less, indicating that the most common tasks were manageable for most carers. It is also important to note that most carers are with patients all day and therefore a number of small and manageable tasks can add up and become a lot to manage every day. In some instances the challenges of caring for the patient fell upon a single carer, but they were often spread across the family.

“I had my family to help me too”

“Easier to provide help and ask other family members for help”

The most challenging aspects cited by respondents related to going out and participating in other activities. They found it particularly difficult to arrange for someone else to provide care and support when the carer went out for other activities. This was reported as extremely challenging by seven carers, however two reported that this also was an ongoing difficulty related to patients' general condition, rather than just when they had IV diuretics.

Other tasks which a small number of carers indicated were challenging for them included helping the person they cared for:

- ★ with washing or bathing
- ★ get in or out of bed, chair or couch
- ★ get into a comfortable position in bed.

It is important to note that many of these tasks were a routine part of caring for some carers. For example, many carers living with patients with multiple co-morbidities had to be available to support them throughout the day, or to drive them if they needed to get out. Some of these tasks were not therefore additional tasks for the carers, and many carers indicated that having the treatment allowed them to get on with their daily routine.

“It was less stressful and you could carry on with the normal way of life”

“I never really felt it was any more or less responsibility when he was receiving the treatment than I’d be doing for him on any other day”

One carer reported that she was able to get respite when the nurse was giving the treatment and that she was actively encouraged by the nurse to take a break.

4.4.3 Carer satisfaction

98% of carers were either satisfied (20%) or very satisfied (78%) that they had the information they needed to make informed decisions about participation in the pilot.

“I was very pleased with all the treatment. The nurses were very helpful and explained every little detail”

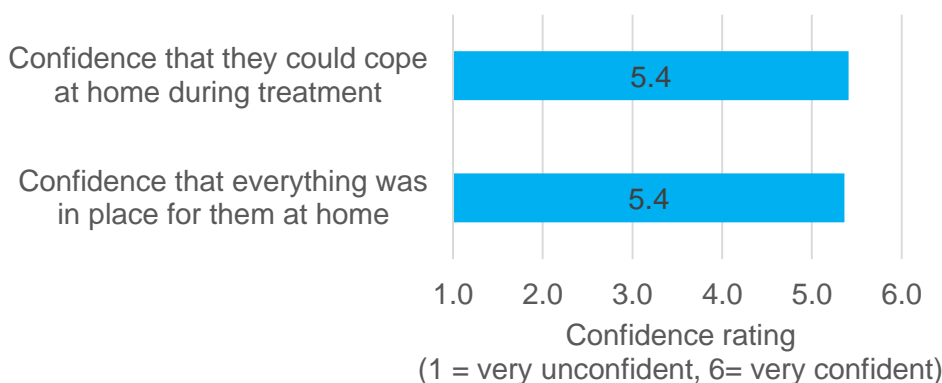
“Everything was explained to us and they took the time to answer all our questions”

One carer (2%) was dissatisfied with the information they had to make their decision about the treatment, however, no reason for this dissatisfaction was provided, and the carer indicated that they were satisfied with the treatment and would be happy for the person they cared for to have the treatment again if further IV diuretics were required.

Most carers were very confident that everything they and their carer needed was there for them during the treatment.

“I am confident he will receive the best care and treatment”

Average carer confidence rating (1-6 scale)



Only three respondents rated their confidence of whether they could cope at home or whether everything was in place for them at less than 3 out of 6, suggesting that most carers were confident in the treatment.

It is important to note that no carer indicated that they were dissatisfied with any specific component of the treatment delivery, and all but one carer was satisfied or very satisfied with the overall treatment. The component of the treatment which the largest proportion of respondents were very satisfied with was the team who provided the care. Many carers were also extremely satisfied with the treatment environment and the amount of information they were given about the treatment.

“I felt better informed having one to one contact with a specialist nurse”

“He was much happier at home and more relaxed, which was a very great help indeed for me”

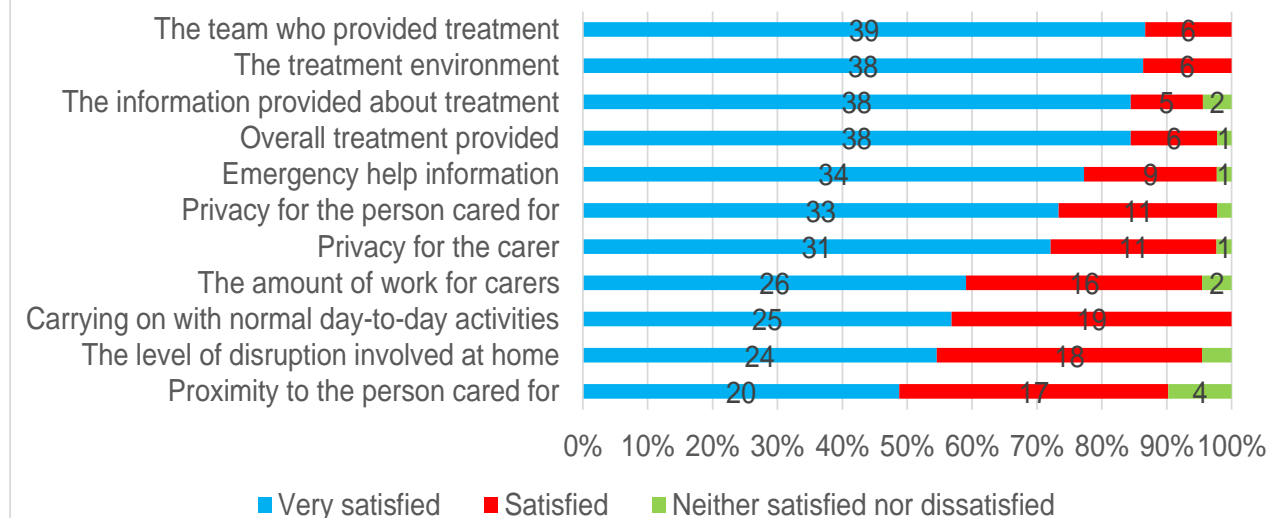
One carer commented that there was a very holistic approach with the nurses taking account of the wider health conditions and environment that was often missing in a hospital setting. The carer and her loved one felt fully involved in all aspects of the decision making and felt like they developed a close relationship with the nurse.

Most carers were also all satisfied with the amount of work they were required to do as a result of their loved one receiving IV diuretics.

“I never minded doing it for him – it meant he was with me and that’s what he wanted as well”

The chart below demonstrates satisfaction that carers had with different components of the treatment:

Carer satisfaction with components of treatment



4.4.4 Would they want the person they care for to have home-based treatment again?

96% of carers indicated that they would like to see the person they care for receive home-based treatment again, if they required further treatment. The reasons for this were in line with the responses already listed in section 4.4.1.

“The treatment was excellent in every possible aspect. All the nurses were so vigilant and easily accessible when the need arose. My sincere thanks for this excellent service”

“The service was excellent and should be offered to all, it is a life saver”

Only two carers indicated that they wouldn't want the person they care for to have further IV diuretics at home though only one carer gave a reason. The carer explained that they didn't want to see the person they cared for treated at home again while they were so poorly and frail. If the person they cared for was in a stronger state they indicated that home-based care would be preferable.

4.5 Cost effectiveness

At the end of the evaluation period, there had been 126 interventions, of which 80 were clinically successful. This enables us to calculate the cost effectiveness of home based IV diuretics. We have done this from two perspectives: Firstly, and of most interest to organisations considering implementing home-based IV diuretics is:

- ★ cost of starting up a service
- ★ cost effectiveness of day to day delivery of a service from an NHS perspective

Finally, we assess the total costs of the pilots from BHF's perspective, and the overall benefits delivered as a result.

4.5.1 Cost of start up

Any organisation interested in setting up a home-based IV diuretics service needs to know how much investment is required before savings can be generated. Our findings indicate that it takes six months to establish an operational service, provided the service has a half-time dedicated post to drive the process. Based on the mid-point of Band 7 (plus on costs at 20%), plus an allowance of £5,000 for equipment, the start-up cost would be £15,660.80.

4.5.2 Cost effectiveness of day to day delivery

Our calculations are based on data from all the sites which have had clinically successful interventions to date.

Bed days saved

The 80 successful interventions accounted for 629 days of treatment, as set out in the table overleaf. Our comparative in-patient study showed that the average number of days of active IV diuretics treatment was similar in hospital to in a home-based setting. It is therefore reasonable to assume that the pilot saved at least 629 bed days.

However, it is not unusual for patients receiving IV diuretics in hospital to be kept in for a few days beyond their treatment, to stabilise their oral diuretics. There is no set national guidance on this, but anecdotally project staff and our cardiology specialist advisers indicate that a two to three day period of stabilisation is typical. Our comparative in-patient study showed an average of six days from cessation of IV diuretics to discharge, but this included a number of patients awaiting onward referral to other in-patient services. We have therefore erred on the side of caution and assumed that a successful home-based IV diuretics intervention also saves a further three bed days after completion of treatment. We have therefore inflated the bed day savings by three days, for each successful intervention, bringing the total bed day saving to 869.

Cost of admission for IV diuretic treatment

Not all sites were able to supply local tariff data, as not all parts of the UK work on the tariff system. Therefore we have worked with the NHS National Schedules of Reference Costs to provide approximate costings of treatment if the patients had been admitted as a non-elective admission.

The average cost of a long stay non-elective admission for heart failure without coronary care is £1884. However, these costs are based on an average length of stay of 5.19 days, which many interventions on the pilot significantly exceeded. The cost of each excess day (again without coronary care) is £239. Our comparative in-patient study showed that the length of active treatment is similar to what would be experienced in hospital.

Our method was to calculate the reference cost per successful intervention, topped up with:

- ★ excess day charges for each day the treatment lasted beyond the average of 5.19 days
- ★ three excess day charges per intervention, to account for the common practice of keeping a patient in hospital for a few days after their IV treatment to stabilise them on oral diuretics²

We have not included the costs of IV Furosemide or equipment, on the basis that these are costs both in the hospital and in the community.

The table below shows the costs of equivalent in-patient treatment for the patients who had successful home-based diuretics interventions:

	Treatment days for successful interventions	Number of successful interventions	Reference costs (avg LOS 5.19 days)	Excess days (LOS beyond 5.19 days)	Cost of excess days (£239 per day)	Top up for oral stabilisation (assume 3 days post treatment)	TOTAL COSTS
Leeds	234	15	£ 28,260.00	156.15	£ 37,319.85	£ 10,755.00	£ 76,334.85
Hastings	86	16	£ 30,144.00	2.96	£ 707.44	£ 11,472.00	£ 42,323.44
Aneurin Bevan	48	8	£ 15,072.00	6.48	£ 1,548.72	£ 5,736.00	£ 22,356.72
Dudley	56	18	£ 33,912.00	-37.42	-£ 8,943.38	£ 12,906.00	£ 37,874.62
Ayrshire and Arran	26	6	£ 11,304.00	-5.14	-£ 1,228.46	£ 4,302.00	£ 14,377.54
Glasgow	34	2	£ 3,768.00	23.62	£ 5,645.18	£ 1,434.00	£ 10,847.18
Stoke	25	4	£ 7,536.00	4.24	£ 1,013.36	£ 2,868.00	£ 11,417.36
Nottingham City	38	6	£ 11,304.00	6.86	£ 1,639.54	£ 4,302.00	£ 17,245.54
Nottingham West	0	0	£ -	0	£ -	£ -	£ -
Durham & Darlington	82	5	£ 9,420.00	56.05	£ 13,395.95	£ 3,585.00	£ 26,400.95
TOTAL	629	80	£ 150,720.00	213.8	£ 51,098.20	£ 57,360.00	£ 259,178.20

Cost of home-based treatment

The pilot sites collected data on the staff time involved in administering IV diuretics treatment in the home. They also collected data on the salary banding of the staff involved. In addition, we know from earlier phases of the evaluation, that staff travel time (to and from patients homes) accounted for around an additional 88% of the time logged administering the treatment itself. In other words, if the staff member logged one hour administering the treatment, they also spent an average of 0.88 of an hour travelling.

From this data we have been able to calculate the cost of all the interventions administered.

For each salary banding, we have used the mid-point salary plus on costs, and calculated an hourly rate based on 46 working weeks (after annual leave) and a 37 hour week.

	Treatment hrs Band 8	Travel hrs Band 8	Band 8 costs	Treatment hrs Band 7	Travel hrs Band 7	Band 7 costs	Treatment hrs Band 6	Travel hrs Band 6	Band 6 costs	TOTAL COST OF DELIVERY
Leeds				354	311.52	£ 16,671.28	26	22.88	£ 1,025.50	£ 17,696.78
Hastings				262	230.56	£ 12,338.63				£ 12,338.63
Aneurin Bevan				47	41.36	£ 2,213.42	31	27.28	£ 1,222.71	£ 3,436.13
Dudley	1	0.88	£ 58.07	68	59.84	£ 3,202.39	20	17.6	£ 788.85	£ 4,049.31
Ayrshire and Arran				53	46.64	£ 2,495.98				£ 2,495.98
Glasgow				36	31.68	£ 1,695.38				£ 1,695.38
Stoke				43	37.84	£ 2,025.04				£ 2,025.04
Nottingham City				164	144.32	£ 7,723.42	90	79.2	£ 3,549.82	£ 11,273.23
Nottingham West							3	2.64	£ 118.33	£ 118.33
Durham and Darlington				64	56.32	£ 3,014.02	43	37.84	£ 1,696.02	£ 4,710.04
Total			£ 58.07			£ 51,379.55			£ 8,401.23	£ 59,838.86

These figures take into account the different lengths of treatment for different patients.

² Based on feedback from pilot sites and from our cardiology advisers on the evaluation team.

We have also calculated an average cost of delivery per patient (regardless of whether the treatment was successful or unsuccessful). See the table below:

	Total cost of delivery	Total number of interventions	AVERAGE COST OF DELIVERY PER INTERVENTION (SUCCESSFUL AND UNSUCCESSFUL)
Leeds	£ 17,696.78	23	£ 769.43
Hastings	£ 12,338.63	30	£ 411.29
Aneurin Bevan	£ 3,436.13	14	£ 245.44
Dudley	£ 4,049.31	23	£ 176.06
Ayrshire and Arran	£ 2,495.98	11	£ 226.91
Glasgow	£ 1,695.38	4	£ 423.85
Stoke	£ 2,025.04	5	£ 405.01
Nottingham City	£ 11,273.23	8	£ 1,409.15
Nottingham West	£ 118.33	2	£ 59.16
Durham & Darlington	£ 4,710.04	6	£ 785.01
Total	£ 59,838.86		£ 491.13

Net savings generated by each site

The net savings data below is based on what was delivered by either the end of a site's funded period or, if the funded period had not yet ended, the evaluation cut-off date. Those sites which have most recently started delivery could reasonably expect net savings to grow over time.

	Total interventions	Number of successful interventions	NET SAVINGS PER PILOT SITE
Leeds	23	15	£ 58,638.07
Hastings	30	16	£ 29,984.81
Aneurin Bevan	14	8	£ 18,920.59
Dudley	23	18	£ 33,825.31
Ayrshire and Arran	11	6	£ 11,881.56
Glasgow	4	2	£ 9,151.80
Stoke	5	4	£ 9,392.32
Nottingham City	8	6	£ 5,972.31
Nottingham West	2	0	£ -
Durham and Darlington	6	5	£ 21,690.91
TOTAL	126	80	£ 199,457.67

Numbers required for a sustainable service

We have calculated the number of interventions needed to reach a 'break even' point, where the savings generated would be greater than the cost of employing a Heart Failure Specialist Nurse to deliver IV diuretics, to be 12. This is based on the following assumptions:

- ★ the average length of an intervention is 7 days
- ★ the same intervention would require an admission of 10 days, to include 3 days of post-treatment stabilisation; this would cost £3079 based on NHS reference costs

- ★ the cost of delivering one fully operational year of a stand-alone service (ie not including the start-up period and start-up costs) would be the salary of 0.5 WTE Band 7 nurse (mid-point of band 7) plus 20% on costs; this amounts to £21,110.40
- ★ the clinical success rate is 63%

However, our findings indicate that NHS organisations seeking to introduce this service should do so as part of an integrated package of heart failure care, embedded within the Heart Failure Nurse Service, rather than as a stand-alone service. We would expect the costs of delivering the home-based IV diuretics component of such a service to be less than the costs we have calculated above. However, we are only able to calculate the 'break even' point based on the data we currently have, which is derived from stand-alone pilot services.

4.5.3 Costs and benefits from a BHF perspective

BHF funded the pilot to the tune of £572,160, excluding their staff time in supporting the pilot. Each pilot site received funding for a half-time Band 7 post for a two year period, plus an allowance for start-up costs such as equipment. As there were unavoidable delays in some projects, and two of the original sites withdrew from the pilot, some funding was reallocated to pilots that had experienced delays and/or needed additional time to develop their evidence base.

Whilst the current estimated value of avoided admissions (£259,178.20) as a result of the pilot is less than the amount BHF invested, the avoided admissions will continue to be generated year on year as a result of BHF initiating the service. Therefore the long term benefits of the investment will grow annually, especially in the sites that intend to continue the service as part of everyday practice rather through additional funded posts. In addition, the BHF funding has generated two other benefits that are not quantifiable in cash terms, but are very significant:

- ★ supporting the creation of 10 new services that would not have got off the ground without BHF's dedicated funding – our research with supplementary sites shows that despite interest and motivation, unfunded sites have been unable to invest the development time to establish home-based IV diuretics services
- ★ generating an evidence base about the clinical effectiveness, safety, impact on patients and carers and cost-effectiveness of delivering IV diuretics in the home setting, and the practicalities of how to establish a service – this is a legacy that will influence and enable NHS organisations to implement home-based IV diuretics

5 PRACTICAL LEARNING FROM THE PILOT

In the following sections we present the learning that has been identified through the various stages of the programme. We have broken the learning down into:

- ★ learning from the initial development phase
- ★ learning from the delivery phase
- ★ learning from the transition beyond the pilot

5.1 Learning from the initial development phase

5.1.1 Challenges

As expected with any new service or provision being developed and implemented, there are a number of challenges faced along the way. During the early stages of the pilot the main challenges related to three themes:

- ★ operating environment
- ★ operational delivery
- ★ capability and competence

Operating environment

In some instances, pilots were developing the service against a backdrop of major restructuring in their area. This has inevitably impacted on the pace of progress made as roles that were once there no longer exist and people move on.

The scale of collaborative working and cross-discipline buy-in that is required to make the service work was recognised as a common challenge across the sites. The fragmented nature of some services in certain areas also added to this challenge. The feedback from other parts of the local health system confirmed that support was there for the pilot, however it did mean that additional time was needed to work through the practicalities and find a way forward. Strong communication and influencing skills can ease this.

Aligned to this, one site was operating across a range of different localities, each with their own different structures, ways of working and resource. As the pilot progressed, the site in this situation acknowledge that in hindsight, a staged roll out across each locality, and more time spent with each would have been beneficial

Operational delivery

There were three main challenges highlighted in terms of operational delivery:

- ★ making the service available seven days per week
- ★ process and resource for prescribing and administering drugs
- ★ equipment dictating service delivery

Each of the above challenges is discussed in greater detail in the following sections.

Offering a seven day service

The ability to offer the service seven days a week proved challenging for several sites (though not every site had planned on doing this). This was influenced by the delivery model and working patterns of other teams supporting the pilot.

Where a five day service was in place, a patient's IV diuretics treatment was stopped over the weekend and they reverted to their oral medication. In the initial phases of the pilot, the question was asked whether this 'stop-start' would adversely impact on the success of the treatment. However as the pilot progressed, sites reported that in some instances where patients were taken off the IV diuretics for the weekend, they had responded to their oral medication and there was no need to restart the IV diuretics. It is important to note however that this was not always the case.

As pilots progressed they were able to further mitigate this by becoming more effective in their identification and planning to ensure that a patient could be started on the IV diuretics as early in the week as possible.

Where sites were able to operate a seven day service this involved developing an 'on-call' weekend cover rota to negate this issue, or gaining the buy-in of another community team who were willing and able to provide weekend cover.

Interestingly, the Leeds site was a five day service during the pilot funding period, but was commissioned thereafter as a seven day service. The average length of treatment since the service began seven day operation has not changed.

Prescribing and administering drugs

The Nursing and Midwifery Council (NMC) rules state that nurse prescribers should not prescribe and then administer the same drug, therefore someone else is needed to check the administration if the nurse has prescribed the drug.

This presented a particular challenge for smaller Heart Failure Nurse Services where the nurse who prescribes the IV diuretics is often the one who would also administer the treatment. Other sites were able to make a two nurse model work.

The pilot sites were able to find solutions to this challenge which included:

- ★ additional training for other members of staff (so more than one member was a qualified prescriber)
- ★ securing the commitment of GPs as prescribers
- ★ using other community teams to administer the treatment with the pilot lead prescribing

Method and equipment

The method and equipment chosen to administer the drug can also create challenges. One site was not able to use pumps, which dictated how they could administer the drug. This involved making two separate visits and carrying out two separate treatments for any one patient. This impacted on logistics and capacity, and led to the site exploring and introducing the use of slow drips as an alternative

Capability

For several sites the members of staff that were to be administering the treatment did not have recent or extensive experience of inserting cannulas. The initial hurdle to overcome in these cases was arranging training and practice for the appropriate members of staff and allowing them to develop and demonstrate competence. Whilst this was not a significant challenge, more difficulty arose in terms of how staff would maintain competence with relatively low numbers coming through the pilot, and therefore limited opportunities for cannula insertion.

“I think to maintain competence, and keep my confidence, I would have to be doing at least one a week”

To overcome this challenge sites put in place a range of different solutions which included spending time on a ward and working with other areas of the health service. A number of sites also had back up plans in place to support them in a patients home if they were finding it difficult to insert the cannula. This included, being able to call on the local paramedic team or another community-based team with more experienced staff in inserting cannulas.

5.1.2 Opportunities

Even in the early stages of the pilot, those involved were already thinking how the pilot could influence and inform working practice, as well as the obvious potential for cost savings. The key opportunities at that point were identified as:

Encouraging more innovation – informing the development of other IV treatments in a community or home setting, such as antibiotics.

Connecting with telehealth – a number of pilots were operating in areas with telehealth provision, whilst for others it was on the near horizon. In the early stages of the pilot, sites could see potential for the telehealth system to support home-based IV diuretics provision. They also thought there was potential for telehealth to offer efficiencies and costs savings in delivery of IV diuretics services, through the remote monitoring of patients' status between visits.

Improved identification – one site suggested that the pilot could help to catalyse a more proactive identification of fluid retention in patients across community healthcare teams. This was in relation to Heart Failure Nurses as well as other community teams involved in supporting the pilot.

Better self-management and patient/carer knowledge – staff indicated that the time they needed to spend in the patient's home, whilst administering the IV diuretics, gave them more time to discuss the treatment and wider condition management with the patient and the carer. This meant that they were better educated in the long term about the importance of self-weighing, managing fluid intake etc.

Greater collaboration and understanding – a consistent theme fed back by staff was that the pilot, and the associated collaborative working, would be a great opportunity to share knowledge and forge closer links across different disciplines and service areas. As the pilot progressed we heard feedback from different community teams that their involvement in the pilot had given them a greater knowledge and understanding in relation to heart failure, which improved their confidence when dealing with patients with heart failure. Given the increasing importance of integrated care for patients with long term conditions, this is a major benefit of the pilot; it provided a practical opportunity to develop an integrated approach and forge collaborative relationships with colleagues in related teams.

“Developing this pilot has really helped us to develop cross team working and relationships – we understand each other better now as a result”

Reducing length of stay – even in the early stages of the pilot, sites had already identified the potential for home based IV diuretics to support early discharge from hospital, thereby reducing the length of stay for the patient.

Wider roll out – the sites involved also recognised at an early stage that the pilot had the potential to influence the adoption of this approach in other parts of the country. It was recognised that the pilot aligned well with the policy drive to move more care into the community and provide greater patient choice.

5.1.3 Emerging Successes

The most notable early success in the initial phase of the pilot was when sites made the transition from set up to delivery and had treated their first patients. This was seen as a real landmark for the sites and just reward for the effort. Every patient that had a positive outcome, and a positive experience overall, was rightly viewed as a success for the pilot as well.

The manner in which the concept has been received and the positive response from different parts of the healthcare system contributed to the early successes. This is not to say that getting this level of buy in did not come without effort, and there had been some resistance or uncertainty experienced from small pockets, but largely the concept received support. This is reflected in the levels of collaborative cross-team working that enabled delivery to happen.

5.1.4 Lessons learned

Personal and professional development

Many of the lead staff for the pilot sites did not have previous experience of new service design and development. This had given them the opportunity to develop a range of skills and knowledge, including:

- ★ developing policies/guidelines/protocols and seeing them through the approval process
- ★ delivering presentations – sometimes to large audiences
- ★ engaging and influencing stakeholders
- ★ influencing and developing cross team collaboration
- ★ arranging training and procuring equipment
- ★ developing paperwork
- ★ writing articles for journals

Even during our final consultation with pilot leads, many still referred back to this learning as being most significant and valuable for them.

The importance of recruiting well

We also heard about the importance of having the right person in the role of pilot lead, as they were critical in making it happen.

“It’s so important that you get the right person in place – someone who has the right experience, happy with autonomy and able to build relationships”

Don’t despair – it takes time to set up the service

One of the most significant learning points in the early stages of the programme was in relation to the time it took to complete the lead-in and development work required. This included delays in recruiting backfill, engaging

stakeholders, arranging training, gaining feedback on protocols, the various stages of approval that protocols must go through. This all took time. Our findings show that on average this stage will take around six months (with the same level of dedicated resource).

In terms of the time required to develop and gain approval for the protocol, two pilots found a pragmatic way to shorten this process, by making the IV diuretics protocol an addendum to an existing protocol.

Length of intervention

Whilst the original guidance from BHF did not indicate a maximum length of time a patient could receive IV diuretics, most sites had originally expected an intervention to last only a few days. The pilots that were first to get started found that it could be considerably longer. Whilst this was not necessarily an issue for the patient, carer or HCPs, it did forewarn other sites that had not yet started (i.e. for workload and logistical planning).

5.2 Learning from the delivery phase

5.2.1 Referral sources and support from other health professionals

During the initial stages of the programme, some pilots were planning to accept referrals from a variety of HCPs, not only the existing caseload of the community Heart Failure Nurse Service. Some of their awareness-raising activity was therefore focused on encouraging other HCPs to consider the IV diuretics service as an alternative to admission for eligible patients. It is important to note, however, that most of these pilot sites expected that this would come at a later stage, as the pilots progressed.

Data on referral sources for the final evaluation was given for 90 of the 96 patients treated. The final data shows that 84% of patients (76) came from the local community Heart Failure Nurse Service caseload. 16% (14) of patients were referred through other sources including:

- ★ Cardiology (8%, 6)
- ★ GP (6%, 5)
- ★ Care of the Elderly Team (1%, 1)
- ★ Frailty Managed Clinical Network (1%, 1)

Over the duration of the pilot, sites have experienced varying levels of buy in, support and involvement from different parts of the health service. The following summarises the most common themes across the sites:

- ★ most GPs recognised the benefits and were supportive, but in a passive way (they were positive about the service treating their patients, but did not want to be actively involved); however toward the end of pilot, in some areas GPs were starting to take a more proactive role such as agreeing to prescribe the diuretic or actively referring patients
- ★ community nursing teams, whilst positive about the service, often did not have the time or resource to actively participate; there was a notable exception to this in one site, where a multi-disciplinary team delivered the IV diuretics service
- ★ some cardiologists were actively supportive of the service, as it aligned with their interests in heart failure, whilst others were less interested due to their own areas of specialism; we did hear one instance however where some consultant cardiologists were wary of moving a traditionally acute-based and medically-led procedure into the home using a nurse-led model

One pilot that has since had their pilot extended by their local health board have been working with their local palliative care team to encourage and help them adopt the protocol and use it themselves with suitable patients on their caseload.

5.2.2 Patient numbers

The numbers of patients coming through the pilots was lower than expected at the outset, at both a local and programme level. The programme was never a 'numbers game' but this has impacted on the ability of some sites to develop a business case that ensures future delivery. However, two sites have had their pilot extended so that they can gather further evidence, and another was able to use evidence from subcutaneous diuretics delivery to build their case. In one case, the low patient throughput also affected the provider organisation's desire to pursue development of a business case, as it questioned whether the service was the most appropriate focus of funding.

There appear to be several reasons behind the lower-than-expected numbers:

- ★ suitability
- ★ uncertainties around estimating numbers of patients who would benefit from and be suitable for IV diuretics at home
- ★ optimised condition management

Suitability

Sites recorded the data for patients considered but not selected for the pilot on a monthly basis. Data from sites' monthly returns shows that 209 patients were considered but not selected for the pilot, from the start of the pilot until the end of February 2014. On paper their condition and symptoms indicated their eligibility for treatment, but on further assessment they were either clinically or socially unsuitable.

Reasons patients were not selected for the pilot	Number of patients
Medically unsuitable	110
Social/home circumstances unsuitable	23
Insufficient capacity within the team	8
Other	68

Sites were asked to capture further details of patients who were considered but not selected for the pilot. This information was provided for 81 of the 209 patients in this category. 72% (57) were male and 28% (22) were female. The largest proportion of these potential patients lived with their partner or spouse (51%) or lived alone (38%) and the others lived with other family members or carers (sons, daughters, sister).

All of the patients considered met inclusion criteria in that they:

- ★ had confirmed diagnosis of heart failure (100%)
- ★ were living in the community (100%)
- ★ were accepted by the Heart Failure Nurse Service (100%)

The most common reasons that patients were deemed unsuitable were medical, including:

- ★ poor renal function
- ★ blood pressure too low
- ★ chest pain or chest infection

Other reasons why patients were deemed medically unsuitable included:

- ★ patients responding to increases in oral medication
- ★ patient admitted to hospital before they can be assessed for the pilot
- ★ patient's mobility is too limited
- ★ patient has started subcutaneous diuretics

- ★ patient's entering palliative care
- ★ patient requires high doses of furosemide
- ★ patient was not passing urine
- ★ Clostridium difficile
- ★ hyponatraemia
- ★ cardiologist recommending in-patient treatment
- ★ poor venous access/difficulty of cannula insertion at home

A number of patients were also considered unsuitable for social reasons. This was usually due to the fact that the patient lived alone and lacked the necessary support within the home environment, especially where the individual was particularly frail or unsteady. In two instances individuals' houses were considered unsuitable for home-based treatment where the home was not clean and may have posed an infection risk.

In five instances patients declined to participate in the pilot:

- ★ one patient was not confident that they could cope with the treatment at home as they lived alone
- ★ two patients wished to persist with their oral diuretic regime
- ★ two patients indicated that they would prefer to be admitted to hospital.

In one instance a patient was considered unsuitable because their carer wanted them to go into hospital. The carer felt that the patient was too unwell to stay at home.

Uncertainties around estimating

This was a new service that had not been delivered before. When staff were developing estimates for the number of patients that would be treated through the service there were still several unknowns:

- ★ estimates were based on patients being treated in hospital who may have been suitable for home based treatment; however, throughout the evaluation lead staff and colleagues within acute settings have reported that their hospitals' data collection systems were flawed with no specific coding for inpatient episodes relating to IV diuretics; the best they had available was a code for heart failure, but also reported that episodes were often inaccurately coded
- ★ the protocols for the service had not yet been produced at the time of application, so it would have been difficult to accurately assess the number of people that would be clinically eligible based on historical data
- ★ even those patients who were clinically eligible may not be socially suitable for community-based treatment
- ★ changes in the oral diuretic regime of patients often negated the need to deliver IV diuretics (discussed in the next section)

The fact that so many patients were considered but rejected for the pilot reflects these unknowns. More than double the number who were accepted for the pilots turned out to be either clinically or socially unsuitable, despite appearing suitable at first.

Optimised condition management

When a patient was identified as being a possible candidate for community-based IV diuretics by their Heart Failure Nurse Service, they were reviewed by the lead member of staff for the IV diuretics service. This often resulted in changes to their oral regime first (in consultation with a cardiologist). In 16 documented cases, this led to the patient's symptoms being managed without the need for IV diuretics.

Even for those that went on to have IV diuretics, the time spent with the nurse led to a review of their wider management plan (including social care) and medications, to optimise their management once the treatment finished.

Pros and cons of lower numbers

In the early stages of the pilot, the low numbers of patients being identified and treated did have one advantage. Some sites would have really struggled to accommodate more patients. As sites have progressed through the pilot, developed confidence and adapted their delivery models, they were better prepared to cope with higher numbers. Expanding referral routes and supporting early discharge are just two of the options being explored by sites that have continued their service beyond the pilot phase.

The most significant negative impact however is the risk in terms of the sites ability to develop a case to continue the service. We discuss this further in section 5.3.4.

5.2.3 Capacity

The challenges and risks relating to capacity have been an ongoing and consistent theme throughout the evaluation. In most instances the challenges and risks have reduced over time as the service has become more consolidated and confident. However they do remain to varying degrees:

Vulnerability of the Service

For most pilots, delivery was embedded within the Heart Failure Nurse Service. Where not embedded, the pilot was usually delivered by one or two specialist staff but with extensive interface with the Heart Failure Nurse Service (and sometimes the involvement of other community teams).

Even though the role of pilot lead provided additional capacity, the service was hugely reliant on the pilot lead as well as other team members and other teams; this made the pilots vulnerable to staff absence or turnover. It only takes a slight reduction in capacity or change in staffing to make delivery of the service very difficult at best and impossible at worst. Several sites spoke of the challenges of delivering the service during periods of staff absence. Instances include:

- ★ one of the original sites had to withdraw from the pilot due to the challenges of replacing a member of staff who went on maternity leave
- ★ one site had to pause their funding contract for a period of time to accommodate staff turnover and sickness absence
- ★ another site paused for several months due to staff turnover

This vulnerability is inextricably linked to the management, structure, caseload and scale of the Heart Failure Nurse Service. It is also influenced by the extent that delivery is supported by other community teams. In a larger Heart Failure Nurse Service (or a service well-supported by other community teams), there is more scope to share the expertise across a larger group, thus reducing the risk of being without IV diuretics expertise. However in smaller Heart Failure Nurse Services, this is more difficult, and these are more dramatically affected by staff absence and turnover. Ultimately the Heart Failure Nurse Service caseload must be managed, even if this means that the IV diuretics service needs to take a back seat.

Geographical factors

Some of the sites cover large geographical patches and/or rural areas. This can create additional capacity challenges. Individual patients may only live a few miles further away from the IV diuretics staff's base than patients in smaller or more urban patches, but when multiple patients are being treated on the same day, the distances between patients' homes can make for significant additional travel time from patient to patient. In larger urban settings, traffic can cause significant time challenges too.

As Nottingham Citicare move beyond the pilot phase and into one of commissioned service they are exploring whether it will be more effective to allocate different areas to different staff to manage logistics better and reduce travel time. This is a model that was adopted successfully by the Ayrshire and Arran pilot.

Resource intensive delivery models

Two sites used a delivery model that, for safety purposes, involves two nurses attending the patient's home – one to check the IV diuretics dose and one to administer the IV diuretics. Whilst the nurse checking the dose can leave once the treatment has started, it does require additional resource. However, as the pilots progressed, and staff became more experienced and confident, they were able to reduce the amount of time that both nurses were in the patient's home. One of the sites is also exploring how nurses from different pay bandings can be used to reduce the cost of delivery further.

The ways in which other sites tackled this included having the dosage checked before leaving base, so that only one nurse has to go to the patient's home. In Glasgow they complemented this approach by dosing in 50mg increments, as IV Furosemide comes in 50mg vials.

5.2.4 The importance of the dedicated funded post

One of the earliest learnings coming through from the sites was the critical nature of having dedicated resource, particularly in the initial set up and development phase. The importance of this has remained evident during our final round of consultation with supplementary sites (who are developing the service with no additional funding or resource). Although each of the supplementary sites that we have involved in the evaluation have continued to make progress, none of them have yet reached the stage where they have moved to delivery of the service. In all instances the most significant challenge has been doing the required set up and development work alongside 'the day job'. It has meant that the develop process can be stop-start, with progress only being made when capacity is available.

5.2.5 Spreading the load

Sites found that there was a careful balance to strike in terms of spreading involvement and expertise to mitigate against capacity issues, whilst still ensuring they could involve people enough to maintain competence in cannula insertion and administering IV diuretics.

Pilot sites have taken different approaches to spreading the load, including:

- ★ training other staff within the Heart Failure Nurse Service to administer IV diuretics, with the lead nurse accompanying them on their first visits
- ★ staff being allocated a geographic area to cover, with colleagues from other patches providing cover and additional capacity as necessary

One rural pilot faced a multitude of capacity issues. A culmination of staff turnover, reduction of one staff member's working hours, and sickness and illness meant that one part time staff member was effectively covering all three large, rural geographical areas. This highlights just how vulnerable services are to capacity issues. Moving forward the plan is to up-skill the whole Heart Failure Nurse Service to ensure that delivery of home-based IV diuretics is just one of the competencies that nurses on the team have.

There are also challenges in teams where not all Heart Failure Nurses are nurse prescribers. For example in Leeds all four of the nurse prescriber Heart Failure Nurses are already involved in delivering the IV diuretics service, but there is a need to spread the workload across the whole Heart Failure Nurse Service. In this case, the pilot lead is looking at a nurse prescriber prescribing and defining the dosage, and another non-prescriber Heart Failure Nurse administering the IV diuretics and monitoring the patient. Increases in dosage will be decided by the nurse prescriber based on the patient's monitoring data.

5.2.6 Seven day service

Few pilot sites were able to provide a seven day IV diuretic service. For most this was a decision that had been taken at the outset based on current working practices and/or capacity. However, for one site the original

intention had been to deliver a seven day service, but the infrastructure and support from other services that was required to deliver weekend cover fell through due to financial issues.

Where a Monday to Friday service was operating very few people would be started on a treatment schedule on a Thursday or Friday as they would have to stop the treatment over the weekend. This would usually mean that anyone identified late in the week would be scheduled to start the following Monday. As patients were rarely emergency cases, and were being monitored by the Heart Failure Nurse Service, it was possible for staff in the pilots to plan the start of the treatment.

A key question that emerged during the evaluation was the impact that a break in treatment had on the overall length or success of treatment. Leeds is the only service that changed from a five day service during the pilot to a seven day service when commissioned after the pilot. The service lead there reports that there has been no impact on length of treatment as a result of offering the service on a seven day basis.

There have been several examples where IV diuretics has been stopped over the weekend and on resumption of oral diuretics the patient responded sufficiently well that they did not have to restart the IV diuretics after the weekend. This raises the question of whether there are times that someone is kept on IV diuretics longer than they perhaps need to be. However, the data that has been gathered through the evaluation is not comprehensive enough to be able to answer this question.

5.2.7 Dosing protocols

Whilst the BHF guidance set out a suggested dosing regimen for stepped and fixed doses of IV diuretics based on the available evidence, sites have developed their own protocols that reflect local practice. Consequently, dosing protocols vary widely, especially the maximum allowable dose.

As the pilot progressed, some sites with more conservative dosing protocols amended them to extend the maximum allowable dose, based on the experiences of sites with higher dosing protocols.

The patient data is inconclusive about whether a higher maximum dose leads to a shorter length of treatment. It is important to note that heart failure patients in any setting are highly variable in their responses to treatment, and without a clinical trial it would not be possible to draw any reliable conclusions about the impact of higher doses on length of treatment. However our data does demonstrate that higher doses can be administered safely in the home without unusual levels of complications.

5.2.8 Stage on pathway

As the pilot progressed some sites started to raise questions about whether IV diuretics could be introduced earlier rather than being used as the one of the last steps in the diuretic pathway. Oral diuretics are seen as less intrusive for the patient while giving them greater control, and in the past IV diuretics would mean a hospital admission as well. With it now available in the home setting it prompted the question of what stage IV diuretics should be considered in a patient's treatment.

For the duration of the pilot it still remained as an option to be considered after all feasible oral diuretic options had ceased to be effective. For those sites that have continued to deliver the service beyond the pilot phase the same approach is being taken.

5.2.9 Where does subcutaneous diuretics fit?

There has been increasing interest amongst pilot sites in the potential of subcutaneous diuretics as an option for patients who are not suitable for IV diuretics or are approaching the end of their lives. Over the duration of the programme there were a small number of instances where patients on IV diuretics were transferred to subcutaneous diuretics part way through the intervention as it suited their condition better. One of the pilot

sites was running a subcutaneous diuretic service alongside the IV diuretic service and has since had them both commissioned as a non-oral diuretic service. This site reported that there was great value in having both services as it gave them greater options in terms of patient care.

To help inform the debate about where subcutaneous diuretics might fit in a community-based service, BHF commissioned a small scale scoping study to investigate:

- ★ the current scale of community-based subcutaneous diuretics delivery
- ★ the level of interest in establishing community-based subcutaneous diuretics services
- ★ the clinical effectiveness and safety of community-based subcutaneous diuretics
- ★ patients' and carers' reactions to community-based subcutaneous diuretics
- ★ the potential cost effectiveness of community-based subcutaneous diuretics (eg bed nights saved)

The key findings of this scoping were:

- ★ 18 NHS organisations across the UK were already providing home-based subcutaneous diuretics, and a further 11 were planning to do so within the next 12 months
- ★ the treatment was clinically effective and safe, with the overwhelming majority of patients avoiding admission as a result
- ★ patients and carers responded well to having the treatment at home and preferred it to being admitted to hospital; they reported that it enhanced their quality of life and empowered them
- ★ delivering subcutaneous diuretics in the home is relatively inexpensive and is well supported by community colleagues such as district nurses and GPs; it can therefore generate significant cost savings compared to hospital admission for the treatment

5.2.10 A flexible menu

As the programme progressed, pilot sites shifted from the view of IV diuretics as a standalone service and began considering it more in terms of how it could be part of a menu of diuretic options in the future. We have discussed the interest that sites have shown in subcutaneous diuretics and this along with oral and IV delivery were considered to make up the diuretic treatment menu.

Three sites that have continued their service beyond the pilot period now also offer subcutaneous delivery. One site that has been unable to secure commissioning for the IV diuretics service is continuing to explore subcutaneous diuretic delivery. The option of subcutaneous delivery also adds to the potential for greater integration with other community teams/disciplines, as district nurses and other community teams are accustomed to administering medications subcutaneously, such as pain relief for palliative care patients. One site in particular has been able to make closer links with their palliative care team, who can now use the protocol to deliver IV or subcutaneous diuretics to their patients. In another site the team works closely with their district nursing team to delivery subcutaneous diuretics.

In a number of instances patients who were considered for the pilot were assessed as not suitable due to their home environment or social support available. This prompted pilot sites to think more widely about where treatment could be delivered so that it was still delivered in the community, close to the patient's home and wouldn't require overnight admission. Options for this included:

- ★ ambulatory care units
- ★ care homes
- ★ community hospitals
- ★ day case units

5.2.11 Opportunities for integration

The opportunity for working collaboratively with other community based teams/disciplines was something that pilot sites explored as they moved towards the end of the pilot and consider future delivery and sustainability (though not all). For some of the sites that have continued delivery beyond the pilot period they are working with other community teams to deliver the service (though this tends to be subcutaneous delivery). The subcutaneous diuretics scoping study revealed much greater integration in the delivery of subcutaneous diuretics than we have observed in the IV diuretics pilot. This is because GPs and community staff are more familiar with administering subcutaneous treatments in the home already and therefore felt confident in introducing diuretics into the portfolio.

For one site the continuation of the service has happened at the same time as a merger that sees the cardiac rehabilitation team and the community Heart Failure Nurse Service form a single team. This has given them the opportunity to explore how different staff and grades can be used to deliver the service to ensure maximum capacity and cost effectiveness.

The programme also prompted staff to question whether aspects of work that was being delivered by higher grade staff could and should actually be delivered by staff at more junior grades.

Telehealth was something that a few sites had explored and one site trialled the use of. Feedback was not enthusiastic and suggested that it could be beneficial only in a very limited number of circumstances. The reasons for this were:

- ★ **Visiting anyway** – if a patient is receiving IV diuretics then it is likely they will be getting daily, and necessary, assessments of weight/measurement, blood pressure etc. Therefore it is questionable what added value telehealth would bring. However for someone that is identified as potentially needing IV diuretics in the near future, using telehealth for remote advance monitoring could be helpful.
- ★ **The right patient** – feedback from those that had used telehealth suggested that it can only really be used with 'the right patient'. What they mean by this is that it can only be used with a self-motivated patient that will (and is able to) carry out all the self-checks required at the appropriate intervals (bearing in mind that there are instances where patients already forget to take their oral diuretics).
- ★ **Logistics** – In the site that had used the telehealth system, the contract that they had with the installation engineers means that it can only be installed in a patient's home on a Wednesday. This limits the practicality of using it.
- ★ **Past experience** – In some instances telehealth had been trialled before or other teams had used it and had bad experiences. There were stories of faulty or unreliable equipment (eg scales) which had led to patients entering the wrong information which resulted in unnecessary responses from community teams

As the pilot progressed sites tended to move away from the possibility of using telehealth to support IV diuretic delivery.

5.3 Learning from the transition beyond the pilot phase

The majority of the learning for the pilots came during the initial development and set up phase, and in the early months of operational delivery. New learning being reported at this final phase by each of the sites was relatively minimal compared to previous phases.

5.3.1 Early discussions with commissioners

The sites that have successfully transitioned to being commissioned/approved for continuation had entered into discussions with commissioners (or health board in Wales and Scotland) months in advance of the pilot coming

to an end. This has helped to minimise any lapse in service at the end of the pilot phase, thus maintaining momentum.

5.3.2 Changes to delivery model

As delivery staff confidence has grown and the logistics of cross-team working and collaboration have bedded in over the duration of the pilot, pilots have made small adjustments to their delivery model to create greater delivery efficiencies. For example, in one pilot a two-nurse model is used to deliver the treatment, and in the early phases of delivery this involved both nurses staying in the patient's home for the duration. Staff now have enough confidence that the second nurse (the 'checker') will now only be present during the initial stages of treatment delivery. This has reduced the total nurse time and therefore cost of administering the treatment.

Where sites have secured additional investment to continue their service, and recruited new staff as a result, they have looked afresh at skill mix to determine the appropriate staff grades required for each aspect of service delivery. For example, in another pilot site they have been able to recruit additional staff at band 5 and have adjusted their delivery model to use this resource in delivery of the service, thereby reducing the amount of band 6 or 7 staff involvement.

5.3.3 Impact of wider NHS changes

Whether a service will be continued beyond the pilot period can be greatly influenced, both positively and negatively, by changes and priorities in the wider local health infrastructure, regardless of how successful the pilot has been.

For example in one area, as the pilot was approaching its conclusion the Trust entered a process of turnaround which resulted in a freeze on innovations and new services until the turnaround is complete and the required savings are identified. This is not to say that the service will not be commissioned in the future, but it does mean that the home-based IV diuretic service has had to cease delivery.

In another area however, the pilot has been extended whilst being integrated into to a wider restructuring pilot. The community Heart Failure Nurse Service and the cardiac rehabilitation team are being merged to form a single primary cardiac care team. This provided the opportunity to include the home based IV diuretics service as part of the new service specification. In addition, the merging of the teams is also giving scope to explore how new members of the merged team can support delivery of the home based IV diuretics service.

5.3.4 Low numbers – limited evidence

As a result of low throughput numbers, some sites had a relatively limited evidence base on which to build their business cases. In two sites, this has meant that commissioning/continuation is for an extended pilot only at this point.

At time of writing, one pilot has only had two patients through the service. The service covered a relatively small population base, so numbers were never expected to be high, but staff turnover also affected throughput. Consequently the evidence from the pilot is unlikely to be sufficient to justify further investment. However, the staff are exploring other options, such as seeking to encourage other adjacent commissioning groups that cover areas with low populations to commission a shared IV diuretics service. In theory this would provide a big enough pool of eligible patients to justify additional investment. However, the team are awaiting the final evaluation report to see if the evidence contained for the overall programme will be sufficient for them to build a case.

Two other sites, have secured extensions which will allow for further evidence to be gathered, despite the numbers coming through the pilot being insufficient for the commissioners/health board to commit to long term inclusion of the IV diuretics service as part of mainstream service delivery. In one case, the extension was for 6 months to further develop the evidence base. Initial signs are positive with the site having almost reached their target with

a couple of months to go. In the other case, the service has been extended for two years as part of a new restructured team, again to allow time to supplement the evidence base.

5.3.5 An integrated diuretics service

In one site where they have also been delivering a home based subcutaneous diuretics service (outside the scope of the pilot), the ability to bring the different evidence bases together to present to commissioners strengthened the case for additional investment. This has resulted in a community-based non-oral diuretics service being commissioned which includes both subcutaneous and IV delivery.

Having the option to use both delivery methods increases the number of potential patients that can receive treatment. For sites that have experienced lower numbers and challenges in developing a business case there may be scope to develop a new case based on delivery of both methods.

6 CONCLUSIONS

The pilot set out to answer a number of questions. In this chapter we answer them based on the findings of the evaluation.

6.1 Does home-based IV diuretics work?

6.1.1 Is it clinically effective?

The majority (63%) of treatments have been successful, with achievement of target weight loss and/or oedema reduction and/or resolution of patient symptoms. However, a total of 79% of interventions did not involve hospital admission, indicating that some improvement was achieved for a further 16% of patients.

In addition, the time IV diuretics teams have spent with patients in their homes during the treatment has generated a number of benefits:

- ★ educating the patient and carer about heart failure
- ★ empowering the patient and carer to manage the condition more actively
- ★ reviewing and improving the patient's wider care plan

There have also been instances where a referral for IV diuretics has led to a detailed review of a patient's condition and medications. By optimising their medications, the nurse has been able to improve and stabilise the patients' symptoms whilst avoiding the need for IV diuretics.

The delivery model – bolus dosage, usually once daily – appears to be effective, although it is worth noting that a successful intervention can take more than a week, and sometimes considerably longer.

Most of the pilots only operate on weekdays, so the patient must revert to oral diuretics on weekends. Whilst pilot sites question whether this ultimately extends the length of time a patient needs IV diuretics, there have also been instances where a patient has begun to respond to their oral diuretics again over the weekend break in IV treatment; this had not been expected, and if a seven day service had been operating it is possible the staff would have continued with IV diuretics for longer.

The small scale in-patient comparative study showed a higher success rate for patients treated in hospital, with all interventions being successful against at least one of the three criteria (target weight loss, target oedema reduction and resolution of symptoms).

6.1.2 Is it safe?

Only a very small proportion of patients treated at home have experienced serious complications requiring hospital admission. Some patients experienced problems with renal function and blood pressure that were treated successfully whilst continuing with their IV diuretics. There were some minor issues with dislodged cannulas, and there were no infections or phlebitis related to the treatment.

Overall, the current data suggests good levels of safety.

A number of admissions were required for conditions unrelated to the IV diuretics treatment, which would have occurred whether the patient was at home or in hospital.

Our small-scale in-patient comparative study revealed fewer complications for patients receiving home-based treatment compared to those in hospital, but in common with home-based patients the complications experienced by patients in hospital tended to be minor and were managed whilst continuing treatment. In both patient groups, there were no incidences of Healthcare Associated Infections that were attributable to the IV diuretics treatment.

6.1.3 Does it improve patient and carer quality of life?

Due to the severity of their condition, and in some cases the end of their lives, not all patients have been able to provide feedback to the evaluation. Likewise some carers have not been able to participate because of the worsening condition or death of the person they cared for. However, even those that were unable to complete survey questionnaires or speak to the evaluation team provided positive feedback to the staff providing the IV diuretics service.

Those that have participated have been overwhelmingly positive about the experience. Inevitably, some carers find the worry and responsibility of having the patient at home during a complex treatment a challenge, but only a small number would prefer hospital admission. None of the patients would prefer hospital admission.

This positive feedback suggests that home-based IV diuretics would pass the 'friends and family test'³ that forms 12.5% of the NHS Quality Premium, which Clinical Commissioning Groups can access for improving the quality of the services they commission.

In addition to the convenience, comfort and privacy of having the treatment at home, many patients and carers found the quality time with a specialist nurse particularly helpful. It gave them time to ask questions, and they also valued the consistency of being treated by a known and friendly face. Nurses reflected that this time also empowered patients and carers to self-manage more effectively; for example understanding the need to adhere to fluid intake targets.

For the majority of patients, home-based IV diuretics has been clinically effective, but those who were not treated successfully may well have had a successful treatment if admitted to hospital. However, this needs to be considered in the context of patient/carers satisfaction and safety too. Our findings suggest that, given many patients' desire to avoid hospital admission, the cost effectiveness of a home-based treatment and the good safety profile, where a patient is assessed as appropriate, home-based IV diuretics is sufficiently effective to justify using this as a starting point with admission as a last resort.

6.1.4 Is it cost effective?

Once a service is up and running, there is the potential to generate significant savings in bed days and delivery costs compared with admitting patients to hospital.

The start-up costs are also relatively modest – but essential. The time required to develop and establish the service appears to be prohibitive within 'business as usual', and therefore requires dedicated start-up resource.

Perhaps unsurprisingly, there appears to be a correlation between length of treatment and delivery cost; the longer the length of treatment, the more expensive it is to deliver. However, even where treatment lengths are longer, the savings are considerable. Unfortunately it is not possible to draw any conclusions from our data about

³ The 'friends and family test' is a simple question asking patients whether they would recommend a particular service to their friends and family.

whether different dosage protocols or seven day operation could reduce length of treatment and therefore reduce costs.

It is important to recognise that even the sites that have completed their funding period and treated the most patients were operating in 'pilot mode' for 18 months – working within a relatively limited set of eligibility criteria, and learning as they went. Those that have been continued as an embedded part of a wider service now have scope to consider widening eligibility, extending dosing protocols and combining with other complementary provision to make the service available to more patients. This generally leads to more throughput, and greater cost savings.

6.2 Is there an optimal delivery model?

Throughout the pilot, staff in the pilot sites have been particularly interested to know whether the evaluation could tell them:

- ★ the optimal dosing level (ie the dose that leads to most rapid resolution of symptoms without additional complications)
- ★ whether a seven day service would enable patients to have a successful outcome more quickly than those having to break their treatment over the weekend

Unfortunately data from the pilot does not point to any correlations that are helpful for either question. In addition, we have had access to information from the Leeds service which showed no change in average treatment lengths since the service changed from five day to seven day operation.

Given the inherent variability amongst patients with heart failure more generally, it is not possible to identify an optimal dose or length of treatment; what works for one patient may be too much or too little for another.

6.3 Does home-based IV diuretics fit with NHS policy?

In all the nations of the UK, health policy is focused on moving patient care as close to home as possible whilst maintaining safety and cost effectiveness. In addition, long term conditions are a key focus for all governments, with a particular interest in increasing self-management wherever possible. Home-based IV diuretics provides an exceptional fit with the NHS Cardiovascular Disease Outcomes Strategy's overarching ambition to improve outcomes in terms of clinical effectiveness, safety, a high quality patient experience and cost effectiveness. Home-based IV diuretics is effective across all of these domains and can therefore be considered an exemplar of service improvement within the spirit of the Strategy. In addition, it fits closely with a number of specific actions within the strategy including:

- ★ patients having access to what is recognised as the right treatment, including specialist teams
- ★ improving care for patients living with cardiovascular disease, and empowering and supporting them to live as full a life as possible after diagnosis or an acute event
- ★ improving end of life care for patients with cardiovascular disease and enabling them to be cared for in their usual place of residence when they are approaching the end of their life

In addition, home-based IV diuretics supports the NHS Quality Premium for Clinical Commissioning Groups in England, and contributes to the NHS England Outcomes Framework in Domains 2 and 4:

Domain 2 (improving quality of life for people with long term conditions) in terms of:

- ★ increasing the proportion of people feeling supported to manage their condition
- ★ reducing time spent in hospital by people with long-term conditions
- ★ reducing unplanned hospitalisation for chronic ambulatory care sensitive conditions

Domain 4 (ensuring that people have a positive experience of care) in terms of:

- ★ bereaved carers' views on the quality of care in the last 3 months of life
- ★ peoples' experience of integrated care

Many heart failure patients treated with IV diuretics are approaching the end of their lives, and providing the option of having this service delivered in the home aligns closely with the Department of Health's End of Life Care Strategy: Promoting high quality care for all adults at the end of life. This strategy calls for strategic approach to commissioning integrated end of life services across the whole care pathway and increasing the opportunities for people to die in the place of their choosing. Home-based IV diuretics specifically supports this in terms of providing rapid access to appropriate care and the delivery of high quality services in all locations.

In view of the early success of the pilot, and its close alignment with policy, BHF submitted evidence from the earlier phases of the evaluation to the National Institute for Health and Care Excellence (NICE), for consideration to become part of the Quality, Improvement, Productivity and Prevention (QIPP) collection of case studies for increasing productivity and improving quality of care. In December 2013, the case study, *Home administration of intravenous diuretics to heart failure patients: Increasing productivity and improving quality of care*, was accepted and published by NICE.

In summary, home-based delivery of IV diuretics aligns strongly with current NHS policy (and it is highly unlikely that policy will shift towards more hospital-centric care going forward). Where it is appropriate for patients and they have the right social circumstances, home-based IV diuretics offers a safe, clinically effective way to deliver a service more cost-effectively and with greater patient and carer satisfaction.

6.4 Can home-based IV diuretics be a sustainable service?

Patient numbers have been smaller than expected. However, this has not been a barrier to some of the pilot services successfully securing future funding, despite commissioners and some clinical leaders anecdotally expressing concerns about numbers. The combination of clinical effectiveness, safety, cost effectiveness and patient/carer satisfaction is a compelling one; it presses all the buttons for commissioners of services.

However, home-based IV diuretics can only be sustainable in the longer term as an embedded part of a wider service, rather than having to stand (and be counted) alone. Sites that have not secured additional funding intend to pursue this route. This provides the environment in which capacity and competence issues can be managed, whilst providing a menu of services to meet each patient's unique needs.

This menu of services may combine different delivery methods, such as IV and subcutaneous diuretics, and/or different treatment locations such as day case and ambulatory care units. Workload may be more predictable and higher patient numbers offer the scope for bigger savings (which are more appealing to commissioners).

It is important to note that whilst the services funded by the programme are at the stage of exploring how to make the service sustainable, those supplementary sites that didn't receive funding are struggling to get their services started. This suggests that the dedicated resource to begin the service is crucial, and feedback from the pilot sites with funding for dedicated resource confirm this.

6.5 What strategic added value has been delivered by the pilot?

Strategic added value is a term used to describe the effects of projects and programmes that make a significant impact on the activities of partners and stakeholders rather than just the directly visible effects on the target end beneficiaries (patients). It is used to reflect and account for the full range of impacts that a programme can have on the way services are delivered, alongside the tangible impacts on the target group.

Strategic added value is made up of three core components that together can lead to systemic changes:

- ★ strategic leadership and catalytic activity – providing the vision and leadership to encourage others to take action themselves; kick starting innovative approaches, where others would not take the risk independently
- ★ strategic influence – encouraging others to mobilise their resources in line with best practice, influencing collectively on behalf of other (eg national or local policy)
- ★ synergy and engagement – stimulating collaboration, co-ordination and knowledge sharing between partners, to generate new ways of working that deliver 'more than the sum of the parts'

Below we explain the strategic added value delivered by the pilot.

6.5.1 Catalysing adoption of an innovative model

BHF has pump primed 10 sites to be able to dedicate the necessary resource to developing and establishing home-based IV diuretics services. This has been crucial to the ability to get the services off the ground, so that they could generate the evidence base. The experiences of the supplementary sites is instructive here; they did not have dedicated resource, and remain on the starting blocks despite their enthusiasm to adopt the approach.

Several of the original sites that have reached the end of their funding are continuing to deliver home-based IV diuretics, and continue to embed this as one of the options in their 'toolkit' for meeting patients' needs. Several are also looking at how to build on the confidence and knowledge acquired through the pilot to develop complementary service offerings, whether in additional locations or using additional administration methods (eg subcutaneous). Without the pump priming to get the services off the ground, none of these embedded services or extended services would exist.

6.5.2 Influencing wider adoption of home-based IV diuretics

BHF's funding of the pilot has strengthened the evidence base for the effectiveness, safety, cost effectiveness and patient acceptability of home-base delivery of IV diuretics. The successful development of the QIPP case study enables BHF to widen the influence of the pilot, by encouraging other NHS organisations to consider adopting the practice.

6.5.3 Stimulating shared learning

BHF has created a forum for the sites to come together and share learning regularly. However, the people leading each of the pilot services have played a role in this shared learning too – they have sought each other out between learning events, to seek advice and share ideas and resources. These supportive networks will endure beyond the pilot.

6.5.4 Partner engagement

The pilot sites have engaged a variety of operational and strategic partners (such as HCPs in other community teams and senior leaders and clinicians in the acute setting) in the development and delivery of their services, and driven forward a more integrated approach to caring for people with heart failure. In many cases this has bridged organisational boundaries and stimulated dialogue about where and how services should be provided. This can act as a practical exemplar of integrated care in action.

As well as delivering measurable outcomes for patients, the pilot has generated considerable strategic added value in all three domains: it kick-started the adoption of a new service model and strengthened the evidence base so that others can be influenced to adopt good practice in future; it provided a practical platform for developing integrated care approaches; furthermore it fostered collaboration and created a learning community that accelerated progress and will endure.

6.6 What are the key challenges that need to be overcome in establishing a home-based IV diuretics service, and what solutions have been found?

Throughout the duration of the pilot and evaluation a number of challenges have been identified and overcome at each phase as the pilots progressed. The following sections summarise the challenges, solutions and key learning from the different phases of the evaluation:

6.6.1 Set up and development phase

Challenge	Solution
Raising awareness and gaining buy in from other parts of the healthcare system	<ul style="list-style-type: none"> ★ Securing the commitment of senior clinical staff to act as champions for the pilot – help get their peers on board ★ Presenting at conferences and forums ★ Present during CPD/learning events (eg GP learning events) ★ Production and dissemination of literature (eg one site produced an information leaflet specifically for GPs) ★ Attending team meetings ★ Formal and informal one-to-one discussions ★ Including managers of functions with required involvement on the steering group
Prescribing and storage of diuretic	<p><u>Storage</u></p> <ul style="list-style-type: none"> ★ Agreement with local community hospitals to hold a stock of the drug ★ Agreement with local pharmacies to order/hold stock of the drug ★ Stock of treatments held on site <p><u>Prescribing</u></p> <ul style="list-style-type: none"> ★ Anticipatory prescribing – whereby the patient is prescribed their IV diuretics when it becomes clear that they will need them at some point in the future. The shelf life of the diuretics is sufficiently long for this approach to be feasible. The diuretics can be stored in the home until such times as the patient needs them. ★ Securing the buy in of GPs to prescribe the drug, whilst making the process as simple as possible to minimise any potential additional work for them ★ Where more than one nurse on the team is a nurse prescriber, ensure that the same nurse is not prescribing and administering
Providing a 7 day and/or out of hours service	<ul style="list-style-type: none"> ★ Development of on call weekend rota for existing Heart Failure Nurse Service. However, there will likely be an additional cost associated with doing this. ★ Collaborating with a local out of hours service that can support delivery during the out of hours period

	<ul style="list-style-type: none"> ★ Accepting where this cannot be achieved and designing a delivery model that will minimise the disruption and any negative impact for those receiving treatment which spans over the weekend
Maintaining competence in cannula insertion	<ul style="list-style-type: none"> ★ Staff spending time on ward inserting cannula for patients or spending time with a paramedic team. Although this is not ideal as it is potentially time consuming, it does give a workable solution to the problem. ★ Consider use of single-use butterflies instead of inserting cannulas.. ★ Having back-up – although not directly related to maintaining competence, giving staff reassurance and added confidence by having fall-back plan could help ★ Agreement with paramedic service for them to provide on-call support if staff are having problems inserting a cannula
Securing backfill for the project lead	<ul style="list-style-type: none"> ★ During the planning stages, explore the organisation's policy and procedure relating to backfill, to minimise risk of delay ★ Share the workload of the project lead amongst the existing team rather than recruiting a single backfill post
Time taken to develop protocols/policies and have them ratified/approved	<ul style="list-style-type: none"> ★ Consider whether protocol can form an addendum to existing nursing and therapy protocols for the Heart Failure Nursing Service or existing IV protocols such as IV antibiotics ★ Some drugs & therapeutics and governance committees only meet every 2-3 months; plan for this in timing the launch of the service ★ Where other sites have progressed more quickly, use what they have produced as a starting point to accelerate the process
Progressing through the development phase	<ul style="list-style-type: none"> ★ Draw on the knowledge and experiences of other teams locally , eg IV antibiotics service ★ Draw on the learning and experiences from other sites that are at a more advanced stage. ★ Securing buy in from key stakeholders such as cardiologists and GPs at the earliest stage.
Long term sustainability	<ul style="list-style-type: none"> ★ Lead nurse to roll out the service to nurse prescriber colleagues, so that the service can become embedded in the Heart Failure Nurse Service. ★ Training of all community heart failure nurses in the team to be able to administer IV diuretics. ★ Train colleagues in other geographical patches to enable extension of the service in the future
Length of intervention	<ul style="list-style-type: none"> ★ be prepared, in terms of workload planning, logistics and capacity, for relatively long interventions

6.6.2 Delivery phase

As pilot sites progressed from the initial set up to delivering the service a range of different challenges were faced:

Challenge	Solution
Capacity to deliver an IV diuretics service	<ul style="list-style-type: none"> ★ Train and engage multiple staff across the Heart Failure Nurse Service or other deliverers to minimise capacity risks from sickness, staff turnover, etc. ★ Divide responsibility for areas across the team when covering large geographies ★ Factor in additional time requirements and accessibility issues for travel in rural areas ★ Split delivery between half-time posts to deliver the service rather than having a single full-time staff member – this allows more flexibility and coverage of a greater geographical area ★ Factor in time for liaising with other healthcare professionals, eg notifying GPs and out of hours services of patients' treatments and status
Safe delivery of IV diuretics	<ul style="list-style-type: none"> ★ Staff cross-check and sign off on IV Furosemide doses before treatment to increase patient safety and ensure only one staff member is required to deliver services ★ Maximise dosage accuracy by establishing incremental dosage measures (eg 50mg increments to reflect the volume in a single vial) ★ Clearly label and calibrate pumps to ensure they cannot be used for other services
Involving non-prescribers in delivery	<ul style="list-style-type: none"> ★ Arrange for a nurse prescriber to define and prescribe the dosage, whilst a non-prescriber administers the IV diuretics; review monitoring data together (both the prescriber and non-prescriber)
Lower patient numbers than originally anticipated	<ul style="list-style-type: none"> ★ Proactively identify patients from Heart Failure Nurse Service caseloads and a range of other pathways (e.g. GPs, Consultants, clinics) ★ Be prepared to take patients onto the pilot rapidly as there is often a small window when it is appropriate to deliver IV diuretics at home (eg before oedema advances and causes challenges around mobility) ★ Identify patients who would benefit from short, sharp treatments of IV diuretics more than extended oral doses ★ Expand referral routes
Out of hours and weekend delivery	<ul style="list-style-type: none"> ★ Where Heart Failure Nurse Services do not extend to the weekend, consider partnering with other services such as district nurses, rapid response teams or community/virtual wards to continue weekend care ★ Revert to oral diuretics over weekend and assess patients' response, as some patients respond better to oral diuretics following a short treatment of IV diuretics ★ Where possible, begin patient treatments at the beginning of a week to maximise the duration of continuous treatment

Maintaining competence in cannula insertion	<ul style="list-style-type: none"> ★ Ensure staff are regularly involved in cannula insertion as part of their services ★ Ensure different staff members are regularly involved in delivery of home-based IV diuretics to ensure competence is maintained and capacity is spread across the delivery team ★ Agree support from other services problems with cannula insertion, eg paramedic practitioner
Training staff	<ul style="list-style-type: none"> ★ Ensure there is capacity within the team to accommodate staff training to deliver IV diuretics alongside other duties
Developing a business case/evidence to inform future delivery	<ul style="list-style-type: none"> ★ Engage with commissioners early to identify evidence requirements ★ Engage staff and stakeholders early and build buy-in to the home-based approach ★ Identify best fit of the home-based IV diuretics service with other delivery models such as subcutaneous diuretics, early supported discharge, day wards, community/virtual wards, etc. (including any benefits to scale of delivering a menu of treatment options)

6.6.3 Moving from pilot to mainstream delivery

As sites have reached the end of the pilot period, there have been challenges for some in relation to continuation of the service, whilst those that have continued the service are also facing some new challenges. Some of the challenges remain unresolved but where possible we have detailed the things that sites are exploring in order to overcome the challenges:

Challenge	Solution
Insufficient patient numbers/evidence to make the case for continuation of the service	<ul style="list-style-type: none"> ★ Two sites have secured additional investment to fund an extension to the pilot period, in order to further build the evidence base and demonstrate need/demand for the service ★ Two sites will be exploring the feasibility of having a single service commissioned across several commissioning group areas, to provide a larger pool of potential patients for the service ★ May need to accept that, although safe, effective and wanted by patients, a home-based IV diuretics service may not be cost effective in some areas ★ Explore potential for widening referral routes to increase patient numbers
Hitting targets set by commissioners for commissioned service	<ul style="list-style-type: none"> ★ Where relevant, recruit and train new staff as soon as possible to get service up to maximum capacity at earliest opportunity ★ Where possible, ensure responsibility for the service is spread across all team members (everyone having and knowing their role and responsibilities)
Continued pressure on capacity for continued and/or commissioned services/extended pilots	<ul style="list-style-type: none"> ★ Ensure new staff are trained and brought up to speed as soon as possible ★ Develop working relationships with other community teams to bring in additional capacity <p>Spread responsibility for the service across the team; particularly where the pilot phase involved a smaller 'core' staff - it is important for every member of the team to see it as theirs</p>

Wider changes in the local health infrastructure causing uncertainty about the future of the service.	★	Remain up to speed regarding changes and respond appropriately
(UNRESOLVED CHALLENGE)		
Service to be sustained within current resource/funding	★	Explore ways of making the service more efficient to deliver and therefore more manageable within current resource
	★	Define what can be reasonably delivered within current resource and manage expectations
(UNRESOLVED CHALLENGE)	★	Consider embedding in other relevant services, e.g. IV therapy teams and palliative care teams
Trust turnaround process preventing the commissioning of new services	★	Develop business case and remain in communication with managers and commissioners
	★	Be ready for when the process is complete and new services are being commissioned again
(UNRESOLVED CHALLENGE)		

APPENDIX 1

PILOT CASE STUDIES

OVERVIEW OF SITES

The table below presents an overview of each site's current position. We discuss the progress and experiences of each site in detail in the following sections

Site	Pilot finished (Y/N)	Service continued beyond pilot period (Y/N)
Aneurin Bevan	Y	Y (6 month extension to gather additional evidence)
Ayrshire and Arran	Y	Y (Service embedded within existing HFNS and budget)
Dudley	Y	Y (Service embedded within existing HFNS and budget)
Durham and Darlington	N	N/A (Plans to embed the service within the existing HFNS and roll out to two other CCGs in Durham and Darlington)
East Sussex	Y	N
Glasgow	Y	Y (Planning to embed IV Diuretics service in role of HFNS across Glasgow)
Leeds	Y	Y
Nottingham Citicare	Y	Y (2 year pilot to gather further evidence)
Nottingham West	N	N/A
Stoke	Y	Y (Non-oral diuretic service commissioned – subcutaneous and IV)

THE PILOTS

Aneurin Bevan

Summary

- ★ during the pilot 13 patients treated, delivering 14 interventions of which 8 were clinically successful
- ★ pilot operated across 5 localities, working closely with different community teams in each locality to deliver the service
- ★ working across different localities has brought its challenges but also helped to develop the knowledge of wider community teams
- ★ the dedicated resource was a key enabler in the early stages because of the range of stakeholders to get on board
- ★ pilot has been the catalyst for increased
- ★ the board at Aneurin Bevan have recently approved a 6 month extension to the pilot to gather further evidence before deciding whether to approve on a permanent basis

Where the pilot has got to

The pilot period for this site ended in May 2013 and was followed by a break in delivering the home based IV diuretic service whilst they sought approval and additional funding from their board. The original intention had been to seek funding to cover 2 additional part time posts but they changed this and decided that one full time person would provide a better approach.

The Board at Aneurin Bevan felt that they need more evidence before they could approve the service on a permanent basis, feeling that the numbers coming through the pilot were too low to base their decision on. They also wanted to see communication and co-ordination across the 5 different localities was what it needed to be. Therefore the board have approved a further 6 month period of delivery along with the funding required to recruit an additional full time member of staff to provide the capacity required to run the service for a further 6 months.

During this time the service needs to demonstrate that they are getting sufficient numbers and cost savings to justify the additional investment. The 6 month extension period began in October and will run through the end of April 2014. It is worth noting that the extended service provides both IV and sub cut diuretics.

Delivery model and dosing protocol

The delivery model being used during the service extension is the same model that has been used over the duration of the pilot. The service covers five local geographies all of which have different structures for delivering community health care. In two of these localities they have the structures to support a 7 day delivery. The majority of referrals have come through the existing heart failure nurse caseloads though can also come in through in-patient consultants and GPs.

Community based teams from each of the five localities are responsible for administering the IV diuretics treatment which includes three District Nursing teams, a Rapid Response team and a Community Resource team. During the service extension they have been working to involve the palliative care consultants and palliative care community team as well. This has required some minor amendments to the service protocol to make the process clearer for what steps are taken should something go wrong during the treatment and also the arrangements around out of hours service. At present, if the palliative care team identify one of their own patients as requiring IV diuretics they will lead on it and work from the protocol. The next steps are for a service algorithm to be developed and produced.

The additional member of staff that has been recruited is responsible for conducting the initial assessment and is present whilst the first treatment is being administered to complete the necessary paperwork. Thereafter she will conduct follow up assessments with the patient as appropriate with the relevant community team continuing to administer the treatment.

After the treatment is completed the patient's GP and cardiologist are notified.

Dosing protocol	
Stepped or fixed	Stepped and fixed
Dosing range	40mg–80mg
Typical starting dose	80mg
Typical frequency	Once or twice daily depending on patient
IV method	Cannula (left in place)

Key patient data

Number of patients:	13
Number of interventions:	14
Number of clinically successful interventions	8

Challenges

The biggest challenge that the team faced over the duration of the pilot was in relation to working across a large but also varied geographical patch. There are different infrastructures in each of the localities the pilot was operating as well as mixed levels of buy in from the community teams required to support the pilot. The pilot lead however worked closely with the teams involved in each locality and provided training when it was needed which helped to minimise resistance. The pilot team now recognise that a more staged roll out across each of the 5 areas would have likely mitigated this and given them more time with each of the community teams in preparation for them starting.

Working across such a large patch with different local structures has also meant that the pilot had to work hard to get a fairly large and diverse range of stakeholders on board. The pilot recognise the time and effort required to do this and see that a dedicated funded post for the pilot was essential in doing this successfully.

Since the extension of the pilot a few of the different community teams involved in the delivery of the pilot have had changes of staff. This has meant that new staff need to be trained to get them up to speed with the service. Although this has required an investment of time the new staff are all very positive about the service. This is seen as something that will happen from time to time and does not present a significant challenge.

Successes

From an early stage the pilot staff had invested time in securing the buy in of a wide range of stakeholders and securing their buy in was seen as an early success.

Other key successes were related to patients, particularly where successful outcomes had been achieved. The Pilot staff reported that none of the patients treated wanted to go into hospital and being able to provide a treatment that prevents this is rewarding for all concerned.

The pilot has also resulted in development of knowledge and skills for not only the pilot lead but the staff in the community teams supporting the pilot. This obviously has a positive impact on the capability of community teams and the care that they provide.

We have discussed the challenge the pilot faced regarding mixed levels of buy in from some staff in the different community teams involved. Although these challenges were there, as the pilot progressed these were gradually ironed out and overall the collaborative working has been seen as a success. In addition palliative care teams are looking on with interest, though more at the subcutaneous aspect of what is being delivered. It has prompted palliative care teams to be asking the question "if this can be done for heart failure patients in the community what other possibilities are there?" The pilot has also sparked interest and appetite from other Heart Failure Teams across the whole of Wales.

During the pilot period the palliative care team had been watching on with interest. As the pilot has moved into this extended period of delivery the palliative care team are now fully bought in and use the protocol with their patient caseload.

Finally, it is also seen as a success that they have been able to have the service continued even though it is only for 6 months. The staff are confident that they will have the required numbers through the service to demonstrate to their board that it is a cost effective service.

The future

Over the period of the 6 month extension the service had been tasked with seeing demonstrating a saving of 50 bed days (roughly 25 patients at 2 bed days each). At the time of our consultation (February 2014) the service had demonstrated a saving of 40 bed days. This means that over the remaining two months or so of the pilot a further 10 bed days saved would need to be evidenced. The staff involved in delivering the service are very confident that it will be achieved.

Thereafter they are unclear whether a separate business case will be required or whether it is just a case of presenting the evidence on savings generated.

Ayrshire and Arran

Summary

- ★ the pilot at Ayrshire and Arran ran from since October 2011 and finished in October 2013
- ★ over the course of the pilot staff treated 10 patients, delivering 11 interventions, of which 6 were clinically successfully
- ★ the treatments delivered during the pilot have demonstrated to staff that IV diuretics can be safely administered in the home environment
- ★ feedback from patients and carers suggests that home-based treatment is preferable to hospital stays
- ★ treatment is delivered by the Heart Failure Nurse Service, with three nurses providing a five day per week service
- ★ while the pilot has ended, there are three members of the team trained to deliver IV diuretics and the heart failure nurse service continue to deliver the home-based IV diuretics service
- ★ patient numbers were lower than originally anticipated and as of February 2014 no further patients had been treated since the pilot period ended
- ★ the team's capacity to deliver home-based IV diuretics has recently been challenged by staff illness, staff turnover, and the need for remaining staff manage other workload
- ★ new staff will be trained to deliver IV diuretics to ensure that capacity is spread out across the whole team

Where the pilot has got to

The Ayrshire and Arran pilot began in October 2011 and finished in October 2013. The Heart Failure Nurse service in NHS Ayrshire and Arran has embedded home-based IV diuretics as a part of their service offering. NHS Ayrshire and Arran plan to continue to offer the service and will continue to follow the delivery model established during the pilot. New staff will be trained to deliver to IV diuretics to ensure that the capacity to deliver the service is spread across the whole team.

Following the pilot the lead nurse for the pilot has subsequently moved on to another role. While the capacity to deliver home-based IV diuretics treatment has been spread throughout the team, the team has faced challenges with sickness and absence and one staff member reducing their working hours, limiting the team's capacity. As a result, no new patients were treated from the end of the pilot funding period to February 2014.

Delivery model and dosing protocol

The delivery model has remained the same throughout the pilot and the team plans to use the same delivery model for the service in taking the service forward in future.

The area is separated into three largely rural areas, but does not include the area's islands. The service is delivered by three heart failure nurses, each covering one of the three areas. Each nurse is responsible for identifying patients in their geography and administering the treatment to these patients – though staff from other areas can provide support if necessary. The pilot was initially delivered in just one of these areas, but after six months nurses from all areas were trained to deliver home-based IV diuretics and the service was rolled out across all three areas within Ayrshire and Arran.

Patients are identified by the Heart Failure Nurse Service from their existing caseload and by referral from the cardiologist. Some GPs may also refer patients into the service. Patients receive a once daily bolus dose, stepped daily depending on response. A twice daily bolus was considered at the beginning of the pilot but was considered to be unfeasible with the team's other caseload and the geographical spread of patients. Staff report that even with a once daily bolus model it can be challenging to find time for both home-based IV diuretics treatments and other workload, suggesting that a twice daily model would only strain staff capacity further. Staff report that the

guidance is flexible and allows them to look at patients' histories and record of having diuretics to understand which treatment model might be best for them, and in some instances to bypass the additional oral dose.

The service is delivered solely by the Heart Failure Nurse Service and is not available on weekends and out of hours. Patients revert back to oral diuretics over the course of weekends where the service is not available. Following the assessment, staff will inform the patient's GP before commencement of the treatment, and will keep GPs and out-of-hours services informed of the patient's treatment throughout the intervention.

The pilot initially estimated that the team had capacity for one patient at a time per area due to the time required for preparation, travel, administration, and follow-up. This meant that while the pilot was limited to one area during the first six months of the pilot and during this period there was only the potential for one patient to join the pilot at any time. Following this period, nurses from the other two patches began to take on patients, increasing the number of patients that could be treated at once. This capacity is dependent on staff having the capacity to deliver treatment and manage the Heart Failure Nurse Service's other workload. Since the end of the pilot funding period there have been fewer staff, reducing the team's capacity to take on new patients. No new patients have been treated.

The site use McKinley pumps and is using both standard and butterfly cannula. The service initially took out cannula and butterfly following each treatment, however, these are now left in in all patients. Problems with cannulation have been minimal, although assistance from a GP was required in one instance.

Dosing protocol	
Stepped or fixed	stepped
Dosing range	100mg-250mg
Typical starting dose	100mg
Typical frequency	Once daily
IV method	Peripheral cannula (or butterfly)

Key patient data

Number of patients:	10
Number of interventions:	11
Number of clinically successful interventions	6

Challenges

During the setup stages of the pilot one of the key challenges was the length of time required to establish and agree the protocol, especially the dosing schedule. This took some time to finalise as it needed consensus from all the cardiologists. It then needed to go through the Drugs and Therapeutics Committee, which only takes place every 2-3 months which meant that it took longer than anticipated to get to the stage where they were prepared for delivery.

Once the pilot was established, the main challenges noted throughout the duration of the pilot delivery were:

- ★ capacity to deliver home-based IV diuretics along with other heart failure services
- ★ lower patient numbers than expected
- ★ lack of weekend cover forcing treatment to start the following week

Staff indicated that it takes a significant amount of time to see a single patient for home-based treatments. In addition to the time spent with the patient there is also time in preparation and in following up on treatments – for example, e-mailing doctors and out of hours services to ensure that all relevant services are aware of the treatment patients have had. Many small factors therefore contribute to treatments taking slightly longer than initially anticipated, making it challenging to treat more than two patients at the same time.

Staff also indicated that in Ayrshire and Arran significant amounts of time can be required for travel to remote rural areas. It is worth noting that patients in Ayrshire and Arran were, on average, second furthest from hospital when compared with other sites. Where patients do stay particularly far from the hospital, in remote or difficult to access rural locations, this can add extra travel time which exacerbates the challenges associated with limited staff capacity.

While there are three nurses delivering the IV diuretics service in Ayrshire and Arran, their focus is not purely on delivery of the IV diuretics service, but in ensuring that the full range of heart failure services are delivered. Staff have to fit in delivery of home-based IV diuretics with an increasingly heavy workload from the Heart Failure Nurse Service. This means capacity is squeezed and means that there is a limit to the number of patients the service could see at one time. While it was initially anticipated this would be three patients (one for each area and heart failure nurse) this estimation was subsequently lowered to a maximum of just two patients midway through the pilot. In addition, the capacity for the service to treat patients is also diminished by staff sickness and turnover and this has been problematic for the service since the end of the pilot funding period when one member of staff has been off sick, one has reduced their hours and one has moved on to a new role – this effectively reduces capacity across the team to manage the entire heart failure workload, leaving little or no capacity to deliver home-based IV Diuretics.

The number of patients fitting the criteria for treatment throughout the pilot was lower than initially anticipated. While this means that the service seen fewer patients initially anticipated, when capacity challenges are factored it may be that the team would not be able to support the levels initially anticipated due to the time and capacity required in delivery. However, due to the low levels of patients seen this means there is a challenge in maintaining competence and familiarity with the service as staff may go many months without delivering IV Diuretics treatments.

Another key challenge for the service has been the lack of weekend cover for patients receiving home-based IV diuretics. This has meant that sometime a patient assessed during the middle or end of the week will not begin treatment until the start of the following week to ensure they have treatment over a continuous period. This presents the possibility that patients may decline and staff indicated one instance where they felt that they could have prevented a patient from being admitted if they were able to offer a weekend service to deliver treatment at home.

Successes

During the setup phase of the pilot one of the key successes for the Ayrshire and Arran pilot was successfully engaging the relevant stakeholders and getting buy-in to establish the pilot. Having a funded post to support the development of the service was key to this, as it reassures stakeholders there is no additional work for them. During the early stages the lead nurse has spoken to a range of stakeholders in the hospital and primary care arena, including a number of GPs, and they were all very positive about the project. This buy-in has continued throughout the pilot.

Another success from the pilot was in training staff to ensure that staff were able to deliver the service and share capacity across the team. Early on in the pilot, the team's manager secured administrative support to reduce pressure on the team to give them time to develop the IV competency of staff across all three areas.

The biggest success from the pilot has been the successful delivery of 11 interventions with ten patients. Six of these have been clinically successful in either reducing patient's weight or oedema or resolving patient symptoms. These successes have highlighted that IV Diuretics can be safely delivered in the home setting and communicated through the Managed Clinical Networks (MCN) and Heart Patient subgroup and through staff presentations to groups such as the Scottish Heart Failure Nurse Forum.

Most interventions were socially successful and prevented patients from being admitted to hospital. Staff report that the patient and carer feedback has been very positive and this is confirmed by findings from patient and carer surveys. This suggests that the home-based nature of the IV Diuretics treatment is working to improve patient and carer experiences of healthcare services.

The future

The pilot is now finished and has been embedded within the Heart Failure Nurse Service. The team plans to continue to deliver the service using the model established through the pilot, however, the team has recently faced a number of capacity issues, including:

- ★ the lead nurse moving into a new role
- ★ staff illness
- ★ one staff member reducing their hours

These capacity issues impact on the team's ability to deliver the IV diuretics service and no patients were seen in the period between the pilot finishing in October 2014 and the evaluation research in February 2014. This highlights the capacity challenges in delivering an IV diuretics service, even when workload is spread across the team. The team is currently addressing these capacity issues and agreed that all new staff will be trained to deliver IV diuretics, ensuring that there continues to be capacity within the team even where there is staff turnover.

In going forward the team has also plans to consider the provision of early supported discharge services and to provide patients with the option for subcutaneous diuretics where appropriate, however, the team's ability to offer these services is reliant on having sufficient capacity within the team.

County Durham and Darlington

Summary

- ★ the pilot start was delayed due to organisational changes and began in August 2012 and is scheduled to complete at the end of July 2014
- ★ as of March 2014 the service has delivered six interventions to four patients, with five of those interventions being successful in reducing patient's weight or oedema, or resolving their symptoms.
- ★ the service is currently being delivered by the Heart Failure Nurse Service in the Darlington area only due to capacity limitations, however, there are plans to roll this out to the other two Clinical Commissioning Groups (CCGs) areas, with one of the CCGs having commissioned the service for a year's trial period beginning in summer 2014.
- ★ the Trust requires two nurses to be in attendance for each treatment due to patient safety concerns in administering IV furosemide at home
- ★ staff have faced difficulties cannulating a number of patients, but have overcome this by inserting midlines
- ★ the Trust is delivering the home-based IV Diuretics approach alongside an Early Supported Discharge (ESD) service to maximise savings in hospital bed spaces related to IV diuretics
- ★ delivery to date has shown that IV diuretics can be safely delivered to patients in their home
- ★ patient and carer experiences of the service were very positive

Where the pilot has got to

The Durham and Darlington pilot did not begin until August 2012 due to the impact of a range of changes and restructuring in the NHS. The pilot did not treat a patient until April 2013 and has now delivered six interventions to four patients, with five of those interventions being successful in reducing patient's weight or oedema, or resolving their symptoms.

While the trust covers the whole of County Durham, the pilot will be limited to the Southern CCG area. The Trust plans to roll out home-based IV diuretics services across all three CCGs in the area, embedding services within the heart failure teams. To date only services in the North and South have been commissioned and only the pilot in the southern CCG is operational.

Delivery model and dosing protocol

Patients are recruited from the Heart Failure nurse caseload and through the cardiologist and Heart Failure clinic referrals. A small number of GPs have also referred patients onto the service, however, where GPs refer the patients they must already be known to the heart failure team or must be reviewed by the cardiologist to ensure suitability for the pilot.

The team delivering the service is composed of 3 band 7 heart failure specialist nurses and 3 band 6 heart failure specialist nurses, who operate on a rotational basis. The service is supervised by the lead cardiologist and cardiology GPs at a weekly MDT. The service is delivered using a once daily treatment model, where patients are treated in the mornings from Monday to Friday morning and revert to oral diuretics over the weekend. Four patients have been treated using bolus dose and two patients were treated through continuous infusion. Doses ranged from 160mg to 240mg and were infused at a rate of 4mg per minute. IV Dose was calculated from current daily oral dose taken by the patient. Through patient's treatment, patient monitoring systems are updated with relevant information to ensure that GP's are kept up to date on progress.

The trust felt that it was necessary for two nurses to be in attendance during treatment, with 1 nurse taking responsibility for full clinical assessment of the patient and prescribing the IV diuretic regime and a second nurse to check and administer the IV diuretic. Furosemide is accessed through the community pharmacy and nurses

can't check doses before they leave the site and so this must be done on site – therefore requiring two nurses. Some of the staff indicated that having two nurses gave them with additional confidence when making decisions about patients' treatment – for example, where difficulties cannulating patients were encountered. In addition, some staff indicated that they had to carry a significant amount of equipment and resources with them to deliver treatment in patients' houses, and having two members of staff to deliver this was helpful.

Dosing protocol	
Stepped or fixed	Stepped
Dosing range	160mg– 240mg
Typical starting dose	160mg
Typical frequency	Once daily
IV method	Cannula and midline inserted where difficulty cannulating

Key patient data

Number of patients:	4
Number of interventions:	6
Number of clinically successful interventions	5

Challenges

It took longer for the service to be established than was initially anticipated, and setup was delayed. The service was originally part of County Durham & Darlington community health services, but since merged with the Acute Trust and became part of County Durham & Darlington foundation trust, covering the whole of County Durham. The change of structure meant that the business case had to be re-submitted for approval before the seconded post could be released which delayed the process 6 months.

A key learning point for this site was to factor in the length of time that it may take to procure equipment. The site is using McKinley T60 pumps to deliver treatments, however these took longer to procure than was initially anticipated due to the procurement processes. Additionally, the site initially wished to use T3 pumps, however these were being used by community nurses for palliative care and for patient safety reasons the trust didn't want two sets of the same pumps with different doses. In the early stages of delivery staff were required to borrow a pump from the hospital to deliver. Staff indicated that for sites trying to establish a service it is important to understand what equipment is needed, what is required for the procurement process and how long this may take.

Because of patient safety concerns the Trust required two staff members to be in attendance during treatments. This had an impact on the amount of resource required to deliver the service and meant that the service could not cover the whole of Durham and Darlington, and the service was restricted to Darlington and the south only. Staff indicated that they are now able to have one member of staff attend to conduct the clinical assessment of the patient and prescribing the IV diuretics, and then leave for the second nurse to check and administer the IV diuretic which lessens this burden slightly.

The site initially discussed the potential for community hospitals in their patch to hold stocks of the drug on site and support delivery on weekends, however this has not happened and patients revert back to oral dose on the weekends.

The number of patients being identified through the pilot is lower than the Trust anticipated. Initially estimates were that the pilot would take on eight patients per month, however there are fewer patients being identified than previously anticipated. Staff indicated that they may have overestimated patient numbers initially, but that

this may also be because staff are assessing patients more vigorously and considering larger doses of oral diuretics initially as IV treatment is more invasive and time intensive. Staff have discussed whether IV diuretics should be used earlier, or whether using high oral dose is better. Staff said they had concerns that pushing high oral dose, especially adding thiazides, may impact on patients' renal function, which in turn could mean they need hospital admission.

Staff noted that balancing the IV diuretics workload with other workload can be challenging as it's not possible to predict when a patient requiring home-based IV diuretics patients will present, and when they do present this requires prioritisation of these cases to allow treatment to be delivered. This is particularly challenging when multiple patients present at the same time.

Prior to delivering the service staff indicated anxiety about maintaining medical supervision and anticipated that they may look for support from consultants when they encounter challenges in delivering treatments or making decisions about treatment options. Now that the service is running they have regular meetings with the cardiologist and at the Multi-disciplinary team meetings, however staff indicated that they felt it was important to them that they are able to contact the cardiologist when necessary and were concerned that this might not always be possible.

The commissioning landscape in County Durham and Darlington has also been a challenge. Staff indicated that the commissioning system has been challenging to navigate, with a focus on developing their structures and existing services, and only now are commissioners starting to look at new developments. Commissioning in the area is divided between three CCGs in the North, Centre and South, and in the central CCG there has not yet been any agreement to commission a service.

Even prior to delivery the pilot was generating a lot of interest and enthusiasm in the North East. Staff reported that everyone involved had been very keen and that there had been interest from other areas across the North East of England. Staff had presented at the Northeast cardiovascular network (NECVN) meeting and at a study day organised by NECVN. Unfortunately this network from April is now under restructure. The network was attended by representatives from acute and primary care trusts across the northeast. One GP from Middlesbrough, was very interested in the pilot results to support commissioning this in his area.

Staff in Durham and Darlington noted that they faced challenges in cannula insertion in a number of patients. For multiple patients staff reported difficulty in gaining access despite multiple attempts. This was because the patients had particularly poor venous access. It has been possible to get round the problems of cannula insertion in these patients by inserting mid-lines rather than cannula. The hospital offers an outpatient service to allow patients to get mid lines fitted and return to their home for home-based IV diuretics. While midlines are more expensive to place, they allow venous access to patients for up to 28 days.

Successes

A key success for the Durham and Darlington site has been the clinical outcomes achieved patients treated. All but one of the interventions delivered were considered successful in reducing patient's weight or oedema, or resolving their symptoms. All but one episode of care resulted in weight loss and reduction in peripheral oedema. The single incidence which was not considered clinically successful overall, was considered socially successful as the patient was supported to stay at home and avoid hospital admission, however, this patient was approaching end of life and required palliative care.

All of the patient and carer's who participated in the pilot to date are very satisfied with the service. The patients and carers exhibited confidence in the team delivering the service and indicated that staff were friendly and understanding and explained the service clearly. Where patients and carers were surveyed they indicated they were thankful that they could receive treatment at home, rather than in hospital, and would choose to receive

the service at home again if further IV diuretics was necessary. This suggests that the home-based nature of the service has a positive impact on patient and carer satisfaction with services.

From the patients treated to date that Trust estimated that home-based delivery is yielding significant cost savings when compared with hospital admissions. Data collected by the site suggested that it cost £5,428 to deliver the service over the first 6 months of delivery, and anticipated that this would have cost £10,152 if delivered in hospital. This suggests a cost saving of £4,737 within the first 6 months. This evidence has been collated to inform the business case to support roll-out of the service to the other two CCGs in Durham and Darlington.

Delivery of home-based IV Diuretics has also led to daily contact with patients which in some cases has led to better overall care planning and management. With staff spending much time in patient's houses this allows them to see early when patients may need additional support and to liaise with other services to ensure patients are provided this – for example, liaising with the palliative care team.

A key success for the pilot is that it won the Trust Quality Award. This has helped to raise the profile of the service amongst HCPs and more widely.

The future

County Durham and Darlington is divided into three CCGs – north, central and south. The pilot is currently being piloted in the southern CCG area only and following the pilot it is anticipated that the service will be maintained, with the lead nurse maintain their role. No additional funding will be allocated to delivering the service, which means that funding will have to be found internally and this may mean having to make sacrifices elsewhere. Managers believe the service offers value for money, at less than half the price of a hospital admission, and are therefore keen to see the service continued.

Within the North CCG the service has received funding to pump prime and embed the service. The lead nurse in the pilot will work with staff in the North CCG to train them and establish the service their which will then be embedded in the Heart Failure service, as has been done in the Southern CCG. It is hoped that the service in the Northern CCG will be operational by July 2014.

No service has yet been commissioned in the central CCG, however, it is hoped that it will be possible to secure funding for pump priming and embedding the service as is being done in the North. The three CCGs have set up a CHD support group and IV diuretics is on the agenda of their meetings. In the long term, one possibility which is being considered is to have an experienced team which operates across all three CCGs.

Going forward, the service is being delivered alongside a programme of early supported discharge (ESD) of patients from the wards, with suitable patients being taken off the ward to receive treatment at home and free up hospital beds (these patients have not been included in the evaluation data presented here). The ESD service is now running, and alongside the IV diuretics project it is hoped that this will help to ensure that more patients are treated at home to help reduce bed days. The Trust funded an 18 hour band six post to support delivery of the ESD service.

Dudley

Summary

- ★ the pilot at Dudley began in May 2012 and delivered 23 interventions of home-based IV diuretics treatments to 19 patients until the end of February 2013
- ★ 18 interventions have resulted in clinically successful outcomes including weight loss, reduction of oedema, or resolution of patient symptoms.
- ★ the service was temporarily stopped due to staff sicknesses and changes in staff, and highlighted the vulnerability of a model which relied on a single member of staff to deliver IV diuretics treatments
- ★ the service resumed in April 2013 and finished on 31st March 2014
- ★ the service was initially to be delivered by a combination of The Community Heart Failure Nurse Service and other community based teams including District Nursing teams, a Rapid Response team and a Community Resource team, however administration of treatment has been conducted solely by the Heart Failure Nurse Service
- ★ key learning from the pilot highlights the need to train staff across the team and spread capacity to ensure that service delivery can be maintained
- ★ treatments delivered demonstrated that IV diuretics can be safely administered, and clinically effective, within the home environment
- ★ patients and carers in the pilot generally preferred home-based treatment to hospital admission

Where the pilot has got to

Prior to the pilot, staff recognised that the requirement for IV diuretics treatment was one of the main reasons that patients were admitted to hospital and they were keen to explore ways in which the service could be delivered within the community, to avoid admissions and make cost savings. The pilot in Dudley began in May 2012 and treated seven patients in the period until October 2012. At this point the lead nurse, who at that time was responsible for delivering all the IV diuretics treatments, moved into a new role. This left a gap in service provision with other staff requiring training to deliver the service. In addition the service was Community Heart Failure team was faced with multiple staff illnesses, which slowed the training process and ultimately meant that delivery of the service had to be put on hold for six months. The service resumed delivery in April 2013 and finished at the end of March 2013, having treated a further 12 patients.

The service is now embedded within the Community Heart Failure team which will continue to deliver the service in line with the protocol developed for the pilot.

Delivery model and dosing protocol

The project lead is responsible for the day to day management and co-ordination of the project with support from her line manager. The existing Heart Failure Quality Group will be used as a project steering group to oversee the project

Referrals were primarily identified through the Heart Failure Nurse caseload, with a smaller number of patients identified through the cardiology team and two patients referred by GPs. Patients referred by GPs were already known to the heart failure service or needed to be seen by the cardiologist through the heart failure clinic before they could be admitted to the pilot. This helped to ensure that all patients referred were appropriate for participation.

The Community Heart Failure Nurses are responsible for administering the treatment and conducting daily monitoring visits. Treatments have been delivered twice daily using bolus dose – once in the morning and once again in the afternoon. The dosing regime has remained consistent across patients treated, with patients being

treated with 80mg per visit, usually with 80mg on their first day of treatment where they receive a single dose, and moving on to 160mg across two doses in subsequent day. This model has been used throughout the pilot, however, in a small number of instances patients were treated only once per day – usually at the start or end of their treatment, however, this sometimes happened midway through treatments where complications were encountered, such as patients taking oral dose by mistake or cannula problems. During the early stages of the pilot staff indicated that they don't think two visits each day is leading to greater fluid loss, however, on average patients treated in Dudley lost more weight than patients at other sites with the exception of Leeds and Durham and Darlington. If patients required further treatments by the 4th day the Heart Failure Nurse discussed the most appropriate way forward with a cardiologist, though for the majority of interventions this was long enough to yield results in weight loss, reduction of oedema, or resolution of symptoms.

The service initially used a single Heart Failure Nurse who was an independent prescriber to carry out initial assessment and who also treated the patient, with a small stock of the drug held at the hospital or the patient's local pharmacy. When this staff member left there was a six month break in the delivery of the service while other staff members were trained to cannulate and prescribe to allow resumption of the service. The team has learned from the challenges and spread capacity across the team and there are now four members of staff who have delivered treatments, including two prescribers and the team plans to train more nurse prescribers to ensure all members of staff can both prescribe and deliver the service.

The team initially aimed to seek additional support from the District Nurse team to be called upon to visit the patient to check the cannula or respond to any general issues or concerns. The Community Heart Failure team also planned to work closely with the community IV antibiotics team who it was hoped might be able to provide support with cannulation if required. While staff continue to work closely with these other services they have not been involved in the administration of IV diuretics to patients.

The initial aim of the pilot was to provide the service seven days a week but, the service was not able develop an 'on-call' weekend service and so service currently remains at five days per week. This is not necessarily detrimental to patients' treatment as many interventions have helped patients to achieve clinical outcomes and oral diuretics have subsequently been effective over the weekend. In this sense the short burst of IV diuretics have acted as a kick starter to make oral diuretics effective for some patients. The overall community heart failure service may be commissioned to deliver a seven day service, at which it is anticipated that the IV diuretics treatments would also be offered as a seven day per week service.

The service is a Monday-Friday service with no weekend cover as the service doesn't have the finances to deliver this and district nurses are not happy to give IVs at home.

Dosing protocol	
Stepped or fixed	Fixed
Dosing range	80mg – 160mg
Typical starting dose	80mg
Typical frequency	Twice daily
IV method	Peripheral cannula

Key patient data

Number of patients:	19
Number of interventions:	23
Number of clinically successful interventions	18

*please note that while Dudley had in fact seen nineteen patients the intervention record for one of the patients was unavailable as it had been archived following the patient's death.

Challenges

During the early stage of the pilot it was anticipated that the District Nurse team, community IV antibiotics team could be called upon to provide support for the service. While staff within the Community Heart Failure team have successfully treated a wide range of patients, the other community teams have not been involved in the administration of the IV diuretics service

When the pilot started delivering only the lead nurse in the Community Heart Failure team was fully trained to both prescribe and deliver the IV diuretics service in patients' homes. While other nurses were to undergo training 'in-house' with other departments, delivery of the pilot was undertaken by the pilot lead alone. When the pilot lead then moved onto a new role this then left a gap in the service, with other staff members still requiring further training to deliver. This was compounded by illness amongst those managing the pilot and illness of the replacement lead nurse. These challenges emphasised the importance of spreading capacity amongst the heart failure team to mitigate risks from staff sickness and absence and as a result there are now four nurses within the team trained to deliver IV diuretics, as well as three nurse prescribers.

The lack of capacity also highlights the importance of training as other staff needed to be trained following the departure of the first lead nurse. While these staff were trained, there was a delay which also contributed to the break in delivery of the service. This suggests that it is important to spread capacity amongst a team of staff at the earliest opportunity when setting up a service.

When delivering treatments, in a small number of instances patients have taken oral diuretics in the morning which prevents staff from delivering the IV diuretics treatments. In going forward there is a need to minimise the potential for patients to take oral diuretics in error.

The Dudley site is currently working to train more nurses to become nurse prescribers. Managers noted that although nurse prescribers are necessary for effective delivery of the service, up-skilling staff in this way presents a risk too – as staff may move onto other roles having developed new skills. This may be of particular concern in Dudley following the capacity issues raised when the first lead nurse moved on to a new role.

Successes

The biggest success in the Dudley pilot has been delivering 23 interventions to 19 patients. In 18 of these interventions the treatment was successful in reducing weight, reducing oedema, or resolving patient's symptoms. This is particularly notable due to the relative shortness of interventions in Dudley, with most successful interventions lasting only three days. The number of patients found suggests that the referral pathway is working well to identify patients who are suitable for IV diuretics treatment.

Early in the pilot delivery it emerged that that many patients are responding to oral diuretics. While this means that the numbers admitted for home-based IV diuretics are ultimately lower, this may change the way service is delivered, with more aggressive use of oral medications. Staff indicated that it may help to identify patients who are resistant and have substantial gut oedema to target for IV diuretics.

Another success in Dudley is the number of patients who have successfully transitioned from IV Diuretics to oral medication. Staff indicated that for many patients the IV Diuretics acted as a 'kick-starter', helping patients to achieve clinical outcomes during weekday treatments and then responding to oral diuretics over the weekend to support further clinical outcomes.

The future

The service in Dudley is now embedded into the Heart Failure team and although the pilot is now finished, the service will continue to be delivered following the same delivery model.

Commissioners indicated that there is likely to be a new model for community care in Dudley which integrates health, mental health and social care, and will move towards providing 'virtual wards' within the community. It is anticipated that these virtual wards, alongside district nurses will form community wards which will provide patients with a single point of access. These community ward teams will play a role in ensuring patients in the community are seen by appropriate specialist services, which will include the Heart Failure team. If a patient in the community requires IV diuretics it is anticipated that under this new model they will be referred to the Heart Failure team. This will provide a model which will support identification of patients through a community model which reaches in to access specialist services, rather than specialist services reaching out into the community. It is hoped that this model will identify a wide range of suitable patients to be seen, not just palliative care patients.

In going forward commissioners are also interested in delivering an outpatient service within hospitals. A further change the commissioners are considering is moving services to a seven day model. Commissioners believe the evidence is available to suggest that a seven day-service would be more effective. This would mean that the IV diuretics service would also be delivered seven days per week

Greater Glasgow and Clyde

Summary

- ★ the Greater Glasgow and Clyde pilot began in November 2011 and finished at the end of October 2013
- ★ there have been no further patients treated since the pilot ended and as of February 2014, however there are plans to integrate IV diuretics service into the role of Heart Failure Nurses across Greater Glasgow and Clyde, embedding this service across Glasgow
- ★ the service delivered four interventions to four different patients, with two patients successfully achieving clinical outcomes.
- ★ Glasgow operates a five day per week service with no weekend cover
- ★ the service is led by two nurse prescribers who share the caseload and this model has proved to be an efficient and effective model for prescribing and cross checking IV Furosemide for treatments
- ★ the service has also calibrated its pumps to accept to accept 50mg vials of IV Furosemide to ensure that dosing and delivery is easy and safe to administer
- ★ lead nurses have trained staff at seven hospitals across Glasgow to deliver IV diuretics, however none of the sites have identified any suitable patients to date
- ★ patient numbers have been far lower than originally anticipated with only four patients treated across the duration of the pilot and high numbers of patients who were not suitable because they were hypotensive, had poor renal function or were admitted out of hours
- ★ limited staff resources means there was only enough capacity to treat a small number of patients at any one time
- ★ Glasgow is still considering a range of alternative IV diuretics delivery options to be delivered alongside home-based delivery, including subcutaneous diuretics, and in-patient day services and use of programmed investigations units

Where the pilot has got to

The Greater Glasgow and Clyde pilot began in November 2011 and finished at the end of October 2013. During this period significantly lower numbers of patients were recruited than had initially been anticipated. Only four interventions were delivered across the pilot funding period.

The pilot was initiated when the Heart Failure Nurse Service manager had been looking at setting up a day case IV diuretics service, which was proving difficult to get off the ground. Through discussion with colleagues in the Managed Clinical Network, the BHF home-based IV diuretics pilot seemed a good opportunity to offer a service that seemed intuitively good for patients. While the pilot funding period is now finished, Greater Glasgow and Clyde NHS are developing plans to integrate the IV diuretics service in the role of Heart Failure nurses across Greater Glasgow and Clyde. The Nurses in seven hospitals across Glasgow have been trained to deliver IV diuretics but none have yet identified a suitable patient for home-based IV diuretics treatment, highlighting the key challenge faced in delivery of the service in Glasgow. In addition lead staff are still considering a range of different options and models for treating Heart Failure patients beyond the life of the pilot. This is described in more detail in the 'The future' section below.

Delivery model and dosing protocol

The IV diuretics pilot at Glasgow is part of a well-established and extremely busy Heart Failure Nurse Service which has been experiencing increasing pressure on staff time and resources, with a growing palliative care agenda and increasing demand for their services. In addition, at a board level there was no push to reduce admissions and lengths of stay for in-patient admissions.

The IV diuretics service is governed by steering group consists of the lead nurses, their manager, the Specialist Cardiac Pharmacist and the Consultant Cardiologist. The lead nurses are responsible for day to day management of the project and have support when needed from their manager.

The two existing Heart Failure Nurses from the West patch were recruited to share 2½ days per week as lead nurses for the pilot, alongside their existing caseload. Staff have reported throughout the evaluation that balancing the IV diuretics service with other caseload is extremely challenging, due to the time required in preparing, traveling and delivering the service, and following up afterwards. As the pilot was driven by two Heart Failure Advanced Nurse Practitioners based in in the Western Infirmary, the pilot began delivery in the west patch and rolled out more widely. The lead nurses have been responsible for training 14 colleagues across seven other hospitals in Greater Glasgow and Clyde NHS and enabling these staff to deliver IV diuretics in their geographical area. While the funded nurses have now trained all staff, and staff at other hospitals are equipped to deliver IV diuretics, no suitable patients have yet been identified for treatment across any of the other hospitals and all patients treated have been treated by the lead nurses, within the Western patch.

The lead nurses recruited patients from their existing caseload and ran a five day service with no weekend cover. Over the weekend patients take oral medication instead. There was an expectation that all patients receiving IV diuretics were already on the Heart Failure Nurse service caseload. Throughout the pilot staff delivered a once daily stepped bolus treatment, starting at 100mg Furosemide plus oral diuretics in the afternoon.

To get around the challenges of checking doses in the patient's home, the dosage protocol is stepped in 50mg units. This is because each vial of Furosemide is 50mg, thus there is less risk of error in dosage if working with whole vials. Patients began on a dosage of 100mg per day and graduated up to 200mg per day.

Dosing protocol	
Stepped or fixed	Stepped
Dosing range	100mg-200mg
Typical starting dose	100mg
Typical frequency	Once daily
IV method	single-use butterflies

6.7.1 Key patient data

Number of patients:	4
Number of interventions:	4
Number of clinically successful interventions	2

Challenges

During the pilot setup phase there were challenges in agreeing the dosage protocol amongst the multidisciplinary team. This took longer than was initially anticipated and was exacerbated by the fact that staff were so busy – only the lead nurses have dedicated time to work on the project. This reflects the challenges of developing and delivering a new service where not all staff have protected time to devote to the pilot.

Glasgow also noted that during the setup phase the Service Manager had responsibility for signing off equipment purchases (such as the infusion pumps used to deliver treatments) and obtaining this approval was challenging and created a delay in the set-up process. Glasgow was also required to hold additional pumps as back-ups in case one of the pumps failed. This meant the service typically had pumps which were not being used. The Medical Physics Department was happy to service the pumps while there are only a small number of pumps, but any up-scaling of services would need to include budget for ongoing maintenance of the pumps. The pumps also

had to be specifically labelled for the heart failure service to ensure that they were not used for other services and are calibrated to only give doses in alignment with the heart failure service.

The biggest challenge in Glasgow has been in identifying patients. Over the course of the pilot staff across Glasgow only identified four patients for treatment. Staff indicated that there were recurring themes in why patients were not referred to the pilot including:

- ★ patients were hypotensive
- ★ patients were admitted out of hours
- ★ patients had very poor renal function

Our interim research also highlighted that staff there are far fewer patients who need treatment than was originally anticipated because many patients were responding to high oral doses and because there was only small window in which patients must be identified between when they are non-symptomatic and when they need to be admitted if their fluid levels are too high. The latter is particularly challenging when offering a 5-day service when it is preferable to start treatment at the beginning of the week, yet waiting over the weekend may mean the patient may gain fluid and require hospital admission.

Balancing delivery of IV diuretics with other caseload also proved challenging throughout the pilot. It takes a lot of time for a nurse to see patients to deliver IV diuretics at home and in a similar time nurses could see three to four patients in hospital or could run a clinic seeing up to six patients at a time. Staff indicated that this limited the number of patients they would have been able to treat at the same time. In addition, it is anticipated that extremely busy caseloads of the nurses will make it a challenge for integrating the delivery of IV diuretics into the role of the community failure teams across Glasgow. While the lead nurses funded by BHF can provide guidance, they also have limited capacity to support the pilots. In going forward there is a key challenge about how the IV diuretics role will be incorporated into staff roles without any additional resources to fund this. There is a real need for evidence to show which model delivers the best return for staff time and for money.

While 14 staff across the other seven hospitals in Glasgow have been trained to deliver IV diuretics service, none of them have yet recruited any patients. This may be linked to a lack of capacity at the sites or it may be due to low numbers of suitable patients. The result of this is that staff in the trained sites have no hands on experience of delivering IV diuretics service which raises questions about retaining competency. This may be relevant even for the lead nurses as one of them has treated a single patient within the last year and the other lead nurse hasn't administered treatment since November 2012.

Successes

During the pilot setup the lead nurses and their manager liaised with local stakeholders to gain buy-in to the pilot. The majority of cardiologists were very supportive and they were able to recruit a cardiologist to act as champion for the pilot and as a result also gain support from his registrars. Lead staff were also proactive in engaging GPs who were positive about the service. This was important in ensuring that key stakeholders were both aware of and bought into the service, and could contribute towards the setup and delivery of the pilot.

During project set up Glasgow managed to save time and avoid submitting the protocol to the Drugs and Therapeutics Committee as it was agreed that the protocol could form an addendum to the existing nursing guidelines and medical therapy guidelines for the heart failure nursing service.

Glasgow also benefitted from consultation with an established IV antibiotics service in the city, the team providing that service have provided the lead nurses with excellent advice on the practicalities of setting up the service.

One of the strengths of the Glasgow based service is that it is hospital based and it is easy for nurses to speak with the cardiologists regarding treatment. This resulted in nurses realising that the protocol wasn't as rigid as originally thought and they started patients on a slightly higher dose (100mg) than given in the guidance from the protocol (80mg).

Having two staff that are trained and work closely together has worked well to deliver the service, with staff able to support each other in delivery of the IV diuretics, for example checking prescriptions or taking over patient treatments when staff go on annual leave. This also lessens the risks to the service if one nurse should be sick.

While the number of patients who have received treatment in Glasgow is low, feedback from patients and carers who have been treated has been positive and suggests that patients would rather receive treatment in home than in hospital.

The future

While the pilot in Glasgow has now ended the IV diuretics service will continue. Staff are currently planning how to embed the IV diuretics service within the role of Heart Failure nurses across Greater Glasgow and Clyde. Staff in all hospitals have now been trained, but have no practical experience in delivering home-based IV diuretics and it is anticipated that the lead nurses at the Western Infirmary may need to provide support to staff at other sites the confidence and experience to effectively deliver treatment.

In addition the service is still exploring different options and models for delivering similar treatment beyond the life of the pilot. Glasgow was extremely interested to understand which models were most cost effective and made best use of staff resource. While the pilot has highlighted that home based IV diuretics presents cost savings and can be delivered safely in the home environment Staff at Glasgow are still exploring a range of treatment methods which may be delivered alongside home-based IV diuretics, including:

- ★ in-patient day care diuretics
- ★ early supported early discharge from wards
- ★ subcutaneous diuretics

Hastings/East Sussex

Summary

- ★ during the pilot 15 patients treated, delivering 30 interventions of which 16 were clinically successful
- ★ the service was delivered in main by the pilot lead with referrals coming through the community heart failure team
- ★ the pilot lead was externally recruited and there is recognition that the service never fully integrated with the community heart failure team and would have benefitted from doing so
- ★ the pilot secured good engagement with GPs who carried out prescribing responsibilities for their patients
- ★ a turnaround process at the Trust means that no new services are being commissioned at present therefore the service has ceased. The pilot's heart failure nurse has left post and the capacity does not exist within the community heart failure team to take the service on without additional resource

Where the pilot has got to

The Hastings pilot period ended in October 2014. Since that time the pilot lead has left post and responsibility for taking the service forward has been handed over to the Head of Nursing Cardiovascular medicine.

As it stands at the moment there is no home based IV diuretics service in operation. Since last October, when the pilot ended, the Trust has been going through a turnaround process looking at savings across the board. This has meant that no new services are being commissioned until this is completed. The existing community Heart Failure Nurse Service do not have the capacity to deliver the service without funding for additional resource.

The pilot lead is scheduled to attend the next meeting of commissioners to present findings and recommendations relating to the home based IV diuretic service.

It is recognised however that even if the service is commissioned in the future it will take time to re-gather the momentum that had been built.

Delivery model and dosing protocol

The delivery model and dosing protocol remained largely consistent over the duration of the pilot period though with one significant change to dosing. Originally the dosing limit had been a maximum of 80mg twice daily but this has been amended to either 200mg in a single dose or 120mg twice daily.

In terms of the delivery model patients were identified through the community Heart Failure Nurse Service caseload and the referral initially made to the Care of the Elderly Physician (also clinical lead for the pilot) or taken to the multidisciplinary team meeting which happens weekly. From there the decision was taken as to whether the patient can be assessed and offered the treatment.

Where approval for the treatment is given the pilot lead would then assess the patient (with input and guidance from the Community Heart Failure Nurse) and administer the treatment. Following the assessment, the pilot lead informed the patients GP and request that they write the prescription so that the diuretic can be collected and treatment administered. The project lead remains with the patient for an hour or 2 to make sure that the patient is passing urine and is comfortable. Bloods are taken the following day and move to every other day depending on the response from the patient and previous blood results.

Dosing protocol

Stepped or fixed	Stepped where necessary otherwise fixed dose
Dosing range	80mg–240mg
Typical starting dose	80mg–160mg
Typical frequency	Once daily
IV method	Cannula

Key patient data

Number of patients:	15
Number of interventions:	30
Number of clinically successful interventions	16

Challenges

During the development and lead in period of the pilot the most significant challenge experienced was in having the protocol ratified. This process took a tremendous amount of time and in the end the first patient was treated through the pilot prior to the protocol being ratified (though approval had been given to treat the patient by the patients GP and the consultant Physician).

As the pilot moved beyond the set up phase the main challenge was in securing the buy in of the community Heart Failure nurses. The pilot lead recognises that more needed to be done in the development phase to engage and consult with the community Heart Failure team and to develop greater integration and closer working relationships between them and the pilot lead. It is felt that this would have generated greater support for the pilot and have been designed in a way that included the insights of the Community Heart Failure Nurse Service team.

The pilot experienced lower numbers of patients coming through the service than originally anticipated. There is potential that this has been influenced by the challenges around securing buy in from the community Heart Failure Nurse Service, however feedback from that team suggests that they are very effective at delivering complex oral diuretics which prevent patients from reaching the stage where they require IV diuretics. This management of patients will also often take them up to 'end stages' where subcutaneous/other treatments may be considered more appropriate.

The main challenge now is in convincing commissioners that it is a service that they should be investing in. However as the site is going through a turnaround process it is unclear how likely this will be and what realistic timescales would look like.

Another challenge will be in developing and maintaining the skills of the community heart failure team. During the pilot period they were responsible for identifying potential patients to receive treatment by the pilot, however if the service is restarted it would need to be embedded in the heart failure service with them taking on the role previously carried out by the pilot lead.

Successes

For the pilot the biggest success has been in demonstrating that a home based IV diuretic service can be delivered effectively and safely. Having it as one of the options in their menu of treatment options has meant they have been able to offer some patients an alternative to hospital admission – which is significant in the cases of patients that do not want to be in hospital. The positive patient feedback that they have received as a result is also seen as a big success.

The response and buy in from GPs over the duration of the pilot has also been very positive and proved a key support in the treatment with GPs carrying out prescribing as required.

There is also a sense that the pilot has left a legacy in terms of policy, procedures and systems which will be valuable if the service continues but also more widely in informing the development of any new services. In addition delivery of this pilot has also raised the profile of the service amongst stakeholders as well as prompting heart failure nurses to think about the wiser options for care open to their patients.

The future

Prior to the pilot lead leaving post she had been developing a plan for how the service could be embedded and expanded beyond the pilot period. There was a feeling that by exploring and offering options on how the service can be broadened it is thought that this would be more likely to heighten the appeal to commissioners.

However, as the Trust is now going through a turnaround process, innovations and new services are not the focus at present. The person that has taken over responsibility for the service since the pilot lead left post is in the process of developing a business case for the home based IV diuretic service but it is not known whether this will be successful in attracting the additional funding required or the timelines involved

This means that there is currently no home based IV diuretic service being delivered.

Leeds

Summary

- ★ the Leeds pilot began in July 2011 and completed at the end of June 2013
- ★ the service treated 20 patients and highlighted that IV diuretics can be safely delivered within the home environment and can be clinically effective, preventing hospital admissions
- ★ feedback from patients and carers on the pilot shows most prefer home-based treatment to hospital admissions
- ★ the five day per week service is delivered by the Heart Failure Nurse Service only, with no weekend cover
- ★ treatments have often been longer than initially anticipated, with some patients being treated more than a month
- ★ the service has now been commissioned and embedded as part of the wider Heart Failure Nurse Service and is being delivered as a seven day service

Where the pilot has got to

The Leeds pilot's funding concluded at the end of June 2013, with IV diuretics provision being commissioned beyond that date as part of the Heart Failure Nurse Service from April 2014. The commissioned service is offered on a seven day basis rather than the pilot's five day service, with a rotation of staff from the service providing on call cover through the nurse bank. One Heart Failure Nurse has led the service and continues to lead the new commissioned service. Over the life of the pilot she worked with other nurse prescribers in the team to share the skillset and workload across a team. This team is currently four.

The service is supported by one of the consultant cardiologists with an interest in heart failure, providing advice and support to the team as required.

Delivery model and dosing protocol

The IV diuretics service is delivered by the Heart Failure Nurse Service only, with no involvement from other community staff such as district nurses. Five Heart Failure Nurses (also nurse prescribers) delivered the service during the pilot (reduced to four in mid-2013 as a result of staff retirement), led by the Heart Failure Nurse who established the service. All patients are drawn from the Heart Failure Nurse Service's caseload. The service was delivered five days per week throughout the pilot phase, moving to seven days per week once commissioned.

Dosing protocol	
Stepped or fixed	Stepped
Dosing range	80mg – 240mg
Typical starting dose	80-240mg
Typical frequency	Once daily
IV method	Cannula

Key patient data

Number of patients:	20
Number of interventions:	23
Number of clinically successful interventions	15

Challenges

Apart from the first few weeks of delivery, the service during the pilot phase was delivered Monday to Friday. It became clear after a few weeks of seven day delivery that it was not manageable with such a small team (two Heart Failure Nurses at the time). Consequently, patients had to stop their IV diuretics over the weekend, and re-start on the Monday. In a five day service, the team were also unlikely to start a new intervention on a Friday, which meant the patient needed to be admitted instead. This was resolved with the new commissioned service, which funds seven day cover. Interestingly, the average length of treatment has not changed as a result of moving to a seven day service.

During the production of the business case for commissioning, and whilst waiting for the answer, the lead staff reduced activity to promote the service to other health professionals and partners (so they didn't raise expectations they couldn't fulfil). This meant that awareness of the service decreased, and may have impacted on patient numbers during that period of hiatus. The service was re-launched once commissioned, and promotional activity ramped up. The lead Heart Failure Nurse reports that patient throughout is now at similar levels to during the pilot phase, suggesting that any reduction of awareness has been overcome.

Successes

The main success from the team's perspective is the positive impact on and positive feedback from patients and carers. This service has been well-received by patients and carers throughout the pilot.

An additional major success was getting the service commissioned as part of the mainstream Heart Failure Nurse Service. This secured the future of the service, and also extended the service to seven days a week. This was a personal success and learning achievement for the lead member of staff too, as this was the first business case she'd been involved in producing.

The future

Now that the service is embedded as part of the wider Heart Failure Nurse Service, the plan is to spread the expertise and workload to other members of the Heart Failure Nurse Service. All nurse prescribers currently deliver the service, but the pilot lead is now exploring how other members of the team can play a part in delivery too.

Nottingham Citicare

Summary

- ★ during the pilot 5 patients treated, delivering 8 interventions of which 6 were clinically successful
- ★ the pilot runs a five day per week service delivered by the Heart Failure Nurse Service only with no out of hours or weekend cover. This was originally planned but the withdrawal of a key partner meant this was no longer possible
- ★ delivery is through a 2 nurse model – one checking the dose and another administering
- ★ although the two nurse model was time consuming at the start, over time as experience has been gathered it is much slicker and efficient
- ★ the Community Heart Failure Nurse Service is soon to be merging with the Cardiac rehabilitation team to form a new primary care cardiac service. The service being commissioned for delivery by the new team includes home based IV diuretics

Where the pilot has got to

The Nottingham Citicare pilot was originally due to finish in November 2013 but due to an underspend in their allocation the pilot had been extended to April 2014.

To date the pilot has treated 5 patients and delivered a total of 8 interventions. At the time of our visit there was still just over a month of the pilot remaining and potential for this figure to increase slightly.

From 1st May 2014 the Cardiac rehabilitation team and the community Heart Failure Nurse Service will be merging to create a new single primary care cardiac service. As part of this merger a new service specification is being drafted which is to include ongoing delivery of home based IV diuretics.

Delivery model and dosing protocol

Referrals into the pilot come from the Community Heart Failure Nurse Service caseload and this has remained consistent over the delivery of the pilot. When a member of the team identifies one of their patients as a potential candidate for the IV diuretic treatment they conduct an initial assessment using the inclusion/exclusion criteria.

A significant change to the planned delivery model was required fairly early on in the pilot. The Nottingham Emergency Medical Service (NEMS) were originally providing 'in hours support' and 'out of hours' cover to support the cannulation and care of patients. This support had originally been offered free of charge but upon fully understanding what would be required changed their position. This meant that using NEMS was no longer viable and rather than a seven day service the pilot was run as a five day service. This meant that the service would be wholly delivered by the community Heart Failure Nurse Service.

The other change in delivery was in relation to dosing. Initially their medicines management committee had insisted that the maximum dose would be 40mg bi-daily, however shortly before the pilot started delivery this was increased to 80mg bi-daily (though this can increase to 120mg with the approval from a cardiologist).

The selection criteria that they use to assess the suitability of patients for the treatment has also been tweaked. Previously there was a requirement for a carer to be living with the patient but this has been changed to require that adequate social support is in place. This reflects their learning from delivering the pilot, and they no longer feel that a carer needs to be living with the person receiving the treatment.

Dosing protocol

Stepped or fixed	Stepped
Dosing range	40mg – 80mg (though one patient has received 120mg bi-daily after discussions with cardiologist)
Typical starting dose	80mg
Typical frequency	Once daily and Bi-daily depending on patient
IV method	Peripheral cannula

Key patient data

Number of patients:	5
Number of interventions:	8
Number of clinically successful interventions	6

Challenges

An early challenge for the pilot was in losing one of the key delivery partners, NEMS. NEMS pulled out when the pilot was very close to going live and the Community Heart Failure Nurse Service did not have the necessary staff trained in cannulation. To make sure that the pilot could start delivering a priority was given to getting the pilot lead trained up and ready to administer the treatment.

To ensure that there would be enough capacity and cover in across the team it was felt that having all team members trained and able to administer the IV Diuretic treatment was the best way forward. Whilst this has taken time and effort to do all team members have received the necessary training. However the low numbers across the pilot have meant that not all members of the team have been required or gained experience in delivering the treatment. This means that not every member of the team feels as comfortable as the more experienced members

Another early challenge was around dosing. The pilot had originally sought approval to administer up to 80mg bi-daily though this was declined and a maximum of 40mg bi-daily approved. It is interesting to note though that the pilot lead continued to push for the originally proposed limit and this was approved just as the pilot was moving towards delivery of the service.

Although the service has had relatively small numbers of patients receiving the treatment the two nurse model means that routine reviews tend to get postponed or rescheduled. As the pilot has progressed the team have gotten better at forward planning and are able to minimise any disruption.

As they move beyond the pilot a wider challenge will be around the bedding in of the newly merged service. Whilst the two teams merging are not strangers to one another and cross team working happens regularly there is still likely to be a period of time whilst working protocols are agreed and things are put in place to deliver the new service specification. It is hoped though that this would not impact on the services ability to delivery home based IV Diuretics when it is needed and has the potential to give greater flexibility and options in the future.

Successes

The progress the team has made from the early stages of developing protocols and gaining stakeholder buy in to having the service up and running is seen as a great success.

In the early stages not all staff had a chance to be directly involved in delivering the treatment to patients due to the limited number of patients coming through the pilot. However, they remained bought in to the pilot and supportive of the pilot lead. As the pilot progressed the home based IV Diuretic service is now seen as a team service and not just about the pilot lead. This has led to the service already feeling largely embedded..

Although the Community Heart Failure team have always been held in high regard by the hospital cardiology team delivery of the pilot has raised their profile more widely.

The Community Heart failure team see their overall service as being patient centred and have approached the delivery of home based IV diuretics with the same ethos. Because of this one of the most important successes for the team has been the outcomes for patients.

They have also continually refined and tweaked the delivery model. This is more about fine tuning than fundamental changes that have seen the service become slicker and delivered more efficiently. This also reflects the growing confidence of the staff involved.

The future

The Community Heart failure Team have a period of change in front of them as they merge with the Cardiac Rehabilitation team to form a single Primary Cardiac care team.

However, as part of this merger a new service specification has been developed by commissioners and this includes the continued delivery of the home based IV Diuretic service. This inclusion of the service was influenced by a business case prepared and submitted by the pilot lead. The merger itself is a two year pilot and will be reviewed at the end of this period and in addition the home based IV Diuretic service is also only an extended two year pilot. The IV Diuretic service will be assessed for cost effectiveness as well as patient satisfaction and quality of care.

The continuation of the home based IV Diuretic service and the merging of services presents some good opportunities for the team to explore going forward including:

- ★ Working with cardiac rehab colleagues to fulfil the second nurse checker role
- ★ Expand referral routes into the service
- ★ Use of community beds in care homes for patients that do not have the social support requirements at home
- ★ Splitting/allocating geographical areas to save travel time
- ★ Supporting early discharge

Nottingham West

Summary

- ★ 2 key staff left the service/pilot in Summer 2013
- ★ prior to this 2 patients had been treated through the service though none were successful interventions.
- ★ no further patients have been treated
- ★ the time taken to recruit new members of staff and for the new members of staff to familiarise themselves with their patient caseload and get up to speed, little focus has been on the pilot
- ★ although there is still a small amount of time left of their pilot period it is not certain that any further patients will be treated
- ★ uncertainties regarding the future of the service beyond the pilot phase

Where the pilot has got to

At the time of writing the previous report the community nurse responsible for the coordination and delivery of the home based IV diuretic treatment had resigned from her post. From the point the member of staff left post the capacity did not exist to deliver the IV diuretics service.

Shortly after this the pilot lead, whose caseload patients were referred to pilot from also resigned from post. Recruitment to the two posts was completed by December 2013 but had meant that there was a break in service delivery from July 2013.

Even though the two posts were filled the focus for the first few months was really to get up to speed with the core service and their existing caseload. Therefore no patients have been through the pilot since the previous visit.

A few patients have been considered for the pilot in recent weeks but changes to their oral regime were successful. They are considering and assessing patients when it is appropriate and hope to have another couple of patients through before the end of the pilot period though also accept that this may not happen.

Delivery model and dosing protocol

The delivery model and dosing protocol has remained unchanged over the duration of the pilot.

Patients for the pilot are identified from the Pilot lead's patient caseload and assessed against the inclusion/exclusion criteria. The referral is made to the band 6 community nurse who is then responsible for co-ordinating the treatment for the patient, which includes liaison with the patient's GP. If the patient's GP is hesitant the pilot lead will contact them to provide reassurance.

Nottingham Emergency Medical Service (NEMS) provides support for the pilot. They carry out the cannulation of the patient (NEMS currently deliver IV antibiotics so have the skills in cannulation and maintain competence much easier) though it is the community nurse who will remain with and monitor the patient. Before any further treatments are administered bloods are taken and the results discussed with the pilot lead before deciding whether to proceed or not.

The staff involved in the pilot are aware that other sites have a starting dose that is higher than the dose they are using. They acknowledge that they were very cautious to begin with but feel this was the right thing to do, however, they feel that the data from this evaluation means it is something that they can revisit in the future

Dosing protocol	
Stepped or fixed	fixed
Dosing range	80mg
Typical starting dose	80mg
Typical frequency	Once daily
IV method	Cannula

Key patient data

Number of patients:	2
Number of interventions:	2
Number of clinically successful interventions	0

Challenges

The main challenge for the pilot prior to the pilot lead and her backfill leaving post was in identifying suitable patients. Although several had been considered and assessed the majority were not suitable for various reasons whilst two did meet the acceptance criteria.

Since then the challenge has been in replacing the two members of staff key to the pilot operation (and delivery of the community heart failure service). Even after successful recruitment the break in pilot delivery continued as the new staff members got to grips with their caseload and core service delivery.

It is only recently that the focus has been turned back to delivery of the pilot.

Successes

The pilot has largely stood still since the last visit and therefore still only had two patients through the IV diuretic service. However it has had successes along the way and is still seen as something that has been worth doing.

Although it has only been two patients, it has helped to show that it was possible to do. It also provided an insight into the mechanics of delivering treatments like this at home and an appreciation of how labour and time intensive it could be and the co-ordination required to make it run right. This valuable learning is considered a success of the pilot.

There is also a perception that the service has re-enforced the credibility of the community heart failure nurses and the impact they can have.

The future

For the remainder of the pilot period the community heart failure team will continue to identify and assess appropriate patients for inclusion in the pilot.

Beyond the pilot period however it is uncertain whether the home based IV diuretic service will be continued. The low numbers coming through the pilot will not provide the evidence base on its own to justify the additional investment required to deliver a home based IV diuretic service. The pilot lead's line manager also questioned whether there would be greater value in a collection of commissioning groups in Nottingham getting together to commission a single home based IV diuretic service that would deliver across several patches and therefore increase the patient population and make it financially justifiable.

The team are waiting to see the evidence from the overall evaluation before having discussion with their local commissioning group regarding the future of the IV diuretic service.

Stoke

Summary

- ★ during the pilot 4 patients treated, delivering 5 interventions of which 4 were clinically successful
- ★ the pilot originally delivered a subcutaneous diuretics service which was not in scope of the programme and therefore lost much time and momentum because of this
- ★ the pilot ran a five day per week home based IV diuretics service where patients were identified and treated by the lead nurse from the Heart Failure Nurse Service
- ★ pilot has helped to develop the knowledge of other community teams
- ★ Since the end of the pilot phase local commissioners commissioned a non-oral diuretic service including subcutaneous and IV diuretic delivery

Where the pilot has got to

The Stoke pilot came to a close in April 2013 but had been active during the final months of the pilot in securing additional investment from commissioners to continue the service. This resulted in additional funding being invested which enabled the recruitment of an additional band 7 nurse and two band 5 nurses. The additional funding secured delivery of a community based non-oral diuretic service (which includes sub cut and IV diuretic delivery) as well as other aspects of expanded service delivery.

All staff have been recruited though the band 7 is currently completing a prescriber qualification (meaning all band 7 nurses in the team will be qualified prescribers) and the new band 5's are still to receive training to enable them to support the new service. This means that the service is not at full capacity yet but will be within the next 2 months. During this time the member of staff that was the pilot lead is continuing to take a lead role in the non-oral diuretic service delivery, however, once the team is up to full capacity the responsibility will be spread across the team.

Delivery model and dosing protocol

During the pilot phase the patients were identified from the Community Heart Failure Nurse Service caseload and from the Shine clinic⁴ and referred to the pilot lead. The pilot lead conducts the assessment and will administer the treatment with a colleague carrying out the prescribing responsibilities. The patient is reviewed on a daily basis to inform the appropriate course of action thereafter. In some instances the district nursing team will support delivery of the service as well. The service is delivered over 5 days with patients moving back on to oral diuretics over the weekend.

As the service moves forward and gets up to full capacity the delivery model will be tweaked slightly to make best use of the resource available. This will see the band 7 nurses responsible for initial assessment following a referral and arrange the prescription. When they go to the patients home to administer the treatment they will be accompanied by a band 5 nurse. Once the infusion is up and running the band 7 will then leave and the band 5 will remain with the patient to complete the treatment. This will lower the cost of delivery and strengthen the evidence base in relation to cost benefit.

Dosing protocol	
Stepped or fixed	Stepped if needed otherwise fixed
Dosing range	120mg-240mg

⁴ The shine clinic is an ambulatory Heart Failure day clinic which assesses patients and provides intravenous diuretics, monitoring and intensive drug titration. It also provides self-management advice and psychological support to patients and carers

Typical starting dose	120-160mg
Typical frequency	Once daily
IV method	Peripheral cannula

Key patient data

Number of patients:	4
Number of interventions:	5
Number of clinically successful interventions	4

Challenges

The Stoke pilot had started out delivering a sub cut diuretic service which was not in the scope of the pilot. This presented a major challenge and set back as the original pilot lead was disheartened by this and chose not to continue in the pilot lead role. Therefore a new pilot lead had to be identified to implement the IV diuretic service. One of the positives in this was that a lot of the groundwork that had been carried out for subcutaneous delivery reduced the work required for setting up and implementing the IV diuretic service. This meant the new pilot lead could quickly progress things..

There was a small challenge in getting the dosage agreed in terms of duration. The pilot lead did not have the support of the cardiologists to begin with who wanted IV delivered over 24 hours – the pilot lead disagreed that this was necessary and had to gather evidence to justify her position. In the end the pilot lead was able to gather the necessary evidence to convince the cardiologists and get them on board.

As the service reaches full capacity responsibility for the service will be spread more widely across the team and it is likely that this transition will see some challenges. However the team are fully committed and this will ensure that any challenges will be overcome.

Successes

The learning gained by the pilot lead and the new challenge that the role brought is one of the main successes of the pilot, and will prove valuable if involved with other service developments in the future.

The initial groundwork that was done in the set up phases is viewed as a critical component to ensuring a smooth transition into delivery of the service. This transition is seen as an early significant success for the pilot and being in a position where they were delivering a new innovative service.

Another success has been the positive reaction of patients and carers which is what makes it worthwhile for the team involved. As well as providing an additional treatment option for some patients the pilot has potentially had a wider impact on the care of heart failure patients in the community. The District Nurses involved in the pilot reported being up-skilled in relation to their knowledge of heart failure and are now more confident supporting patients with heart failure.

The most significant success however has been securing the commitment of commissioners to ensure that a piloted service is now embedded aspect of community Heart Failure team service. At the time of our discussion with the pilot lead they had been shortlisted for the innovation category in their local trust awards for their non-oral diuretic service. Even if they don't win it will further raise the profile of the team in the locality.

The future

As has already been discussed the next steps will be to spread responsibility for the non-oral diuretic service across the wider community heart failure team once up to full capacity. There has been a target set of 6 interventions per month, which they have not been able to hit every month but once up to full capacity are confident they can make this up.

The Community Heart failure team are also commissioned to deliver a service in North Staffordshire, though this does not include a non-oral diuretic service. There have been ongoing discussions with the local commissioners about an expanded service specification to include a non-oral diuretic service and this is something that will be pursued going forward.

Supplementary sites

Supplementary sites include those who wished to start a home-based IV diuretics service, but who did not receive funding for a lead nurse from BHF. The sites we spoke to were happy to share their experience of using BHF and guidance to try and establish services without funding.

Berkshire Healthcare Foundation Trust

The supplementary site in Berkshire has now been commissioned and began delivery on 1 April 2014. At the time of the evaluation interview one patient had been identified for treatment, but no treatments had been administered yet.

The service has taken substantially longer to set up than was initially anticipated, and the site has faced a range of challenges in getting the service commissioned and operational. Most notable of the challenges faced has been the difficulty which staff faced in trying to establish a service without a dedicated, funded post with protected time. The lead nurse responsible for driving the establishment of the service had to squeeze the role of setting up the pilot in on top of all their other duties. As the lead was so busy with the existing heart failure caseload, finding time to meet with staff and commissioners and develop the model was extremely challenging. Without a dedicated post, or protected time, for set up of the service it is challenging for a single staff member to build momentum in setting up the service. Finding capacity is therefore a major challenge for setting up a service without a funded post to help launch the service.

The challenge of having a non-funded post trying to establish the service was compounded by wider capacity issues in the heart failure team. Two members of staff were off sick and during this time the attempt to set up the IV diuretics service came to a standstill while the reduced staff aimed to manage the existing heart failure team's workload.

Set up of the service was also affected by changes in the NHS. The Trust in Berkshire was broken into four CCGs, which complicated matters, for example, meaning that the protocol had to go through two different medicines management groups and then had to go out for comment to a wider audience.

During the interim phase some staff indicated they had concerns about capacity to deliver the service once the service is up and running. While the service has now started it is in its early stages and it is not yet clear how the service will impact on staff capacity during delivery, or how the service will be affected by any staff leave.

The Trust has established its protocol and passed this through the medicines management committee. The Trust is delivering the service through a team of three Heart failure nurses, with one nurse delivering the service and the other two nurses currently being trained in cannulation. The service will use traditional cannula but may also make use of single use butterflies. The Trust also initially also planned to make use of its IV antibiotics service to be able to deliver a joint service between the Heart Failure team and the IV nurses, however, currently only nurses from the Heart Failure Nurse Service will be delivering the service.

Patients are referred to the service from the Heart Failure Nurse Service's caseload. Once assessed and deemed eligible, patients will begin treatment based on a five day per week service model where patients are treated on weekdays and revert to oral medication on weekends. Patients will receive a once daily bolus dose of 80mg of furosemide for the first day, unless they lose too much weight (in which case it would be decreased). The patient's treatment will be reviewed on day four, and if the patient still has not lost weight the intervention will move to twice a day model – delivering 80mg in the morning and a further 80mg in the afternoon.

The service will not use pumps and the nurses will be delivering the drug by hand. One of the challenges when setting up the service has been in accessing IV Furosemide and pumps to deliver the IV diuretics. In particular, staff indicated that they were not able to secure budget for pumps.

During the early stages of development, staff indicated that the BHF guidance for protocols was very helpful for establishing the service, however they had not engaged with any of the pilot sites delivering IV diuretics services. Since the publication of the interim evaluation findings staff have drawn on these findings to inform their protocol and to learn from other sites. In addition the lead nurse consulted with the service lead from the Hastings pilot which provided valuable learning to help establish the service

Establishing the service in Berkshire also provided valuable learning about engaging with commissioners and getting the service commissioned. Staff indicated that it was important to be proactive in engaging with commissioners, and understanding if an IV diuretics service is something commissioners want. Fortunately, commissioners in Berkshire were receptive to the service, however, if this is not something commissioners want, staff may be wasting time trying to establish a service. In addition, staff indicated that having evidence of the safety, effectiveness and cost savings associated with home-based delivery was important for making a business case. In Berkshire the evidence published in the interim evaluation of the BHF IV diuretics pilot was influential in demonstrating that the service could be delivered safely and effectively, whilst also providing cost savings. Any further evidence would help commissioners to make informed decisions about developing a home-based IV diuretics service.

In going forward Berkshire is considering developing day care 'furosemide lounges'. This kind of service is popular around the Thames Valley area and the staff in Berkshire are being visited by staff from a site currently running a day care 'furosemide lounge' to talk to them about it. In going forward, staff indicated that because the criteria for participation in home-based IV diuretics treatments are quite tight (e.g. need to have a good renal function) it may be possible to treat more patients in the community if a menu of options was available to patients, which included home-based care in the community and day care through secondary services.

Southern Health NHS Foundation Trust

Southern Health NHS Foundation Trust is still trying to establish an IV diuretics service and are currently trying to get a protocol through the medicines management committee. Staff hope that this can be achieved in April 2014 and that once agreed a service will soon be established. The aim is to incorporate the service into the role of the Heart Failure service which has already been commissioned, removing some of the challenges of commissioning an entirely new service.

The process for getting the protocol has been challenging, and the reviewing committee have asked for the protocol to be amended numerous times to align with Trust format. Staff indicated a key point of learning for them was get the lead pharmacist on board from an early stage, and to contribute to and review the protocol as this helps get the protocol through medicines management.

The delivery model which staff now aim to implement is a five day service, delivering bolus doses by hand rather than using pumps, with patient reverting to oral diuretics on weekends. The service will be delivered by five Heart Failure Specialist Nurses who are trained in cannulation. Referrals will primarily come from patients on the Heart Failure nurses' caseload, but may also be come from discussions with GPs.

The lead nurse initially anticipated that the easiest route would be to work with teams in the community to deliver the IV Diuretics service, however, one of the main challenges this site has encountered is getting buy-in from the key stakeholders. The lead originally engaged with the Rapid Assessment team in the community to try and develop a process where IV diuretics could be delivered by the Rapid Assessment team in the community and even did lots of training for the community unit, but this never really got off the ground. Staff indicated that they developed guidelines and passed these to the Rapid Assessment team, however the teams wanted more prescriptive guidance and it wasn't possible to agree a workable way forward. As a result the lead nurse started to develop a protocol for the Heart Failure nurses themselves to deliver the IV diuretics service. The lead nurse felt that in retrospect the Heart Failure team should have tried to set up the service themselves from the start, rather than working with teams in the community – a partnership approach didn't seem to be suited for establishing the service.

Over the last year Southern Health NHS Foundation Trust has also started to deliver IV diuretics to patients through a hospital day case model. Staff indicated that approximately 10 patients had been treated as of April 2014 and the service has been in operation for approximately five months. In going forward the service aims to identify patients who are consistently and repeatedly admitted to hospital for IV diuretics and aim to understand if patients can be treated as day cases within the hospital setting, and if not, staff will deliver home-based IV diuretics. In addition, staff are considering subcutaneous diuretics forward as an option for end of life patients. A protocol for subcutaneous diuretics has not yet been agreed, but it is thought this could be administered by community care teams.

A key point of learning for establishing the hospital day case service was to learn from other sites who are already delivering services similar to those they want to deliver. The lead nurse spoke with staff from the Stoke pilot, and reviewed how their hospital day case unit was run. The Lead nurse in Southern Health NHS Foundation Trust felt that it was important to invest time to look at this service, to see how others are delivering similar services, and to save effort by trying to design the model on your own.

Possibly the biggest point of learning from staff was that you need a dedicated individual to get an IV diuretics service established quickly. The lead nurse had to establish the IV diuretic service, whilst also fulfilling other heart failure nurse service duties and often the establishment of the IV diuretics service was lower priority than delivering key services. As a result this pushed development of the service to the back of the work list and has meant that it has taken an extremely long to develop the service, though staff are hopeful this service will soon be established and delivering.

Buckinghamshire Healthcare NHS Trust

Buckinghamshire Healthcare Trust had been interested in developing and piloting an IV diuretics service when the original call for expressions of interest had been put out from BHF. However the Trust was going through some major re-structuring at that time and it was decided that it was not an appropriate time.

Following completion of the restructure the Community Heart Failure Nurse Service have picked it back up again and are progressing the development of a home based IV diuretic service following approval from their management team. They also have a steering group in place to oversee the development.

During the early stages they experienced challenges securing the buy-in from the Cardiology lead who did not think it was a service that should be delivered in the community. Using the evidence already gathered through the BHF pilot they were able to convince the cardiologist who is now supportive of the pilot.

At this stage there is a fully developed protocol which is to be ratified by the policy team. There has also been work done to increase awareness of local GPs with around 80% currently aware of the service and looking forward to its introduction. Delivery will initially be restricted to the 'south patch' during the pilot with the potential of extending this to the north at a later date. Both of the community heart failure nurses that will be involved in delivery of the service have undergone the necessary training and are ready to get started as soon as the protocol is ratified, which will be May at the earliest. To start with patients will be identified from the community heart failure nurses caseloads though will potentially be expanded to take referrals outpatient clinics who do not want to admit a patient for IV diuretics. Capacity allowing they expect they could treat up to 4 patients a month.

Progress has not been made as quickly as originally expected or hoped. As with other supplementary sites the service is being developed over and above doing the day job with no additional resource to support the work. This means that it has been difficult to maintain any momentum and alongside dealing with other internal issues and challenges finding capacity has been a struggle.

South Eastern Health and Social Care Trust – Lagan Valley (Northern Ireland)

The home based IV diuretic service being developed in this trust area has been driven by the 'Transforming Your Care' agenda which is focussing on more services and care being delivered in the community. In addition, the nurses running the cardiac outpatient clinic had identified patients that would benefit from such a service.

This service is being developed from a hospital setting rather than a community based heart failure team (no such team exists in this trust area). Although the nurses are hospital based they will go out to patients homes when they are unable (because the patient is too ill) to make in to their outpatient appointments/reviews.

There has been no additional funding invested to support the development and delivery of the service. The core responsibilities of their role obviously need to take priority on a day to day basis so this has an impact on the pace of progress with the service development.

At this stage they have the buy in of the cardiology team and have developed their operational protocol. The protocol is being sent out to stakeholders for review and comment before a final version is produced and submitted for approval. The nurse leading on the development of the service acknowledged that the delivery model needs further development as do the dosing protocols.

They expect that the service will be delivered to roughly 6 patients a year. It is not certain when the service will be up and running as progress can only be made when time can be found to work on it. Unlike the pilot sites they do not have that dedicated resource that can continually drive things forward and maintain momentum.