Nurse-led community diuretics for heart failure patients

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Heart failure is a chronic long-term condition that affects around 800 000 people in the UK and accounts for around 141 500 hospital inpatient episodes a year (Townsend et al, 2012). Many of these hospital admissions are due to episodes of decompensated heart failure, where oral therapy has not been optimised, changes in symptoms have not been identified, or symptoms related to fluid retention become refractory to oral therapy (Ryder et al, 2008). One million inpatient bed days are owing to heart failure, which equates to 2% of all hospital inpatient bed days and 5% of all emergency hospital admissions (National Clinical Guideline Centre, 2010).

Transforming Community Services (Department of Health (DH), 2009) is a DH driver for the provision of more community-based specialist services in six key areas, including long-term conditions and acute care, in order to reduce the number of avoidable hospital admissions. Outpatient heart failure management programmes have been developed to address this and examples of typical components of these are outlined in *Table 1*.

Evidence suggests that programmes like *Transforming Community Services* (DH, 2009) can help to avoid hospital admissions (Blue et al, 2001; Ryder et al, 2008); however, of those patients admitted, 90% will require intravenous (IV) diuretic therapy (Felker et al, 2009), with an average length of stay of 10 days (National Institute for Cardiovascular Outcomes Research, 2012). IV diuretic therapy is usually chosen over oral therapy when oral treatment has become less effective, or when a faster response is required (Neal, 2005). Absorption of oral medications is reliant on gastrointestinal motility, blood flow, drug formulation, and the actions of other medications (Rang et al, 2007). IV drugs are administered directly into the blood stream, therefore bypassing any absorption barriers one might expect when administering drugs by mouth and increasing the bioavailability of the medication.

Where patients have acute decompensated heart failure, the appropriate place of care may well be secondary care. It has, however, been proposed that, in some cases, IV diuretics may be given safely and effectively in alternative settings in the community in order to avoid an admission. For example, Ryder et al (2008) explored the feasibility, safety and clinical outcomes of patients receiving IV diuretic therapy as an outpatient in a hospital-based heart failure unit. The study found that, with the support of a heart failure team, IV diuretics could be delivered safely without admission to hospital and 30% of potential hospital admissions were avoided. The British Heart Foundation (BHF) and heart failure teams around the UK are now exploring the safety and effectiveness of delivering IV diuretics in patients' homes, and this article explores the development of the service in one pilot site and gives an example of the delivery of community IV diuretics in practice.

Service development: exploring challenges and progress

In the current economic climate, funding for any new initiative is difficult to secure. Clinical commissioning groups will consider funding services which are cost effective and help to reduce hospital admissions, but this needs to be proven before they will commit. Around 3 years ago, however, the BHF launched details of a pilot programme to deliver community IV diuretics. This team was one of 13 sites in the UK that were successful in securing funding for this 2-year pilot project.

ABSTRACT

Heart failure is a chronic condition that results in a high incidence of hospital admissions, often due to decompensation and fluid retention. Patients often require intravenous (IV) diuretics, and until recently these were routinely delivered in secondary care settings. The British Heart Foundation is currently evaluating the delivery of IV diuretics within patients' homes.

As IV diuretics have traditionally been delivered in secondary care, there are challenges in implementing such a service in the community. New ways of working and delivering care need to be considered, along with the development of clinical skills. This article explores the development of a community IV diuretics service and how challenges were embraced and overcome in order to deliver a robust and effective service. A case study highlights how the IV diuretics service was implemented in practice and how patients can benefit from such a service. Recommendations are made for future service delivery.

KEY WORDS

• Heart failure • Intravenous diuretics • Community nursing • Service development • Evaluation of outcomes

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Table 1. Components of a typical heart failure management programme

- Regular home visits or clinic appointments
- Heart failure specialist clinicians
- Education
- Self-management strategies
- Optimisation of therapies
- Monitoring and early detection of decompensation
- Cardiac rehabilitation
- End-of-life care

In the initial stages of the project, a multidisciplinary steering group was formed (*Table 2*) to explore the feasibility of embedding IV diuretics in the existing community heart failure nursing service. A needs analysis was carried out by reviewing hospital admissions from the community heart failure nurse (CHFN) caseloads during the previous year. While it was accepted that community IV diuretics would not have been appropriate for all patients, it was estimated that between one and two patients a month might have been able to receive treatment at home. Inclusion and exclusion criteria (*Table 3*) were developed to enable clinical identification of patients and a proposed pathway was agreed (*Figure 1*), based on the model by Ryder et al (2008), and adapted for local use.

A robust local procedure was developed to guide the nurses in the delivery of IV diuretics, the contents of which are given in *Table 4*. The development and ratification of this document was a complex and lengthy process and delayed the initiation of IV diuretics delivery; however, it was acknowledged that it was essential to ensure the safety and quality of the service.

It was recognised that the existing CHFNs had little recent experience in cannulation and delivering IV medication, and therefore training needs were identified. There were difficulties accessing this training, as no other team within the organisation had these skills. It became necessary to obtain honorary contracts with the secondary care trust in order to gain access to clinical areas and achieve competence. In addition, the CHFNs were required to complete the secondary care IV training package, some of which was not applicable to the community setting or to IV diuretics.

Table 2. Multidisciplinary representation on intravenous diuretics steering group

- Community heart failure team
- Patient and carer representatives
- Cardiology consultant
- Community matron
- General practitioner
- Care of the elderly consultant
- Out-of-hours medical service
- Community end-of-life care team
- Infection control
- Clinical governance
- Medicines management team
- British Heart Foundation
- Business unit and commissioner

It was agreed that IV diuretic preparation and delivery would be checked by two nurses. This is because there were safety concerns relating to one rather than two nurses carrying out checks and IV administration. This decision is also in line with local secondary care policy and is supported by the Nursing and Midwifery Council (2010), which states that, where possible, IV medication should be checked by two registered nurses and only in exceptional circumstances should this not occur.

Establishing a dosage protocol for IV diuretics also proved challenging. Salvador et al's (2005) systematic review suggests that the administration of continuous IV diuretics results in greater diuresis and may be safer than the administration of intermittent bolus doses. The eight trials analysed were small in sample size (ranging from eight to 107 individuals, however seven included fewer than 33 patients) and, due to the wide range of doses, infusion rates and durations, it was not possible to conclude the optimum doses or length of infusion. Two of the studies analysed used infusions of 30–60 minutes and, due to the short duration, cannot be compared to bolus injections. All but one trial were crossover studies where patients received either continuous or bolus doses of IV diuretics in the first phase and switched to the alternative method of delivery in the second phase. Outcomes may therefore be influenced by the responses in the initial phases of the studies. There were concerns that, as the safety of IV diuretics in the home setting had not yet been established, the suggested starting doses might be too high. The CHFNs felt that starting any lower may not be effective, as the patients would be on high doses of oral diuretics before starting IV diuretics. This concern is supported by Felker et al (2011), who demonstrated better clinical outcomes when doses of 2.5 times the patient's oral dose were given IV compared to doses equivalent to their usual dose. This slight conflict was managed though team discussions, and an eventual agreement was made to start with lower doses and have a low threshold for increasing the dose (*Table 5*). The BHF made some recommendations for dosing that were developed and agreed by the project development group, which included a consultant cardiologist, project manager, heart failure specialist nurses, a consultant physician and a GP. The suggested schedules for bolus dosing of IV furosemide started with doses of 80 mg, which would be increased or decreased by 40 mg per day in accordance with the patient's response. It was agreed that this dosage protocol would be reviewed once the IV diuretics service was established and treatment episodes had been evaluated.

The CHFN service is operational from Monday to Friday and it was therefore not possible to deliver IV diuretics over the weekend. Options for out-of-hours IV diuretics delivery were explored with the local emergency medical service; however this could not be funded. The

Figure 1. Pathway for the identification, assessment and delivery of community intravenous diuretics to patients

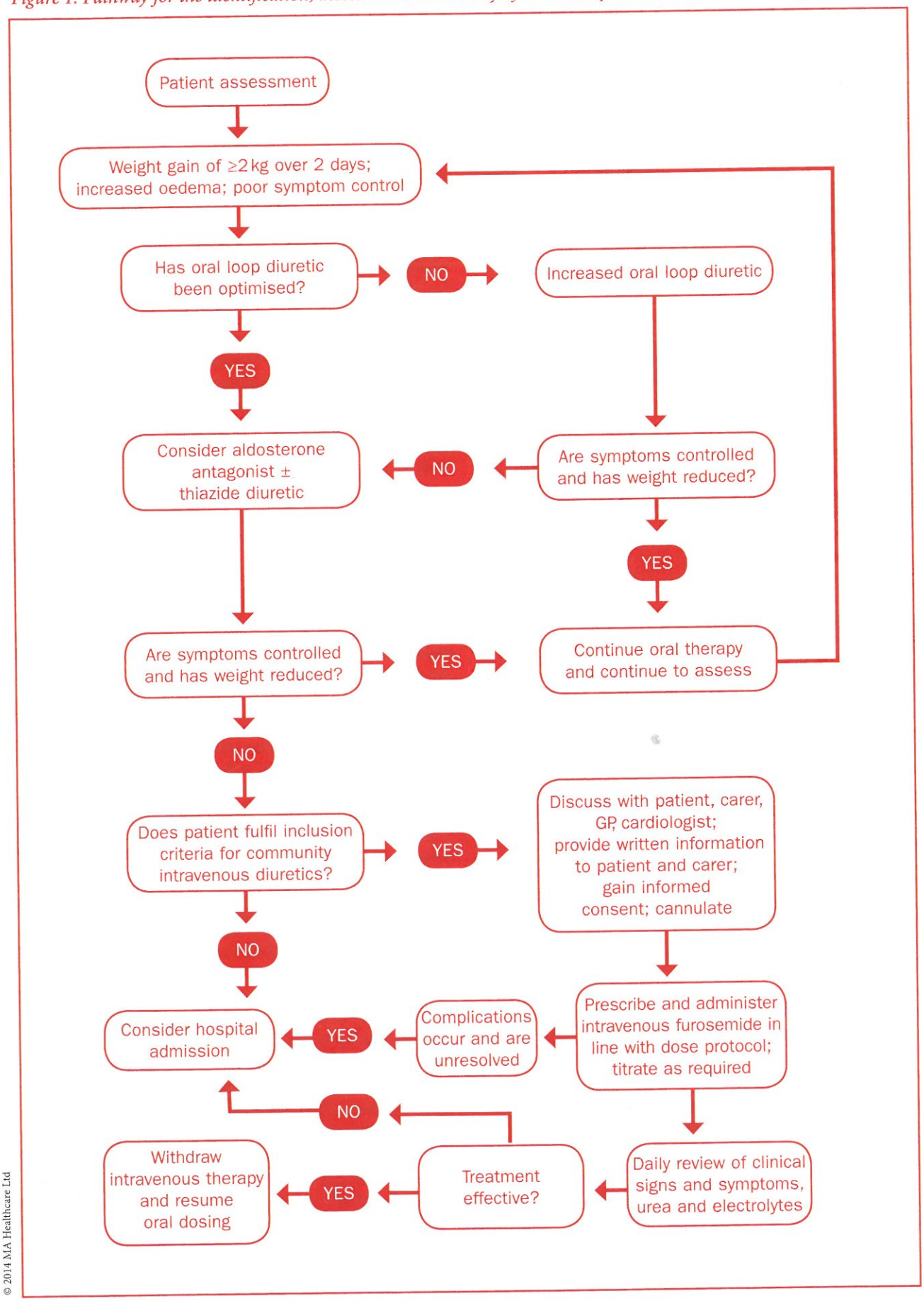

Table 3. Inclusion and exclusion criteria for community intravenous diuretics

Inclusion criteria	Exclusion criteria
Confirmed left ventricular systolic dysfunction	No confirmed diagnosis of left ventricular systolic dysfunction
Known to the community heart failure nursing service	Not currently on the community heart failure nursing caseload
Mental capacity to understand and consent to treatment	Mental capacity insufficient to make informed decision (using standard two-stage test)
Adequate carer support	No designated carer who can stay with the patient/poor support network
Fluid retention/symptoms refractory to optimised oral therapy	Limited understanding of medication regimen
Systolic blood pressure >90 mmHg	Systolic blood pressure <90 mmHg
Urea and electrolytes • Sodium >128 mmol/L • Potassium >3.5 mmol/L • Creatinine <250 µmol/L • Glomerular filtration rate >30 ml/min • Haemoglobin >9 g/dL	Severe renal dysfunction or anaemia requiring immediate management
Absence of other exacerbating underlying condition	Other conditions requiring acute management
	Severe aortic stenosis
If agreed that the patient is for palliative care, treatment may proceed despite clinical parameters	

Table 4. Contents of the community IV diuretics procedure document

- Patient identification and selection
- Assessment and referral process
- Dosage protocol
- Knowledge and resources required
- Patient monitoring procedure
- Documentation and record keeping
- Infection prevention and control guidance
- Risk assessment
- Management of complications

community nursing service's 'evening and night' team offered telephone support to patients during evenings and weekends at no cost, but did not have the capacity to deliver IV diuretics. It was therefore agreed that patients would receive IV diuretics at home from Monday to Friday and the effects of ceasing treatment over the weekends would be evaluated. Based on the experiences of the IV diuretic pilot sites, the BHF has also identified a need for further study into the effects of stopping IV and resuming oral diuretics over weekends to include the incidence of clinical deterioration and hospital admissions relating to heart failure. In addition, the BHF has suggested examining the potential for positive effects of having a break in treatment, such as whether it might reduce the risk of diuretic toxicity. Once the service model was agreed and procedures ratified, community IV diuretics delivery was able commence.

Community intravenous diuretics case study

Patient background

For the purpose of this case study, the patient will be referred to as Mr Brown. He is a 74-year-old man who has been case-managed by the CHFN service for the past 4 years. He has a diagnosis of left ventricular systolic dysfunction, which was diagnosed in 2008 and is due to ischaemic heart disease. He also has hypertension. He has other comorbidities, including:

- Paroxysmal atrial fibrillation
- Cerebral vascular accident (with residual right-sided weakness)
- Type 2 diabetes
- Urethral damage (supra-pubic catheter)
- Osteoarthritis.

He is a retired train driver living with his wife, who is his main carer. He also has a son living close by who helps out and visits regularly. Mr Brown is usually able to wash and dress with minimal assistance from his wife, and although his mobility is restricted he is able to walk from room to room within the ground floor of his house. He attends a day centre twice weekly and enjoys building model trains.

Mr Brown is assessed at regular intervals by the CHFN, the regularity depending on his symptoms and clinical need. He is also under the care of the district nurses for supra-pubic catheter care and the community matron for his other comorbidities. Mr Brown was taking a number of medications for his medical conditions, such as:

- Ramipril 2.5 mg once daily
- Bisoprolol 1.25 mg once daily
- Bumetanide 3 mg twice daily
- Eplerenone 50 mg once daily
- Gliclazide 160 mg twice daily
- Aspirin 300 mg once daily
- Omeprazole 20 mg once daily
- Oxygen 2 litres/minute as required.

Mr Brown's heart failure therapy had been optimised as far as he could tolerate in accordance with local and national guidelines (National Clinical Guidelines Centre, 2010). Mr Brown's bisoprolol and ramipril were at their optimum tolerated doses. Bisoprolol is a beta-blocker and as such works in heart failure by blocking the effects of adrenaline on beta receptors. This results in reduced heart rate, blood pressure and therefore myocardial contractility (Neal, 2005). Ramipril is an angiotensin-converting enzyme (ACE) inhibitor inhibits the conversion of angiotensin 1 to angiotensin 2, which is a potent vasoconstrictor, therefore lowering arterial and venous resistance (Neal, 2005). The National Institute for Health and Care Excellence (NICE)

(2010) supports the titration of both these drugs to the evidence-based target of 10 mg; however previous attempts to increase these drugs further had resulted in hypotension.

There is also a risk of hypotension with IV furosemide, so treatment would not be initiated if the systolic blood pressure was outwith the parameters in *Table 3*. The management of the patients also included a blood pressure check 20 minutes after the administration of IV furosemide, carer support after the nurses had left, and advice to contact the IV diuretics helpline if symptoms of dizziness should occur. The CHFN would also repeat the blood pressure measurement later in the day either in person or by using remote monitoring (telehealth) if concerns about blood pressure arose.

In the past 4 years, Mr Brown had on two occasions required hospital admission for the management of fluid retention relating to his heart failure. Each admission had resulted in lengthy hospital stays due to urinary tract infection. Both Mr Brown and his wife reported great distress and upset caused by each admission, citing that there was disruption to Mr Brown's daily routine and family life.

Clinical assessment leading to community intravenous diuretics

Following a call from Mr Brown's wife to inform the CHFN that he had gained 3 kg in weight over the preceding 2 days, he was assessed at home. On assessment, Mr Brown had pitting oedema from his feet to knees bilaterally, abdominal oedema, and crackles bilaterally to his lung bases. He reported feeling breathless on minimal physical effort and occasionally at rest while sitting in a chair. His appetite had been affected by nausea and his wife had also noticed some confusion. Mr Brown was less alert and reported feeling fatigued throughout the day. This combination of symptoms affected Mr Brown's usual functional level and he was limited to transferring from his bed to a chair. His wife was required to help more with washing and dressing and Mr Brown did not feel able to carry out his usual activities and hobbies or attend the day centre. Based on these symptoms, Mr Brown was assessed as having a New York Heart Association classification of 3–4 (*Table 6*). Despite the change in Mr Brown's heart failure signs and symptoms, his clinical observations and renal function had remained stable (*Table 7*).

The treatment options were discussed with Mr Brown and his wife. Concerns were raised regarding starting a thiazide diuretic in addition to Mr Brown's existing therapy. Thiazides can cause hypotension and electrolyte imbalance (Rang et al, 2007), as can some of his other medications. Mr Brown had become hyponatraemic when bendroflumethiazide had been tried in the past; however, he had previously received IV furosemide without complications. Due to other concerns raised by Mr Brown and his wife about hospitalisation, management at home was considered. Mr Brown was assessed against the inclusion criteria for community IV diuretics and it was concluded that home treatment would be appropriate. Mr Brown and his wife were keen to proceed with this.

Table 5. Locally-approved dose protocol for community intravenous furosemide

Day 1	Administer intravenous (IV) furosemide 40 mg daily Review after 4–6 hours and if there is inadequate diuresis consider a further dose of IV furosemide 40 mg
Day 2	If diuresis of 1–2 litres or weight loss of 1–2 kg (over the last 24 hours), continue IV furosemide 40 mg daily If diuresis of <1 litre or weight loss of <1 kg (over the last 24 hours), increase with IV furosemide to 80 mg daily If diuresis of >2 litres or weight loss of >2 kg, consider reducing IV furosemide to 20 mg daily
Day 3–4 onwards	If diuresis of 1–2 litres or weight loss of 1–2 kg (over the last 24 hours), continue IV furosemide at the previous day's dose If diuresis of <1 litre or weight loss <1 kg (over the last 24 hours) consider increasing IV furosemide by 40 mg per day (to a maximum of 160 mg daily in two doses of 80 mg separated by a minimum of 4 hours) If diuresis of >2 litres or weight loss of >2 kg, reduce the dose by 40 mg
Throughout treatment	If there is inadequate response to treatment despite increased doses of IV furosemide, or if you are unable to titrate due to clinical findings, discuss with the GP/consultant/cardiology registrar with a view to hospital admission If there is a good response to treatment, continue dose schedule and/or discontinue IV furosemide when the treatment goals are achieved IV diuretics will be withheld during weekends and bank holidays and an oral diuretic regime restarted. IV diuretics will be restarted if necessary after the weekend or bank holiday

Intravenous diuretics delivery

Mr Brown's GP, community matron and district nursing team were consulted on the proposed plan, and all agreed to support the CHFN and proceed. The plan was also discussed with the cardiologist, who agreed to offer guidance to the CHFN if necessary.

The IV diuretics procedure was fully explained by the CHFN to both Mr Brown and his wife, along with information on potential side effects, complications, cannula care and contact details for the CHFN and the evening and night service. Written information was also provided for reference. Based on the information given and the support from the CHFN, Mr Brown and his wife gave consent for community IV diuretics.

IV furosemide was prescribed by the CHFN based on the locally-developed dose protocol. Mr Brown was asked

Table 6. New York Heart Association classification (McMurray et al, 2012)

- **NYHA 1:** No limitation of physical activity; no symptoms of breathlessness, fatigue or palpitations on usual level of activity
- **NYHA 2:** Slight limitation of physical activity; comfortable at rest; symptoms of breathlessness, fatigue or palpitations occur during usual level of activity
- **NYHA 3:** Marked limitation of activity; comfortable at rest; symptoms of breathlessness, fatigue or palpitations occur on less than usual level of activity
- **NYHA 4:** Symptoms occur on any physical activity and may occur at rest

to stop his bumetanide but to continue eplerenone and all other oral medications.

Ototoxity can occur if furosemide is given too quickly due to similar cellular ion exchange occurring in the membranes in the ear (Rang et al, 2007). The recommended administration rate is 4 mg per minute (Joint Formulary Committee, 2013) and therefore an infusion pump was used to regulate the delivery of this drug. The initial dose of 40 mg IV furosemide resulted in an inadequate response and therefore an additional IV dose of 40 mg was given later in the day. On review the following morning, there had been no change in symptoms or weight. As Mr Brown's blood pressure and renal function remained stable, the CHFN increased the IV furosemide dose to 80 mg in the morning and 40 mg in the afternoon, quickly increasing to 80 mg twice daily by the third day owing to poor diuretic response to the lower doses. This dose resulted in a limited clinical response. Although there was good diuresis and slight improvement to symptoms and weight, it was felt to be inadequate and Mr Brown remained troubled by both breathlessness and reduced mobility.

The dose that Mr Brown was receiving was the maximum that should be given at home according to the local dose protocol, and Mr Brown and his wife stated that they did not want hospital admission for higher doses. Discussion therefore took place between the CHFN and Mr Brown's cardiologist, who suggested that, with his support and guidance, the IV furosemide dose be increased to 120 mg twice daily. This dose was much more effective in reducing weight and alleviating symptoms. This is likely to be due to fact that Mr Brown was taking high doses of loop diuretics prior to IV treatment and had in fact taken a significant dose reduction when given IV furosemide 40–80 mg, a theory supported by Felker et al (2011). An agreement was subsequently made with his cardiologist that should Mr Brown require community IV diuretics again he could be prescribed furosemide 120 mg twice daily from the outset.

Mr Brown received IV diuretics for 16 days in total, with breaks over the weekends when he took his oral diuretics as advised. The IV diuretic treatment was withdrawn when Mr Brown's symptoms were more acceptable to him and his fluid status had improved adequately.

Patient care and monitoring

Mr Brown was clinically reviewed daily by the CHFN team. This included monitoring of his weight, waist circumference, symptoms, clinical observations, fluid balance and renal function. IV diuretic dosing and delivery was decided based on this monitoring and Mr Brown's response to treatment.

Mr Brown and his wife had been given advice on cannula care and were advised to contact the CHFN or evening and night service if the cannula became dislodged

Table 7. Clinical findings before and after intravenous diuretics

Clinical findings before intravenous diuretics	Clinical findings after intravenous diuretics
Blood pressure: 118/62 mmHg	Blood pressure: 120/62 mmHg
Pulse: 64 beats per minute and regular	Pulse: 70 beats per minute and regular
Weight: 82.5 kg	Weight: 81.5 kg
Oedema from feet to knees	Oedema to right ankle
Waist circumference: 114 cm	Waist circumference: 111 cm
New York Heart Association: 3–4	New York Heart Association: 2–3
Bibasal lung crackles	Lungs clear
Urea and electrolytes:	Urea and electrolytes:
• Sodium 139 mmol/L	• Sodium 135 mmol/L
• Potassium 3.9 mmol/L	• Potassium 4 mmol/L
• Urea 14.1 mmol/L	• Urea 12.9 mmol/L
• Creatinine 116 µmol/L	• Creatinine 129 µmol/L
Glomerular filtration rate 54 ml/min	Glomerular filtration rate: 47 ml/min

or became painful or inflamed. At each visit, the CHFSNs assessed the cannula site using the visual inspection of phlebitis (VIP) score tool. This is a widely used tool recommended by the Infusion Nurses Society (2011). In order to prevent phlebitis and infection, the cannulas were resited every 72 hours, or sooner if required. This is in accordance with local policy and supported by the Royal College of Nursing (2010), which suggests that peripheral cannulas are changed every 72–96 hours.

Mr Brown was issued with a fluid intake and output chart that his wife maintained and he was consistently in a negative fluid balance, with an average of 250 ml each day. This was assisted by maintaining a 1.2 litre per day fluid restriction. Stewart and Blue (2004) recommend a fluid restriction of 1.5 litres per day in patients with fluid retention. McMarray et al (2012) acknowledged that there is a lack of evidence to support the optimal fluid intake in heart failure; however, they do recommend <1.5–2 litres depending on the patient's condition. Mr Brown had successfully and effectively maintained a 1.2 litre restriction in the past and so this was agreed.

Outcomes and findings

Mr Brown showed a steady reduction in his symptoms and increased functional capacity throughout the 16 days. The improvements increased as the dose of IV furosemide was titrated up.

Mr Brown's wife noticed that he was no longer confused and he appeared to be more alert during the day. Cognitive impairment in heart failure is attributed to effects on cerebral oxygenation due to reduced blood flow, reduced blood oxygen saturation and increased breathlessness (Johnson and Lehmen, 2006) It is probable that Mr Brown's confusion and drowsiness were resolved as a result of the offloading of fluid. He also denied any further nausea and his appetite had returned to normal.

Mr Brown's clinical observations and renal function remained satisfactory throughout the IV diuretic treatment. Clinical findings at the end of the treatment are outlined in *Table 7* and demonstrated that Mr Brown was not clinically compromised by receiving IV diuretics at home. No complications occurred and the clinical response was positive.

From Mr Brown and his wife's perspective, they both felt that it was a positive experience as Mr Brown was able to remain in the comfort of his own home, being looked after by his wife and visited by his son. He felt that, by staying at home, the disruption to his daily routine and activities was minimal. He also expressed satisfaction at being cared for by a regular group of nurses who were familiar to both him and his wife. Mr Brown and his wife both commented that, by being offered IV diuretics at home, they were given more choice and involvement with his care and felt much more valued as a consequence.

During the treatment, Mr and Mrs Brown were able to renew their wedding vows at home, something they do every year, without a hospital admission hindering their plans. They both felt this was a very positive outcome in terms of their quality of life. Following the treatment, Mr Brown was able to return to his day centre, and felt he could resume his hobby with model trains.

Recommendations for ongoing service delivery

The experience and learning gained from Mr Brown and other patients that have received IV diuretics at home have enabled the CHFNs to consider ways to develop the service further and adapt practice to improve its effectiveness for the future. Resourcing and staffing the community IV diuretics service proved challenging due to the frequency and length of home visits and the need for two nurses to attend. This will be taken in to account in future service planning, and cost analysis and a recommendation will be made to utilise a more cost-effective grade mix.

In cases such as Mr Brown, where other services are involved, it is recommended that other nursing staff, such as the community matron or district nurses, are asked to check the IV medication. It is also suggested that the second nurse attends to check the drug and patient and can leave once the infusion is running.

To reduce the frequency of visits, it may be possible to administer larger doses of IV furosemide on a once-daily basis. Other pilot sites have followed this protocol, and once the safety and effectiveness of this has been evaluated fully this may be recommended as standard practice.

It is suggested that the dose protocol as a whole be reviewed, as it has become apparent that the current starting dose may not be sufficient for patients who are already on high-dose oral diuretics. This will be addressed with the steering group and recommendations made to start patients on higher doses of IV furosemide based on their current clinical condition and previous response to IV diuretics.

The absence of IV diuretic delivery over weekends may have prolonged total treatment time, although further evaluation is required to establish this as fact. Mr Brown's

KEY POINTS

- Intravenous diuretics for heart failure patients with fluid overload have traditionally been delivered in secondary care
- In response to recent strategies to provide more clinical care in the community, the British Heart Foundation is running a pilot project in order to deliver intravenous diuretics in patients' homes
- Developing and implementing such a service can be both challenging and rewarding
- Evaluation of the project's early stages has demonstrated positive clinical outcomes
- Patients and carers have expressed a positive impact on quality of life and patient choice
- Further evaluation work needs to be done to establish the service's cost-effectiveness

treatment stretched over several weekends, when he took his diuretics orally. It is, however, acknowledged that, although this may have delayed his response, it did not prevent positive outcomes. In order to develop a truly seamless service, however, the need for 'out-of-hours' cover may need to be explored.

Conclusion

The experience of developing and delivering a community IV diuretics service has not been without its drawbacks and challenges, but these have been explored and examined in order to take this treatment approach forward and improve its effectiveness for future delivery. There have been multifactorial and individual benefits for patients and carers, highlighted in this case study, that have led to an effective holistic approach to patient care. By avoiding unnecessary hospital admissions, there are positive outcomes, such as clinical effectiveness and safety, patient and carer satisfaction and enhanced quality of life. It is highlighted, however, that these patients do need to be carefully selected based on their clinical condition and that management in acute care may the preferred option in certain cases. By working together, primary and secondary care heart failure teams should be able to identify those patients and provide services in the most appropriate settings.

Further evaluation needs to take place to ensure cost-effectiveness, as it has been recognised that there is a large impact on resources within the CHFN team. BJCN

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