

Quality and Productivity: Proven Case Study

Home administration of intravenous diuretics to heart failure patients: Increasing productivity and improving quality of care

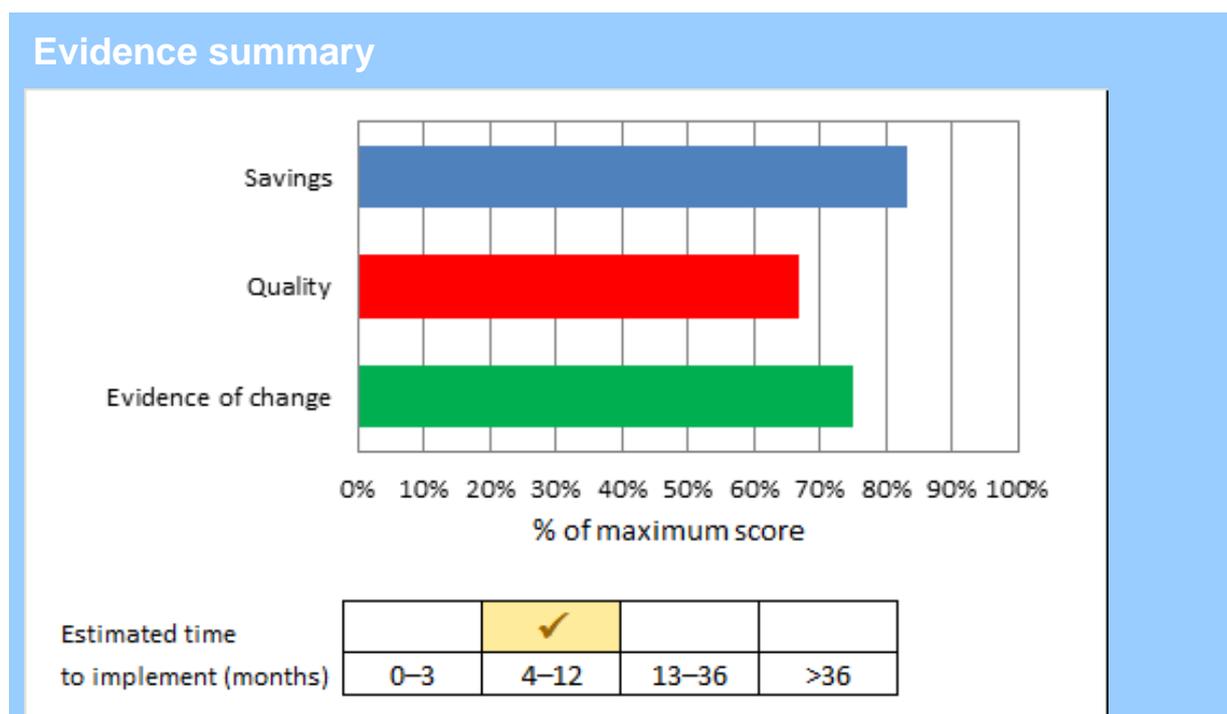
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Sharing good practice: What are 'Proven Quality and Productivity' case studies?

The NICE Quality and Productivity collection provides users with practical case studies that address the quality and productivity challenge in health and social care. All examples submitted are evaluated by NICE. This evaluation is based on the degree to which the initiative meets the NICE Quality and Productivity criteria: savings, quality, evidence and implementability. The assessment of the degree to which this particular case study meets the criteria is represented in the summary graphic below.

Proven Quality and Productivity examples are case studies that show evidence of implementation and can demonstrate efficiency savings and improvements in quality.



Changes since the previous version

Published Quality and Productivity case studies are reviewed annually. One year after the case study has been published in the Local Practice Collection, the submitter of the case study is contacted to ask if there is further information relevant to the case study, and the case study updated as required. The case study has been amended to meet NICE style and any additional changes to this case study are outlined in the table below.

Case study section	Update
Introduction	<p>The case study was originally published as a proposed example in December 2013. The case study has been republished as a proven quality and productivity example.</p> <p>This case study describes how the British Heart Foundation implemented a programme to assess how existing specialist nursing teams administer intravenous (IV) diuretics to people at home or in a day care setting. The pilot was delivered at 10 NHS sites across the UK, where heart failure specialist nurses (HFSNs) developed and delivered community-based IV diuretic services as part of existing services such as hospice or day care hospital.</p>
Savings	<p>Over the duration of the project across the 10 pilot sites a total of 1040 bed days were saved. In addition a 77% reduction in costs for 80 successful interventions (defined as nurses administering diuretics through cannulation) was achieved. The evidence demonstrating a reduction in hospital admissions and increased cost effectiveness has led to most sites sustaining and integrating this into their existing service.</p>
Quality	<p>Since the publication of the original case study the anticipated quality outcomes have now been demonstrated. A small-scale in-patient comparative study revealed fewer complications for patients receiving home-based treatment compared to those in hospital.</p> <p>Significant improvement in patient and carer experiences was reported. It is anticipated that service reconfiguration will be well received by the wider public if care can be provided at home.</p>
Evidence	<p>New data demonstrates evidence of implementation. The majority (63%) of treatments have been successful with achievement of target weight loss and/or oedema reduction and/or resolution of patient symptoms. A total of 79% of interventions did not involve hospital admission, resulting in 869 hospital bed days being prevented over the pilot duration.</p> <p>The pilot met its deliverables across clinical effectiveness, safety, patient and carer experience and cost effectiveness and is an effective way of delivering home-based IV diuretics.</p>
Implementation	<p>At each site the lead nurse set up a consultation process with heart failure patients that identified the need for the service.</p> <p>Although the pilot projects were set up as stand-alone home-based IV diuretics, they have developed into integrated parts of wider heart failure care packages. All pilot sites recognised that</p>

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	this practice was effective and intend to continue the intervention within the delivery of their mainstream heart failure service. Most pilot sites have secured funding or additional resources post BHF funding.
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Details of initiative

Purpose	Originally a 2-year pilot programme to assess safe and effective ways for specialist nursing teams to administer intravenous (IV) diuretics to people at home or in a day-care setting, preventing hospital admissions and improving patient experience. Without this service patients would be admitted to hospital to receive IV diuretics.
Description (including scope)	<p>Heart failure is a debilitating condition that affects the day-to-day lives of many people in the UK. People with heart failure often experience breathlessness. As the condition worsens, fluid accumulates in the lower limbs and eventually in the abdomen. Diuretic tablets help reduce fluid retention, but as the disease progresses oral diuretics are not enough to control symptoms. To relieve symptoms at this stage, patients are usually required to be admitted to hospital to be treated with IV diuretics.</p> <p>The pilot was delivered across 10 NHS sites in the UK, where existing heart failure specialist nurses developed and delivered community-based IV diuretic services as part of their existing heart failure service. There is anecdotal evidence that patients are often reluctant to be admitted to hospital and would prefer to see a nurse in their own home. The evaluation captured the preferences of where patients wished to be treated, including those who declined hospital admission.</p> <p>After the initial funding by the British Heart Foundation, pilot sites secured additional resources to continue administering IV diuretics to people at home.</p> <p>The British Heart Foundation steering group included external healthcare professionals experienced in the management of heart failure who provided guidance on patient eligibility and dosing protocols. While this guidance provided parameters for treatment, each site has developed a locally adapted version of the protocol that is subject to local governance. However, there were a number of core aspects of the guidance that were fixed for all sites:</p> <ul style="list-style-type: none">• all patients must have a diagnosis of heart failure• diuretics must be administered intravenously• patients may receive their IV diuretics in established treatment locations such as their home or other community/day care

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	settings such as a hospice or community hospital. The service did not operate overnight but patients were given a patient information leaflet and an out of hours contact telephone number in case there were any problems.
Topic	End of life care, long-term conditions, right care, right care for patients – shared decision-making and safe care.
Other information	<p>As part of the pilot programme, the British Heart Foundation commissioned BrightPurpose, an independent evaluation company, to evaluate the IV diuretic service with the aim of demonstrating the safety, effectiveness and cost benefits of a community IV diuretic service. The findings within this case study are based on the final evaluation report (BrightPurpose, 2014).</p> <p>The pilot sites differed in their approaches to implementation partly because of the variation in local infrastructure and geography. Some pilot sites incorporated the service using their existing resources, while others used the evidence of cost saving to expand and redesign services. However, it is unlikely that sites would have a full-time heart failure specialist nurse working solely on delivering IV diuretics. Therefore the costings are based on the time taken to deliver the service.</p>

Savings delivered

Amount of savings delivered	<p>Over the duration of the project across all 10 pilot sites a total of 869 hospital bed days were saved. In addition there was a 77% reduction in costs for 80 successful interventions. A successful intervention is defined as a nurse administering diuretics through cannulation resulting in oedema reduction, weight loss and symptom resolution.</p> <p>The NHS National Schedules of Reference Costs was used (because not all sites worked on the tariff system) to provide the average cost of a non-elective admission for heart failure without coronary care. This was £3796, based on an average length of stay of 13 days that several interventions in the pilot exceeded. The cost of each excess day (without coronary care) was £239. Using this, individual interventions were calculated across all sites, giving a total cost of £303,680 for 80 interventions.</p> <p>In comparison, the cost of delivering home-based IV diuretics to the successful interventions, where there was a significant reduction in symptoms and no hospital admission was required, was £62,640, with an average cost of £783 per intervention. This took into account staff banding, staff travel time, as well as time spent delivering the treatment.</p> <p>The overall cost savings for the service was £162,740 across the</p>
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10 sites, however if the services run at full capacity then these are forecasted to be much higher (for example just for the 80 interventions the cost savings are £241,040, however, annual nurse salaries combined with services not running at full capacity, reduces the actual saving to £162,740). A comparative inpatient study showed that the length of active home-based treatment was similar to the length of time that patients need to stay in hospital. The costs of the IV diuretics and equipment were not included because the cost would be the same for hospital and community.

Type of saving

A mixture of real cash savings and improved productivity. This was achieved by using specialist nurses to administer or supervise delivery of IV diuretics to people at home or in a day-care setting rather than as an inpatient with the associated costs.

Any costs required to achieve the savings

Investment is required before savings can be generated. Services may have extra training costs as part of the set-up, depending on existing knowledge and the skills available within the heart failure team. Therefore the amount of investment required is specific to each service. The pilots indicate that it takes 6 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 £5000 for equipment, the start-up cost would be £15,660.

The evaluation showed cost savings based on the heart failure specialist nurse time taken to deliver the service. Patients and pilot sites were positive about the interventions and results achieved. The evidence demonstrating a reduction in hospital admissions and increased cost effectiveness led most sites to keep this service and integrate it into their existing heart failure service.

The recurring costs for running the service (consumables and training) would be the same as those within the hospital and so these have not been included. The cost of the time that it takes for a heart failure nurse to deliver the service has been included within the cost savings. Further potential savings are possible where existing community IV diuretic services are being delivered within the community as less training would be needed.

Programme budget

Circulation problems.

Supporting evidence

The pilot site in Leeds had a 5-day service model during the pilot, based on IV diuretics provision being managed solely by the heart failure nurse service. Of the 23 interventions in Leeds, 15 were reported as being successful with patients achieving their target weight loss and/or oedema reduction and/or resolution of symptoms.

The findings indicate that there is the potential for significant cost savings for an individual patient treated at home rather than in hospital, but this will depend on the number of patients using this

service.

Further cost savings are expected through a reduction in consultant time compared with time supporting the service within the hospital and a reduction in ambulance costs for admissions.

A full breakdown of costs to achieve the savings can be found within the 2014 evaluation report that was used as part of the cost reviews. Costs vary across the sites that have implemented the service. More sites, other than Leeds, are reconfiguring existing resources and some sites have a business case for further resources based on the evidence. The evaluation highlights that although variation exists across the pilot sites, the service is cost effective to deliver when compared with hospital admission.

Quality outcomes delivered

Impact on quality of care or population health

Improved quality of care resulting in better patient outcomes.

Better self-management and patient/carer knowledge. The time to deliver the service, including education of patients, has been included within the cost of delivering the service. An additional outcome includes more time for patient and carer education on the treatment and management of the wider condition. An example from 1 site is where treatment of a patient in their home led to the provision of social care, home adaptations and a pendant alarm service – needs that may not have been identified during a hospital admission.

Impact on patients, people who use services and/or population safety

Improved safety, such as reducing the risk of adverse events.

The complications experienced during the pilot were similar to those that can be experienced when IV diuretics are provided in hospital. Problems with cannulas were the most common complication encountered as part of treatment. These were generally minor complications and very easily dealt with. The healthcare professionals re-sited the cannula and resumed treatment. A common problem with IV treatments is phlebitis around the cannula site. Patients' cannula sites were checked every time the IV diuretic was administered using the Visual Infusion Phlebitis Score.

A small-scale inpatient comparative study revealed fewer complications for patients receiving home-based treatment compared with those receiving treatment in hospital. As with home-based patients, the complications experienced by patients in hospital tended to be minor and were managed while continuing treatment. In both patient groups, there were no incidences of healthcare-associated infections that were attributable to the IV diuretics treatment. Only a small proportion of patients (4%) required hospital admission following serious complications related to home-based IV diuretics. These

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complications included hypotension, collapse and patients being unable to cope at home.

All patients' renal function was monitored closely during their IV diuretic treatments and during most interventions the renal function remained within the normal range. Patients with renal dysfunction were largely managed within the community and were able to continue treatment; only 3% of patients required hospital admission because of renal dysfunction.

Patients could contact the heart failure team during office hours.

The out-of-hours contact telephone number was provided on the patient information leaflets in case of any problems in the evening or at weekends.

Impact on patients, people who use services, carers, public and/or population experience

Significant improvement in patient and carer experiences. It is anticipated that service reconfiguration will be well received by the wider public if care can be provided at home.

100% of patients who completed the survey (55 patients) found the treatment preferable to hospital admission and said that if they need IV diuretics again they would choose to have it at home rather than in hospital. Their main reasons were:

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

One-to-one interviews were also conducted with 9 patients. In these interviews it was highlighted that for some patients home-based IV diuretics treatments were preferable to treatments in hospital because of the bond that patients developed with the staff who delivered treatments. They reported that in hospital they had less consistency of staff contact because staff shifts rotated regularly and so they received support from different staff members.

One patient said "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."

97% of patients who completed the survey (54 patients) were either very satisfied (82%) or satisfied (15%) with the service they received. One patient was dissatisfied with the information provided to them about their treatment, but was satisfied with the other components of the support they had received, including their overall treatment.

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.

40 of the 42 carers (95%) responding to the survey indicated they

felt that the treatment for the person they cared for was better than being treated in hospital. One respondent said that 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. 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 condition again and therefore felt hospital treatment may be more appropriate. This was purely because of the patient's condition, rather than the treatment, and the carer indicated that if the patient had not been so weak then home-based treatment would have been preferable.

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.

Patients were satisfied with the service and felt that they and their carer could cope at home while being treated. Feedback from carers suggests that they were reassured by the dedicated treatment provided and particularly satisfied with the information provided about the pilot, which helped them understand what would be required of them and who to contact in an emergency.

Supporting evidence

Full details of the outcomes are published in BrightPurpose (2014) [Evaluation of IV diuretics pilot](#). Final report for British Heart Foundation

Evidence of effectiveness

Evidence base for case study

The initiative is informed by published research evidence such as systematic review or non-accredited guidance. The BrightPurpose (2014) evaluation report is the first systematic review of this service.

Evidence of deliverables from implementation

There were 4 components used to determine if the implementation was effective:

- clinical effectiveness
- safety
- patient and carer experience
- cost effectiveness.

126 IV diuretic interventions were administered during the pilot to a total of 96 patients.

The majority (63%) of treatments were successful, with achievement of target weight loss and/or oedema reduction and/or resolution of patient symptoms. A total of 79% of interventions did not involve hospital admission, resulting in 869

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fewer bed days over the pilot duration.

The time IV diuretics teams spent with patients in their homes during the treatment 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.

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. Different localities implemented a variation on this delivery model; bolus doses administered twice a day, stepped dosages, fixed doses or continuous infusion.

Most of the pilots only operated on weekdays, so the patient had to change to oral diuretics at the weekends. While 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.

Patient and carer satisfaction is significantly higher, resulting in 100% of patients and 95% of carers preferring home-based IV diuretics compared with hospital admission.

Where implemented	The pilot took place across 10 NHS sites.
Degree to which the actual benefits matched assumptions	The pilot met its deliverables across all 4 components and is an effective way of delivering home-based IV diuretics.
If initiative has been replicated how frequently/widely has it been replicated	Most pilot sites have secured funding and/or additional resources after the initial British Heart Foundation funding to continue with this service.
Supporting evidence	No other details provided.

Details of implementation

Implementation details	The implementation of the service model varied across the programme sites. However, key features of the delivery remained consistent, ensuring economic evaluation could be completed. At each site the lead nurse set up a comprehensive consultation process with heart failure patients that identified the need for the service. The IV diuretics service was offered to patients in their own home as an alternative to hospital admission when they were
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failing to respond to oral diuretics. Patients were rigorously assessed by the heart failure nurse specialist to ensure they were suitable candidates for home IV diuretic therapy. These nurses were also responsible for prescribing and administering the therapy, and monitoring the patient during treatment.

Most of the service was delivered by heart failure nurses. Therefore clinical responsibility was with the heart failure nurses, who worked with the British Heart Foundation guidance document adapted to local governance. Anything that fell outside of this, or any complex patients, was to be discussed with the cardiologist. A patient did not have to be seen by a cardiologist before starting IV diuretic treatment at home. All treatment changes and decisions were communicated to the GP.

GPs had very little input but were informed about all aspects of the service. GPs received a memo about the service before it was launched and again after it was commissioned to continue. GPs were very supportive of the project and recognised the value that the home-based IV diuretic service provides to patients.

While the pilot projects were set up as stand-alone home-based IV diuretic services, they have naturally developed into integrated parts of wider heart failure care packages. Combining 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, is the route to sustainability.

All pilot sites recognised that this practice was effective and intend to continue this intervention within the delivery of their mainstream heart failure service.

Time taken to implement	The initiative can be implemented in the medium term: 6 months to 1 year.
Ease of implementation	Affects cardiac services in the hospital and community.
Level of support and commitment	<p>Good buy-in from the start because cardiologists are involved from the beginning. Patient feedback (as described in the Implementation details) was positive from the start because patients preferred to be at home.</p> <p>Feedback to date has been positive, particularly from patients and carers. There has been support from cardiologists, who are happy to provide advice as needed.</p>
Barriers to implementation	<p>Operating environment: It is important to recognise the pilots have been developing the IV diuretics service against a backdrop of major restructuring, fragmented services and variation across localities. This is making collaborative working and securing buy-in challenging. Solutions have included:</p> <ul style="list-style-type: none">• securing the commitment of senior staff to act as champions for the pilot, to help get their peers on board

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- presenting details of the service at conferences and forums
- presenting details of the service at continuing professional development/learning events (for example, GP learning events)
- producing and disseminating literature (for example, 1 site has produced an information leaflet specifically for GPs)
- anticipatory prescribing, when the patient is prescribed 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 time as the patient needs them
- developing an on-call weekend rota in some areas for the existing heart failure nurse service to provide a 7-day service
- collaborating with local out of hours services that can support delivery during this period
- securing backfill for the project lead to minimise risk of delay
- sharing the workload of the project lead among existing staff
- considering whether the 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 because it takes a considerable amount of time for policies to be ratified
- progressing through the development phase by drawing on the knowledge and expertise of teams locally as well as learning from other sites that are at a more advanced stage
- training for nurse prescribers, community heart failure nurses and colleagues in other geographical areas so that the service can become embedded in the heart failure service.

Additional barriers include:

- capacity to deliver an IV diuretics service
- safe delivery of IV diuretics
- lower patient numbers than originally anticipated
- involving non-prescribers in the delivery
- developing a business case/evidence to inform future delivery meeting targets set by commissioners for a commissioned service.

Risks	None provided.
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Supporting evidence	No additional information provided.
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Further evidence

Dependencies	Capability and competence: Refresher training is being delivered by the pilots for staff to gain competence, but there is a challenge in maintaining this if patient numbers are low. Solutions have included staff maintaining competence by inserting cannulas for
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patients either within hospital wards or with paramedic teams. One site has opted to use butterfly needles instead of cannulation as a solution to this challenge.

Contacts and resources

Contacts and resources

If you require any further information please email: qualityandproductivity@nice.org.uk and we will forward your enquiry and contact details to the provider of this case study. Please quote reference 12/0019r2 in your email.

BrightPurpose (2014) [Evaluation of IV diuretics pilot](#). Final report for the British Heart Foundation

British Heart Foundation (2008) [G235 Heart failure nurse services in England: executive summary](#)

Ryder M, Murphy N F, McCaffrey D et al. (2008) Outpatient intravenous diuretic therapy: potential for marked reduction in hospitalisations for acute decompensated heart failure. *European Journal of Heart Failure* 10(3): 267–72

Other documents

NICE has published evidence-based guidance for healthcare professionals. This QP case study goes beyond the scope of these guidelines. Links to the guidance have been included here for information and to support you in the development of evidence-based services:

National Institute for Health and Clinical Excellence (2010) [Chronic heart failure: management of chronic heart failure in adults in primary and secondary care](#). NICE guideline CG108

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