



**Liverpool
Public Health
Observatory**

**The Public Health contribution to capacity planning and
demand management in Cheshire and Merseyside,
Phase 3: Managing heart failure**

Nigel Fleeman

Observatory Report Series No. 57

PROVIDING INTELLIGENCE FOR THE PUBLIC HEALTH

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Executive Summary

Aim

The aim of this report is to estimate the likely impact of nurse-led interventions for managing heart failure on hospital readmissions for heart failure.

Method

Evidence on effectiveness and quantification was obtained from the literature and from key informants and was applied to hospital data (2000/2001-2002/2003) provided by Cheshire and Merseyside Primary Care Trusts (PCTs).

Findings

Interventions could have a significant impact in reducing emergency hospital readmissions for heart failure amongst heart failure patients by around 62%.

The implications for Cheshire and Merseyside are summarised in the Appendix to the Summary (*Table 1*).

Discussion

Nurse-led interventions for managing heart failure have been shown to have impressive results in reducing readmissions for heart failure. However, the findings must be interpreted with caution because:

1. Heart failure initiatives are already being developed and in place in areas of Cheshire and Merseyside (and Cheshire and Merseyside already has an NHS beacon site at Aintree Cardiac Centre).
2. The estimates assume that there are currently no similar interventions for managing heart failure already in place.
3. Difficulties in applying research findings to local situations must be borne in mind.

Conclusions

Different nurse-led models of heart failure intervention exist and have been found to be effective.

However, because heart failure provision already exists to differing degrees, estimating the likely impact is particularly problematic, particularly in those Primary Care Trusts where heart failure provision is most developed. Where this is the case, the estimated reductions in readmissions will almost certainly overestimate the impact.

Notwithstanding these limitations highlighted, it is estimated that amongst heart failure patients, up to 62% of emergency readmissions for heart failure may be averted.

Appendix to the executive summary

Table 1: Estimated reductions in emergency heart failure readmissions by PCT, aged 15 and over

Intervention	Estimated reduction in readmissions after a year of the service being fully functional	Resource implications: basis for assessment	Mean number of heart failure readmissions 2000/2001-2002/2003		Estimated number of annual readmissions post-intervention
Nurse-led intervention	62%	Based on the experiences of Aintree Cardiac Centre, two or three specialist heart nurses of at least grade G are required (at Aintree Cardiac Centre nurses must have at least 5 years of Cardiology experience at Grade E) The nurses have a clinical, research, educational and managerial role to play. Developing the capacity for home visits to those who are unstable and frail and unable to attend clinics in person seems to be key to improving outcomes. Aintree Cardiac Centre currently receives about 500 new referrals a year.	Central Liverpool PCT*	98	37
			North Liverpool PCT*	72	27
			South Liverpool PCT*	52	20
			St Helens PCT*	87	33
			Knowsley PCT*	103	39
			South Sefton PCT*	99	38
			Southport and Formby PCT*	66	25
			Ellesmere Port and Neston PCT**	42	16
			Cheshire West PCT**	67	25
			Central Cheshire PCT**	108	41
			Halton PCT***	87	33
Warrington PCT***	126	48			

Source: Blue *et al* (2001), Aintree Cardiac Centre Resource Pack (available from Aintree Hospitals NHS Trust), personal communication with Barbara Appleton (13/11/2003) and Inpatient CDS

* A heart failure admission was counted as a readmission if it occurred within 12 months of a previous heart failure admission. In all instances, the primary diagnosis was used.

** Data for Ellesmere Port and Neston, Cheshire West and Central Cheshire PCTs was only provided for admissions. Thus the mean figure for the proportion of readmissions to admissions (36%) across the seven Merseyside PCTs (all those denoted by *) has been applied to admission data to make very crude estimates. The validity of the findings for these three PCTs is therefore open to question.

*** A heart failure admission was counted as a readmission if it occurred within 12 months of a previous admission for any condition. In all instances, the primary diagnosis was used.

Please see the full text of this report for a full explanation of assumptions and caveats in applying the findings to hospital data – in particular it is important to note that the findings presented *cannot* be compared across *all* PCTs because of the differences in definitions in collecting the data.

Background

Introduction

The main reasons for emergency admissions/readmissions to Aintree and the Royal Liverpool and Broadgreen University Hospital NHS Trust for the period 1998-2001 were identified from a report produced for the North Mersey Future Healthcare Project (Gandy, 2002). The report concluded that the group most likely to be readmitted to hospital were elderly patients over the age of 75 who were also found to be the biggest users of beds.

Primary, secondary and tertiary preventive public health interventions that would impact upon those admissions have been determined and the evidence for effectiveness summarised in Fleeman (2003a). Following this, three areas were examined in more depth. These were managing heart failure, pulmonary rehabilitation and preventing falls in older people.

This report focuses on managing heart failure. Separate reports have been produced for the other two topic areas (Fleeman 2003b; 2003c).

The epidemiology and burden of heart failure

Heart failure is a disease that is on the increase and which predominantly affects older people with "short lives remaining of extremely poor quality, punctuated by frequent admissions to hospital" (Murray, 2002). The prognosis for people with heart failure is worse than for those with breast and prostate cancer (Sanderson, 1994).

The advent of angiotensin-converting enzyme inhibitors, beta-blockers, and spironolactone has revolutionized the management of heart failure, reducing morbidity and mortality (Ahmed, 2002).

Over the last 50 years, new cases of heart failure have fallen in women but not in men. This has been attributed to the fact that most women get heart failure from hypertension, and with better management of blood pressure, the incidence is falling. Men are more likely to develop heart failure as a result of a heart attack (Gottlieb, 2002).

According to the National Service Framework (NSF) for Coronary Heart Disease (CHD), population prevalence rates have been estimated at between 3 and 20 people per 1,000 increasing to at least 80 cases per 1,000 among people aged 75 and over (Department of Health, 2000). In two Liverpool GP practices in 1994 the prevalence rate was 15 per 1,000 (and raising to 90 per 1,000 in the over 65s) (Mair *et al*, 1996).

Age-sex standardised rates (to the European population) for heart failure provided for selected PCTs in Cheshire and Merseyside show that there were between 87 and 182 admissions per 100,000 population (aged 15 and over) in 2002/03 (*Table 2*). The length of stay across these PCTs is on average between 10.4 and 17.8 days (*Table 3*).

Table 2: Age and sex standardised admission rates (with 95% Confidence Intervals) for heart failure per 100,000 population by PCT, aged 15 and over

	2000/01		2001/02		2002/03	
Central Liverpool PCT	123	(123-123)	106	(106-107)	101	(101-101)
North Liverpool PCT	150	(149-150)	149	(149-150)	159	(159-160)
South Liverpool PCT	146	(145-147)	120	(120-121)	147	(146-147)
St Helens PCT	136	(135-136)	123	(123-124)	102	(101-102)
Knowsley PCT	166	(166-167)	146	(146-147)	161	(160-162)
South Sefton PCT	162	(161-162)	150	(149-150)	139	(138-139)
Southport and Formby PCT	124	(123-124)	94	(94-95)	104	(103-104)
Ellesmere Port and Neston PCT	108	(87-132)	118	(96-143)	118	(110-159)
Cheshire West PCT	99	(85-115)	89	(75-104)	87	(74-101)
Central Cheshire PCT	220	(201-240)	178	(162-196)	182	(165-200)
Halton PCT	127	(110-143)	124	(107-140)	122	(105-138)
Warrington PCT	114	(102-126)	80	(70-90)	104	(90-115)

Source: Inpatient CDS and 2002 ADS Population (Reconciled to 2001 based mid-2001 LA population estimates)

Table 3: Emergency admissions and bed days for heart failure by PCT, aged 15 and over

	2000/01			2001/02			2002/03			Annual mean activity (2001-2003)		
	Number of admissions	Number of bed days	Average length of stay (days)	Number of admissions	Number of bed days	Average length of stay (days)	Number of admissions	Number of bed days	Average length of stay (days)	Number of admissions	Number of bed days	Average length of stay (days)
Central Liverpool PCT	314	6159	19.6	273	5099	18.7	256	3758	14.7	281	5005	17.8
North Liverpool PCT	165	2289	13.9	170	2399	14.1	183	2341	12.8	173	2343	13.6
South Liverpool PCT	167	3040	18.2	161	2654	16.5	161	2358	14.6	163	2684	16.5
St Helens PCT	278	3050	11.0	253	2797	11.1	219	2616	11.9	250	2821	11.3
Knowsley PCT	255	2837	11.1	235	2867	12.2	240	2362	9.8	243	2688	11.0
South Sefton PCT	284	3915	13.8	277	3822	13.8	255	3426	13.4	272	3721	13.7
Southport and Formby PCT	239	2762	11.6	185	2024	10.9	185	1862	10.1	203	2216	10.9
Ellesmere Port and Neston PCT	105	1410	13.4	111	1328	12.0	130	2161	16.6	115	1633	14.2
Cheshire West PCT	195	2672	13.7	178	2401	13.5	179	2248	12.6	184	2440	13.3
Central Cheshire PCT	340	4007	11.8	274	3137	11.4	278	3639	13.1	297	3594	12.1
Halton PCT	146	1500	10.3	141	1449	10.3	139	1498	10.8	142	1482	10.4
Warrington PCT	223	3012	13.5	162	1988	12.3	212	3108	14.7	199	2703	13.6

Source: Inpatient CDS

The NSF for CHD notes that hospital admissions for heart failure are increasing each year - heart failure now accounts for 5% of all acute medical admissions and 10% of bed occupancy each year. Around 50% of readmissions over a three month period may be attributable to heart failure. (Department of Health, 2000). Particular attention needs to be paid to the determinants for increased readmission and/or bed day usage which Jaarsma and Dracup (2001) summarise as being:

- Older aged patients.
- Patients with increased heart failure severity, significant left ventricular systolic dysfunction and/or a large number of comorbidities such as ischaemic heart disease, diabetes, renal failure and chronic obstructive pulmonary disease (on average, heart failure patients will have three comorbidities) and patients who have poor physical fitness.
- Inadequate diagnosis and treatment - including patients not receiving direct care from a cardiologist, those discharged prematurely and those receiving inadequate follow-up.
- Patients lacking adequate education about heart failure.
- Poor social support (and it is noted how many caregivers often have a cardiovascular illness which may impair the ability to provide care).
- Patients suffering adverse drug reactions from their medication.
- Non-compliance with prescribed medication and treatment (which may occur in between 42% and 64% of patients).
- Patients with depression (which is commonly under diagnosed as symptoms of heart failure e.g. fatigue, sleep disturbance and anorexia).

The management of heart failure should aim to control symptoms associated with heart failure, improve quality of life and slow disease progression (Holland, 2001).

Aim

The aim of this report is to estimate the likely impact of nurse-led interventions for managing heart failure on hospital readmissions for heart failure in Cheshire and Merseyside.

Objectives

1. To review the evidence of effectiveness of a nurse-led intervention for managing heart failure.
2. To quantify the potential impact of this intervention on reducing hospital readmissions.

Method

The method built upon earlier work undertaken and summarised in Fleeman (2003a) by seeking out further evidence on effectiveness and quantification from the literature and from key informants and applying this to Cheshire and Merseyside hospital data.

Outcomes

1. Identification of evidence based nurse-led interventions for managing heart failure.
2. Quantification of the impact of a nurse-led intervention on hospital readmissions.

Managing heart failure

Introduction

The National Service Framework (NSF) for Coronary Heart Disease (CHD) states that shared care is required for managing heart failure (Department of Health, 2000). By including care from a multi-disciplinary disease-management team (often comprising all or some of the following: a cardiologist, geriatrician, heart failure nurse, pharmacist, palliative care, physiotherapist, district nurse, psychologist, dietician, GP and social services), the common reasons for readmission (identified above) should be addressed.

Holland (2001) notes that a heart failure nurse is likely to take the pivotal role in any such system, with responsibility for educating patients and their family about the importance of self-monitoring of body weight, recognising signs and symptoms of worsening heart failure (dyspnoea, orthopnoea and nocturnal diuresis) and explaining the impact of heart failure on social activities.

The NSF for CHD has a list of key investigations and treatments for heart failure which include a 12 lead echocardiogram, angiotensin-converting enzyme (ACE) inhibitors, diuretics, beta-blockers, risk factor advice, influenza immunisation, controlling blood pressure, considering cardiac rehabilitation, etc (Department of Health, 2000).

The NSF for CHD also states the importance of a systematic approach to delivering care which should identify people at high risk of heart failure (Department of Health, 2000) and highlights the importance of the primary/secondary interface ("outreach" follow-up by specialist nurses, "multidisciplinary support in the community" and "heart failure clinics" which it states may be located in Primary Care Trusts [PCTs] or secondary care).

Home visits may well be crucial. Mair (2003) reported problems in recruiting frail and elderly people with chronic illnesses, i.e. those who may need the intervention the most (and who probably already have a large number of hospital appointments elsewhere). In this study, men and younger people on ACE inhibitors and those who had seen a cardiologist were more likely to be recruited.

Principles and programme components

The aim of the nurse-led practitioner, as defined by Aintree Cardiac Centre (which is an NHS beacon site) is to develop and implement a comprehensive therapeutic regimen of medication and lifestyle modification that can reduce the risk of progressive deteriorations of myocardial function for patients with the diagnosis of heart failure and to improve the patients functional capacity and quality of life and reduce the frequency of hospital admissions (*Table 4*).

Increasingly, in addition to hospitals providing specialist nurses who lead clinics and/or make home visits, it is increasingly being recognised that the most efficient way of caring for patients is to have trained nurses in primary care to care for the less severe patients so that the specialist nurses in secondary care can concentrate on the most severe cases.

Table 4: The role of a nurse practitioner for heart failure

- The aim of the nurse practitioner is to reduce the risk of progressive deterioration of heart function and to improve their functional capacity and quality of life and to reduce hospital admissions.
- Nurses should provide a focus for patients with heart failure by providing education, advice and support, by aiding diagnosis and to adjust medication where necessary.
- Nurses should ensure appropriate utilisations of investigations and treatment. This entails a management role through education and support.
- Nurses should provide collaboration between health provider in clinic and primary care settings.
- Nurses therefore have a clinical, research, educational and managerial role to play.
- They must have had E grade experience within Cardiology for at least five years.

Source: Aintree Cardiac Centre Resource Pack (available from Aintree Hospitals NHS Trust)

The British Heart Foundation (2002) has highlighted the Greater Glasgow model of managing heart failure as a model of good practice (which includes home visits to the most severe heart failure patients). This has been evaluated in a randomised controlled trial (Blue *et al*, 2001) and is summarised in *Table 5*. Many other proven interventions also exist but all tend to have in common a similar definition/role (Stewart and Blue, 2001).

Table 5: General principles of the Greater Glasgow model of managing heart failure

- The nurses are specially trained in heart failure management and work in conjunction with general practitioners, cardiologists and colleagues in primary and secondary care to optimise the management of patients with chronic heart failure in the community. There is no dedicated time resourced to the service from other healthcare professionals in either primary or secondary care.
- The key components of the nurse intervention include; regular contact with patients to detect clinical deterioration; continued adjustment and optimisation of therapy; teaching patients to monitor their weight and to detect early signs of sodium and water retention; teaching the patient to adjust diuretic dose according to symptoms/sodium volume status [or making this adjustment for patients]; monitoring blood chemistry; giving dietary advice [salt and alcohol in particular]; encouraging drug and dietary adherence and acting as an intermediary between the patient and other health care professionals in both primary and secondary care settings. A patient held record booklet is issued to the patient prior to hospital discharge.
- Patients have a first visit within one week of hospital discharge and a second visit one to two weeks later. Subsequent visits and telephone contact are determined by individual patient needs. If telephone contact is not possible then a home visit is made instead. All patients have a telephone call at three months and patients and their families are encouraged to make contact should they have any problems or change in their condition. Patients can be re-directed to the service by the GP/health care professionals at any time. If a further admission occurs the intervention process restarts.
- Currently patients' eligible for this service are the most high risk group i.e. those patients who have had an emergency hospital admission related to deteriorating heart failure.
- Future developments include access to palliative care support.

Source: British Heart Foundation (2002), information on the Greater Glasgow PCT Heart Failure Liaison Service (04/11/2002) and personal communication with Lynda Blue (01/07/2003)

Current provision for managing heart failure in Cheshire and Merseyside

Heart failure nurses are currently employed in both primary and secondary care in Cheshire and Merseyside. While Cheshire and Merseyside is fortunate in that they have a service with an Aneurin Bevan award in primary care at Wallasey Heart Centre and an NHS beacon site in secondary care at Aintree Cardiac Centre (Aintree Hospitals NHS Trust), service provision currently varies quite widely between PCTs (and even within some PCTs) and hospital providers which means that not all patients are receiving the same care. For example, while St Helens PCT have seven cardiac nurse advisors and Knowsley PCT have six cardiac nurse advisors working in primary care attached to GP practices, most PCTs have fewer nurses carrying out similar roles. However heart failure is increasingly being seen as a priority by PCTs, with clinical champion groups and proposals being developed.

Because (at least until recently), there have rarely been primary care guidelines for heart failure in primary care, there has been no effective system for calling and recalling patients. The problem (as found by Mair, 2003) is that to set up the necessary templates and registers is extremely time consuming (and therefore costly) in primary care. However, Knowsley PCT plan to take the names of all known heart failure patients in secondary care and to populate a register with these, with the hope that when primary care nurses undertake their CHD clinics, they can add to this register as appropriate. A template has been created for recording patients with heart failure on GP systems and this is currently being piloted (Personal communication with Michelle Creed, 15/09/2003).

Generally, for all heart failure patients, there is also a long referral process from a patient being suspected as having heart failure to them undergoing all the necessary tests and being confirmed as having heart failure. Thus the Royal Liverpool and Broadgreen University Hospitals NHS Trust has a nurse-to-nurse referral system for patients known to the service, thus cutting the outpatient cardiology appointment out. There is also a one-stop heart failure diagnostic service in Liverpool. This allows patients to be directly referred to a clinic and be reviewed by a cardiologist and heart failure nurse and have their diagnosis confirmed or refuted by echocardiography. If confirmed, a management plan is sent out to the GP and community based heart failure nurses for follow-up management. Education and advice is offered to the patient at the clinic session.

At Aintree Cardiac Centre plans are being developed to look at the feasibility of a diagnostic clinic. Their service was established in 1998 and was one of the first nurse-led heart failure services to be established in the UK. Initially, there was only one heart failure but this subsequently increased to two nurses in 2001 and from April 2003 a third nurse has been seconded to the service for one year from cardiology to look at palliative services.

Aintree Cardiac Centre see all types of patients with heart failure including asymptomatic heart failure for initiation of treatment (e.g. betablockers) and all grades of heart failure including valve disease and right sided heart failure, if they are symptomatic or need changes to treatment. The service is mainly clinic-based (about 60%) for initiation and up titration of betablockers while the cardiology department offers an open access echocardiogram service to local GPs. Home visits are made to those who are unstable and frail and unable to attend clinics in person. Aintree receives about 500 new referrals a year

and sees 100-120 patients weekly in clinics. Links have been established with palliative care in both primary and secondary care.

Despite all this, Aintree Cardiac Centre are currently only able to see about 60% of all patients with heart failure partly because they are not able to take patients formally from other specialties and partly because of the long referral process. Because many people with heart failure are admitted for a variety of diagnoses they are not always identified as having heart failure unless they have an echocardiogram. Aintree NHS Hospitals Trust is currently looking at trying to redress these problems by trying to direct back to primary care the more routine cases of heart failure patients so that the more serious patients can be seen in secondary care; the appointment of a third nurse has also helped to increase the number of patients seen but the post is not funded through PCT resources and is not guaranteed. It is felt that this would need to receive secure funding and to become a substantive post for the service to develop and for all patients with heart failure to be seen (personal communication with Barbara Appleton, 13/11/2003 and 14/11/2003).

The service provided by Aintree Cardiac Centre is very similar to the Greater Glasgow service described above. In essence, the main difference is that the Greater Glasgow service is able to provide clinics for recently admitted patients at the patients' home whereas Aintree Cardiac Centre see patients in hospital outpatient clinics and shares the responsibility of follow up care with primary care nurses.

However, cardiac nurses based in the community in Cheshire and Merseyside have, on the whole, not routinely seen heart failure patients. To redress this, it is felt that the skills of the primary health care teams need to be utilised to take on routine investigations and CHD screening, with the cardiac nurses concentrating on the more severe patients. This will free up capacity within the cardiac nurse advisor teams to enable them to address the gaps in heart failure management in the community.

Primary care can also coordinate diagnosis and management for the local practices' patients, possibly through the use of a GP with a special interest in heart failure as well as heart failure nurses. Close working relationships with secondary care will facilitate fast tracking of appropriate referrals onwards. This is the model that has worked for CHD at Wallasey Heart Centre, for example, where GPs and nurses can refer patients directly to the GP with a special interest in heart failure at Wallasey Heart Centre and he can diagnose in the community. The Centre has demonstrated a number of successful outcomes in patient care, including:

- CHD patients are mainly diagnosed and managed in primary care (of those referrals made from GPs and practice nurses to the GP with a special interest in heart failure, 9-10% are referred on to Arrowe Park Hospital).
- There is major patient involvement through Patient Held Records and Interactive patient groups and participation by spouses and carers is welcomed. Improved concordance with drug treatments is such that the average proportion of hypertensive patients with attained BP < 140/85 in Wallasey is well above the UK average.
- The standard mortality rate (SMR) for CHD has declined to such an extent that in Wallasey, the SMR is now below the UK average for the first time ever. The CHD SMR has also declined in Birkenhead but not at the rate it has in Wallasey. Both areas are relatively deprived areas (i.e. areas where the SMR for CHD tend to be high).

It is argued that if all of this can be achieved on approximately £60,000 annually over three years, then this is a very cost-beneficial model of achievement and demonstrably improved outcomes. Indeed, Wirral Hospital NHS Trust currently provide a nurse from Arrowe Park Hospital to carry out heart failure sessions in the community and fund the provision of echocardiograms in the community as this is seen as cost-effective because of reduced readmissions (personal communication with Anthony Creed, 25/09/2003).

Findings

Findings from studies examining the impact of nurse-led interventions for managing heart failure

In Glasgow, Blue *et al* (2001) found in their randomised controlled trial (RCT) (n=165) of patients with mild to severe heart failure, that at 12 months follow-up, the risk of readmission to hospital for worsening heart failure was reduced by 62% (Hazard ratio=0.38, 95% Confidence Interval: 0.19-0.76). In addition, the length of hospital stay was shorter in the intervention group although this was not statistically significant.

Appleton *et al* (2002) found from their randomised controlled trial (RCT) (n=55) that at 12 months follow-up, amongst known patients primarily with stable heart failure, heart failure related admissions were reduced to just 2 in the intervention group compared to 14 in the control group (Risk Ratio = 0.14), a reduction of 86%. While the mean average length of stay was around 7.5 days in both groups, annual healthcare costs for heart failure were significantly lower in the intervention group, being just 40% of the cost for patients not receiving the intervention (£570 Vs £1409 – a reduction of £838 per patient). However, this study examined the impact on patients who mostly had relatively stable heart failure, whereas the Blue *et al* (2001) study examined the impact on patients with mild to severe heart failure.

In addition, Southport and Ormskirk, which does not have the same levels of support from cardiology as at Aintree or Greater Glasgow, had a 10.5% reduction in admissions and a 22.67% reduction in readmissions (for heart failure) following the establishment of the heart failure clinic there (based on the one years' activity before and after the service was set up (Table 5). Caution has to be taken in interpreting this as it may be a chance finding or may be influenced by an altered catchment population. It should also be noted that this is one of the centres involved in the RCT mentioned by Mair (2003).

Table 5: Activity data following the establishment of a nurse-led heart failure service at Southport and Ormskirk NHS Trust

	Admissions for heart failure	Readmissions for heart failure
July 1998-June 1999	543	75
July 1999-June 2000	486	58
Reduction	10.50%	22.67%

Source: Personal communication with Barbara Flowers (09/06/2003)

Estimating the impact of nurse-led interventions for managing heart failure on hospital activity in Cheshire and Merseyside

Because it studied some of the most severe cases of heart failure (i.e. those most likely to result in readmissions), Blue *et al's* (2001) percentage reductions in hospital readmissions for heart failure have been directly applied to heart failure hospital activity data (aged 15 and over) from 2000/01-2002/03 provided by some Cheshire and Merseyside Primary Care Trusts (PCTs).

Unfortunately, not all the Cheshire and Merseyside PCTs were able to provide data in the timescale available so not all PCTs are represented in the findings.

Definitions of readmissions differed from each PCT which means comparisons across all PCTs is not possible:

- For the seven Merseyside PCTs (Central Liverpool PCT, North Liverpool PCT, South Liverpool PCT, St Helens PCT, Knowsley PCT, South Sefton PCT and Southport and Formby PCT) a heart failure admission was counted as a readmission if it occurred within 12 months of a previous heart failure admission. In all instances, the primary diagnosis was used. This was the desired definition for all data.
- Readmission data was not made available within the timescale available for three PCTs (Ellesmere Port and Neston PCT, Cheshire West PCT and Central Cheshire PCT) but admission data was made available, as it had been for the seven Merseyside PCTs who had provided data. Thus, the mean figure for the proportion of readmissions to admissions across these seven PCTs (36%) has been applied to admission data to make very crude estimates. The validity of these findings is particularly open to question.
- Halton PCT and Warrington PCT were able to provide readmission data but the definition of a readmission differed to the other PCTs. Here any patient admitted with a primary diagnosis for heart failure following an admission for any condition was counted as a readmission. This means that patients who may not have previously been admitted for heart failure will be counted as a readmission.

The full findings for each PCT by provider can be found in the appendix. Below is a summary of the findings.

Please note that any small discrepancies between the totals and the sum of their parts are due to the rounding of figures.

Please read the discussion section for the reservations regarding these calculations.

Central Liverpool PCT

On average 61 readmissions for heart failure may be avoided each year, 46 (75%) at Royal Liverpool and Broadgreen University Hospitals NHS Trust.

North Liverpool PCT

On average 45 readmissions for heart failure may be avoided each year, 41 (92%) at Aintree Hospitals NHS Trust.

South Liverpool PCT

On average 32 readmissions for heart failure may be avoided each year, 20 (61%) at Royal Liverpool and Broadgreen University Hospitals NHS Trust.

St Helens PCT

On average 54 readmissions for heart failure may be avoided each year, 42 (77%) at St Helens and Knowsley Hospitals NHS Trust.

Knowsley PCT

On average 64 readmissions for heart failure may be avoided each year, 31 (48%) at St Helens and Knowsley Hospitals NHS Trust and 24 (38%) at Aintree Hospitals NHS Trust.

South Sefton PCT

On average 61 readmissions for heart failure may be avoided each year, 56 (91%) at Aintree Hospitals NHS Trust.

Southport and Formby PCT

On average 41 readmissions for heart failure may be avoided each year, 40 (97%) at Southport and Ormskirk NHS Trust.

Ellesmere Port and Neston PCT

As noted above, readmission data was not provided for Ellesmere Port and Neston PCT but applying the mean figure of the proportion of readmissions to admissions (36%) found from seven other PCTs, to the Ellesmere Port and Neston PCT admission data, 26 readmissions may be avoided. Most (73%) heart failure admissions were found at Countess of Chester NHS Trust.

Cheshire West PCT

As noted above, readmission data was not provided for Ellesmere Port and Neston PCT but applying the mean figure of the proportion of readmissions to admissions (36%) found from seven other PCTs, to the Cheshire West PCT admission data, 42 readmissions may be avoided. Most (85%) heart failure admissions were found at Countess of Chester NHS Trust.

Central Cheshire PCT

As noted above, readmission data was not provided for Ellesmere Port and Neston PCT but applying the mean figure of the proportion of readmissions to admissions (36%) found from seven other PCTs, to the Central Cheshire PCT admission data, 67 readmissions may be avoided. Most (91%) heart failure admissions were found at Mid Cheshire Hospitals NHS Trust.

Halton PCT

As noted above, a different definition to the desired definition was used for readmissions for Halton PCT. On average 54 readmissions for heart failure may be avoided each year. The breakdown by provider was not available but most (69%) admissions were found at North Cheshire Hospitals NHS Trust.

Because the readmissions are for patients who were previously admitted for any condition, the figure is not comparable to the other PCTs. A more comparable figure may well be 36% of the original admissions (based on data provided for seven Merseyside PCTs). If so, this would imply the number of readmissions may decrease by 44 (from 51 to 7).

Warrington PCT

As noted above, a different definition to the desired definition was used for readmissions for Warrington PCT. On average 78 readmissions for heart failure may be avoided each year. The breakdown by provider was not available but most (97%) admissions were found at North Cheshire Hospitals NHS Trust.

Because the readmissions are for patients who were previously admitted for any condition, the figure is not comparable to the other PCTs. A more comparable figure may well be 36% of the original admissions (based on data provided for seven Merseyside PCTs). If so, this would imply the number of readmissions may decrease by 62 (from 72 to 10).

Resource implications in establishing nurse-led interventions for managing heart failure in Cheshire and Merseyside

In order to capture every inpatient admission episode for heart failure and to reduce readmissions, the Nurse Consultant for heart Failure Management at Aintree NHS Hospitals Trust believes at least three nurses are required for a Trust their size. The nurses to be employed at grades G and H (with at least five previous years of Cardiology experience at Grade E) should have a clinical, research, educational and managerial role to play and are accountable to staff who should already be in post, namely the clinical services manager for cardiology and the clinical director for cardiology.

The Aintree Cardiac Centre Resource Pack includes a job plan example of setting up a nurse-led heart failure service with a timetable of tasks in the first 3 months, 4-7 months, and then 7 months onwards. It also includes guidelines for diagnosis and treatment (which include the NSF for heart failure proforma). This Resource Pack also includes sections on:

- The management of patients whilst in hospital.
- Working with patients in the community Drug protocols.
- Fostering links with primary care.
- Evaluation: Research and audit.

Currently, the Aintree service is mainly clinic-based (about 60%) although home visits are made to those who are unstable and frail and unable to attend clinics in person. Aintree receives about 500 new referrals a year.

In addition to the provision of care from specialist heart failure nurses based in secondary care, it is essential that there are trained nurses in primary care for the service to be truly effective; the emphasis being on secondary care nurses providing care for the most severe cases of heart failure. In turn, secondary care nurses must be able to refer to other professionals based within cardiology, as well as the likes of GPs and pharmacists, as and

when necessary. Stewart and Blue (2001d) provide guidance on setting up a nurse-led heart failure service in primary and secondary care. They highlight the importance of:

- Developing a precise description of the service with a list of aims and objectives.
- Establishing formal links with other relevant health-care services. As highlighted by Aintree Cardiac Centre (see above in *Table 4*).
- Select the type of patients eligible for intervention. As Stewart and Blue (2001c) note: “Whilst all hospitalised heart failure patients should be considered to be at high risk, not all require intensive intervention. It is probably more cost-effective, therefore, to provide a ‘safety-net’ of minimal intervention to all hospitalised heart failure patients and provide incremental care to those who need it most.”
- Establish a concise protocol for admitting patients to the service.
- Establish precise operational guidelines for the service following patient discharge.
- Establish precise operational guidelines for patient follow-up.

Discussion

General findings

It has been found that nurse-led interventions for managing heart failure lead to reductions in emergency heart failure readmissions, and based on the Blue *et al* (2001) study (which sees the most severe cases of heart failure, i.e. those most likely to result in a readmission), this is likely to be by around 62%.

However, for reasons outlined below, these findings must be interpreted with caution.

Types and settings of interventions

A number of models of good practice for managing heart failure already exist and have been found to have impressive impacts on admissions. This report has focussed on the Greater Glasgow model, which is recommended by the British Heart Foundation.

It is increasingly being recognised that nurse-led interventions can be provided by Primary Care Trusts (PCTs) as well as hospital trusts. Certainly both hospital trusts and PCTs may well be able to provide visits to community settings as well as clinics on their own premises. The seriousness of heart failure in patients may well determine the best setting for their clinics and care.

While many patients with severe heart failure may well be the patients who most need the types of specialist services that secondary care can offer, it is also likely to be these patients who may be less able to leave their home and attend clinics. They therefore are of most in need of home visits. The service described by Blue *et al* (2001) and on which estimates are made is able to meet these patients' needs.

Building on initiatives already in place

There are varying degrees of provision of nurse-led services for managing heart failure within Cheshire and Merseyside. It is increasingly being felt that the primary care setting is the most suitable setting for most patients, not least where there is already fairly comprehensive provision available in secondary care.

It is expected that the estimated impacts will be most felt where heart failure provision is less well developed. However, benefits should be felt even where services are already well developed if the number of patients seen are increased. It would appear that this could still be the case at Aintree Cardiac Centre (for example) where despite there being a beacon service already being provided, only around 60% of heart failure patients are currently seen. Thus it would appear that secondary care provision does need to expand.

Applying study findings to local data

It is assumed that findings from one randomised controlled trial provided conducted in Greater Glasgow can be directly applied to all of Cheshire and Merseyside readmissions data, if a nurse-led intervention is introduced. This translates to between 26 and 78 readmissions each year depending on the size and location of the PCT, the current heart

failure service provision already in place, and the definition used for readmissions. While those PCTs which are currently well served by heart failure provision are still likely to experience reductions in heart failure readmissions by any expansion in nurse-led interventions, the impact here will obviously be much less. This is likely to be the case for South Sefton PCT in particular and also Knowsley PCT whose patients are currently served by Aintree Cardiac Centre.

Conclusions

Different nurse-led models of heart failure intervention exist and have been found to be effective.

However, because heart failure provision already exists to differing degrees, estimating the likely impact is particularly problematic, particularly in those Primary Care Trusts where heart failure provision is most developed (and Cheshire and Merseyside already has an NHS beacon site at Aintree Cardiac Centre). Where this is the case, the estimated reductions in readmissions will almost certainly overestimate the impact.

Notwithstanding these limitations highlighted, it is estimated that amongst heart failure patients, up to 62% of emergency admissions for heart failure may be averted.

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Appendix: Breakdown of estimated impacts by Primary Care Trust and hospital provider

The following is a breakdown of activity and expected activity within each Primary Care Trust (PCT) by provider Trust.

For each PCT the historical data is presented first. An average (mean) is calculated so that the expected impact of providing nurse-led interventions for managing heart failure (calculated by applying the findings from the Blue *et al* [2001] study) can then be applied to each PCT.

Readmission data that met the desired definition (of a readmission within 12 months following an admission for the same diagnosis) was only made available for seven PCTs. Data on bed days was not available for these PCTs.

The source for all data in this appendix is the Inpatient CDS.

Please note that data is rounded up or down to whole numbers for readmissions and this means that totals may not always appear to equal the sum of their parts.

Data for “other” also has to be interpreted with caution because activity at these providers is least likely to be affected by interventions (if indeed at all).

Appendix: Breakdown of estimated impacts by Primary Care Trust and hospital provider

Central Liverpool PCT

Emergency heart failure readmissions by provider, aged 15+

	2000/01 Activity	2001/02 Activity	2002/03 Activity	Average Activity
Royal Liverpool and Broadgreen University Hospitals Trust	84	71	66	74
Aintree Hospitals Trust	11	6	8	8
Cardiothoracic Centre	11	12	10	11
Other	3	6	6	5
Total	109	95	90	98

Central Liverpool PCT

Estimated reductions and new activity in emergency heart failure readmissions by provider, aged 15+

	Estimated Reduction	Estimated New Activity
Royal Liverpool and Broadgreen University Hospitals Trust	46	28
Aintree Hospitals Trust	5	3
Cardiothoracic Centre	7	4
Other	3	2
Total	61	37

North Liverpool PCT

Emergency heart failure readmissions by provider, aged 15+

	2000/01 No	2001/02 No	2002/03 No	Average No
Aintree Hospitals Trust	65	67	68	67
Royal Liverpool and Broadgreen University Hospitals Trust	6	2	4	4
Other	1	0	4	2
Total	72	69	76	72

North Liverpool PCT

Estimated reductions and new activity in emergency heart failure readmissions by provider, aged 15+

	Estimated Reduction	Estimated New Activity
Aintree Hospitals Trust	41	25
Royal Liverpool and Broadgreen University Hospitals Trust	2	2
Other	1	1
Total	45	27

Appendix: Breakdown of estimated impacts by Primary Care Trust and hospital provider

South Liverpool PCT

Emergency heart failure readmissions by provider, aged 15+

	2000/01 No	2001/02 No	2002/03 No	Average No
Royal Liverpool and Broadgreen University Hospitals Trust	30	34	31	32
St Helens and Knowsley Hospitals Trust	17	5	12	11
Cardiothoracic Centre	13	6	7	9
Total	60	45	50	52

South Liverpool PCT

Estimated reductions and new activity in emergency heart failure readmissions by provider, aged 15+

	Estimated Reduction	Estimated New Activity
Royal Liverpool and Broadgreen University Hospitals Trust	20	12
St Helens and Knowsley Hospitals Trust	7	4
Cardiothoracic Centre	5	3
Total	32	20

St Helens PCT

Emergency heart failure readmissions by provider, aged 15+

	2000/01 No	2001/02 No	2002/03 No	Average No
St Helens and Knowsley Hospitals Trust	73	62	66	67
Other	25	14	22	20
Total	98	76	88	87

St Helens PCT

Estimated reductions and new activity in emergency heart failure readmissions by provider, aged 15+

	Estimated Reduction	Estimated New Activity
St Helens and Knowsley Hospitals Trust	42	25
Other	13	8
Total	54	33

Appendix: Breakdown of estimated impacts by Primary Care Trust and hospital provider

Knowsley PCT

Emergency heart failure readmissions by provider, aged 15+

	2000/01 No	2001/02 No	2002/03 No	Average No
St Helens and Knowsley Hospitals Trust	49	43	56	49
Aintree Hospitals Trust	39	38	41	39
Cardiothoracic Centre	14	6	6	9
Royal Liverpool and Broadgreen University Hospitals Trust	5	5	3	4
Other	1	2	0	1
Total	108	94	106	103

Knowsley PCT

Estimated reductions and new activity in emergency heart failure readmissions by provider, aged 15+

	Estimated Reduction	Estimated New Activity
St Helens and Knowsley Hospitals Trust	31	19
Aintree Hospitals Trust	24	15
Cardiothoracic Centre	5	3
Royal Liverpool and Broadgreen University Hospitals Trust	3	2
Other	1	0
Total	64	39

South Sefton PCT

Emergency heart failure readmissions by provider, aged 15+

	2000/01 No	2001/02 No	2002/03 No	Average No
Aintree Hospitals Trust	97	79	94	90
Southport and Ormskirk Hospital Trust	8	4	6	6
Other	4	4	1	3
Total	109	87	101	99

South Sefton PCT

Estimated reductions and new activity in emergency heart failure readmissions by provider, aged 15+

	Estimated Reduction	Estimated New Activity
Aintree Hospitals Trust	56	34
Southport and Ormskirk Hospital Trust	4	2
Other	2	1
Total	61	38

Appendix: Breakdown of estimated impacts by Primary Care Trust and hospital provider

Southport and Formby PCT

Emergency heart failure readmissions by provider, aged 15+

	2000/01 No	2001/02 No	2002/03 No	Average No
Southport and Ormskirk Hospital Trust	67	54	72	64
Other	3	1	1	2
Total	70	55	73	66

Southport and Formby PCT

Estimated reductions and new activity in emergency heart failure readmissions by provider, aged 15+

	Estimated Reduction	Estimated New Activity
Southport and Ormskirk Hospital Trust	40	24
Other	1	1
Total	41	25

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