

Managing heart failure in a specialist clinic

Abstract – Patients with heart failure are often inadequately investigated and treated in general practice. To improve the management of heart failure locally we initiated a specialist clinic in 1994. After its first 18 months, we audited the outcome of general practitioners' referrals to the clinic to examine its effectiveness in improving the diagnosis and treatment of heart failure. Eighty-five patients were referred with suspected heart failure. However, only 48% had echocardiographic evidence of left ventricular systolic dysfunction. Following referral, 80% of these patients were given a trial of angiotensin-converting enzyme inhibitors compared with 27% before referral. Six patients were receiving angiotensin-converting enzyme inhibitors unnecessarily, and five patients had significant structural cardiac disorders. Referral to a specialist clinic improved the accuracy of diagnosis and the number of patients on appropriate treatment. Greater use of open access echocardiography prior to referral might have allowed a more selective (and cost-effective) utilisation of the clinic.

Heart failure secondary to left ventricular systolic dysfunction has an overall five-year mortality of approximately 50%¹. Its prevalence in Great Britain is between 0.8% and 1.6% and it appears to be on the increase²⁻⁴. Most patients with heart failure are managed by general practitioners (GPs)², yet only about half of the heart failure diagnoses made in primary care are correct^{2,5}. This is not surprising – the diagnosis is not always easy to make clinically, particularly early on in the natural history of the condition and in patients with coexistent obesity and pulmonary disease.

Even when correctly diagnosed, patients with heart failure are often inadequately treated. Angiotensin-converting enzyme (ACE) inhibitors reduce both morbidity and mortality in heart failure secondary to left ventricular systolic dysfunction⁶⁻⁸. It is a cause for concern, therefore, that in a previous study we found that only 17% of heart failure patients were receiving ACE inhibitors, and in only 1% of cases had the ACE inhibitor been initiated by a GP⁹.

To overcome these problems, all patients with suspected heart failure should be referred for an echocardiogram to assess left ventricular function objectively and to exclude significant valvular abnormalities. All those with left ventricular systolic dysfunction

should then be considered for an ACE inhibitor. The provision of an echocardiography service for GPs can either be direct, via an open access service, or indirect, via a referral to an outpatient clinic. Recent studies have suggested that open access echocardiography is well utilised by GPs in the management of heart failure^{10,11}, but the effectiveness of a specialist heart failure clinic has not previously been reported.

A heart failure clinic was established at the Queen's Medical Centre in Nottingham in 1994 as part of a drive to improve the diagnosis and treatment of heart failure patients locally. After 18 months of operating the clinic, we assessed its effectiveness in fulfilling its original aims to learn whether further improvements could be made.

Method

The heart failure clinic was initiated in 1994. GPs from the surrounding area were encouraged to refer any patients whom they suspected of having heart failure. Referral for open access echocardiography was not a prerequisite of referral to the clinic.

This audit was undertaken after the first 18 months of the clinic's operation and it met with local ethics committee guidelines. We examined the medical notes of all patients referred to the clinic by GPs. In its first 18 months a total of 74 clinics was held. Attendance lists were available for 72 clinics, and using these we identified 88 new referrals from GPs. Medical notes were obtained for 87 patients, one set of notes having been transferred to another hospital. Two patients had not undergone echocardiography and were excluded from the study. The notes of the remaining 85 patients were examined for details of the patient's referral and subsequent management.

The reason for the referral and any explicit concern about initiating ACE inhibitors outside the hospital were noted. The clinic notes were examined to discover the patients' treatment when they first attended the clinic, any subsequent alterations, and any investigations undertaken. The echocardiography findings, final diagnosis and eventual outcome of the referral were also noted. All echocardiograms were performed and reported by an experienced technician or cardiologist, measuring (where possible) ejection fraction or fractional shortening. An ejection fraction of <40% or a fractional shortening of <25% was considered indicative of left ventricular systolic dysfunction. Where accurate measurements were not possible, a global assessment of overall left ventricular systolic function as normal or impaired was made.

Simple descriptive statistics were used for most of the data analysis. Comparisons of frequency estimates

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were made using the χ^2 test with Yates's correction. The Mann-Whitney U test was used to analyse unpaired non-parametric data.

Results

Referral rates

Referrals were received from 53 GPs in 39 practices. There was a marked variation in referral patterns, with 19 (49%) practices making just one referral each, while 12 practices accounted for over half the referrals (52 patients, 61%). In 5/85 (6%) referral letters, GPs explicitly mentioned their concerns about initiating ACE inhibitors in the community.

Characteristics of referrals

Of the 85 referrals studied, 52 (61%) were men. The mean age of all men and women referred to the clinic was 69 years (range 40 to 89 years) and was the same in the two sexes.

Diagnosis of left ventricular systolic dysfunction

Although all 85 patients had been referred with suspected heart failure, echocardiographic evidence of left ventricular systolic dysfunction was obtained in only 41 (48%) patients. Women with suspected heart failure were significantly less likely to have left ventricular systolic dysfunction on echocardiography than the men (Table 1). There was no significant difference in the mean age of the male and female patients with heart failure (72 versus 75 years, respectively, $p = 0.2$), although patients with heart failure were significantly older than those without (72 versus 66 years, respectively, $p = 0.01$).

Among the patients with left ventricular systolic dysfunction, echocardiography identified one patient with hypertrophic obstructive cardiomyopathy and one with severe aortic stenosis and mixed mitral valve disease.

Alternative diagnoses

A definite diagnosis was not reached in 12 (27%) of the 44 patients with normal left ventricular systolic dysfunction. The principal diagnoses made in the remaining 32 patients are listed in Table 2. Three of these patients had significant valvular abnormalities (mitral regurgitation, mitral stenosis and severe aortic stenosis) on echocardiography.

Use of ACE inhibitors

Of the 44 patients with normal left ventricular systolic function on echocardiography, six (14%) had already been started on ACE inhibitors by their GPs. None of

Table 1. Patients with abnormal and normal left ventricular systolic function

	Abnormal left ventricular systolic function		Normal left ventricular systolic function	
	No.	%	No.	%
Men	32	78	20	45
Women	9	22	24	55

these six patients had any other indications (such as hypertension) for ACE inhibitor treatment.

Of the 41 patients with confirmed left ventricular systolic dysfunction, 11 (27%) were being treated with ACE inhibitors at the time of referral. In seven of these, ACE inhibitors had been initiated by GPs, in two they had been initiated during a previous hospital attendance, and in two the person who initiated the drugs could not be determined.

As a result of attending the clinic, 33 of these 41 patients (80%) are now being treated with ACE inhibitors. Of the remaining eight patients, one had an absolute contraindication to ACE inhibitors, one was lost to follow-up and one died before treatment was initiated. In five cases the reason for not using ACE inhibitors was unclear.

Outcome of referral

At the time of the audit, 33 (80%) of the patients with left ventricular systolic dysfunction were still attending for outpatient follow-up and five (12%) had been discharged. Three patients had died or been lost to follow-up.

Table 2. Principal diagnoses in patients with normal left ventricular systolic function

Diagnosis	No.
Obstructive airways disease	13
Definite diagnosis not reached	12
Ischaemic heart disease	5
Significant valvular disease	3
Atrial fibrillation	2
Anaemia	1
Dependent oedema	1
Fatigue related to beta-blocker	1
Hypertension	1
Non-cardiac chest pain	1
Obesity	1
Pericardial effusion	1
Respiratory muscle weakness	1
Thyrotoxicosis	1

Of the 44 patients with normal left ventricular systolic function, 25 (57%) were discharged back to the care of their GP, with recommendations for a change of treatment in 15. Four patients were lost to follow-up. The remaining 15 (34%) continued outpatient follow-up at the hospital, although only one was referred to another speciality.

Tolerance of ACE inhibitor initiation

Of the 22 patients given a trial of ACE inhibitors after attending the clinic, only three (14%) were admitted to hospital for test dosing. Of the other 19, the ACE inhibitors were successfully tolerated by 17 (89%). Fifteen (79%) of the 19 patients were in one or more of the groups for whom initiation in hospital is recommended in the *British National Formulary*¹².

Discussion

There is now overwhelming evidence that patients with heart failure secondary to left ventricular systolic dysfunction gain significant benefits, in terms of morbidity and mortality, from treatment with ACE inhibitors⁶⁻⁸. However, identifying who is likely to benefit from treatment poses a problem for GPs because left ventricular systolic dysfunction can be difficult to diagnose clinically.

This view is supported by the observation that only about half of heart failure diagnoses made in primary care are correct^{2,5}. We also found that only 48% of patients referred with suspected heart failure by GPs had echocardiographic evidence of left ventricular systolic dysfunction. Our data are also consistent with earlier observations by others that a false-positive diagnosis of heart failure is more frequent in women^{2,5}. Why this should be the case is not clear from our study, but it has been previously suggested that a higher prevalence of obesity among female patients may account for the discrepancy⁵.

The overdiagnosis of left ventricular systolic dysfunction leads to the inappropriate use of ACE inhibitors. We found that, of the patients with normal left ventricular systolic function, 14% had already been commenced on unnecessary ACE inhibitors by GPs. The management of patients with heart failure was estimated in 1990/91 to account for almost £360 million, over 1%, of total National Health Service expenditure¹³, and this is likely to escalate as its prevalence increases. As fewer than half the patients referred to the clinic had objective evidence of left ventricular systolic dysfunction, the inappropriate use of ACE inhibitors has potentially considerable resource implications.

To avoid inappropriate use of ACE inhibitors, objective evidence of left ventricular systolic dysfunction must be sought in all patients suspected of having heart failure¹⁴. Although several investigations exist for this purpose, the most widely used is echocardiography. Not

only does this allow the assessment of left ventricular function, but it also identifies patients with valvular disorders which require surgical intervention or contraindicate the use of ACE inhibitors. The importance of this is highlighted in our study by the four patients with significant valvular abnormalities (two of whom were subsequently referred for surgery) and one with hypertrophic obstructive cardiomyopathy.

Referral to the heart failure clinic was certainly effective in identifying patients who did (and did not) require treatment with ACE inhibitors, and it led to a three-fold increase in their use among patients who stood to benefit. Of the patients with left ventricular systolic dysfunction, only 27% were on ACE inhibitors at the time of referral. This is a greater proportion than has been reported in a previous study in our region⁹, but it still suggests that many patients are being denied the symptomatic and survival benefits these drugs confer. Although the proportion of patients who had been given a trial of ACE inhibitors increased to 80%, with a further 7% unable to be given a trial, there is no room for complacency. Even in the setting of a specialist clinic, five patients were not given ACE inhibitors despite there being no apparent contraindications.

Is referral to a specialist clinic the most economical way of improving the treatment of these patients? If an echocardiogram is all that is needed to identify those who should be on ACE inhibitors, perhaps an open access echocardiography service, at an estimated cost of £55 per patient referred¹⁰, would prove more cost-effective. Previous studies of open access echocardiography have found it to be well used by GPs^{10,11}. In addition, it led to alterations in treatment being recommended in almost 70% of patients¹⁰. Furthermore, we know that the cost-effectiveness of treating heart failure with ACE inhibitors is considerably greater when these drugs are initiated in general practice. ACE inhibitor initiation in hospital, with a one-day admission, costs £747 per life-year gained; initiation by a GP in the community leads to a cost saving of £11 per patient treated¹⁵.

The diagnostic information and recommendations that GPs receive following open access echocardiography are only of value if they lead to management changes being implemented. Fortunately, this does appear to happen. In one study, an inspection of patients' records after they had been referred for open access echocardiography showed that 76% of patients with an ejection fraction <40% had subsequently been started on ACE inhibitors¹¹. This percentage is similar to that achieved by referral to the specialist clinic.

For the patients with left ventricular systolic dysfunction in this study, we cannot say how many would have been initiated on ACE inhibitors had they been referred instead for open access echocardiography. The finding that only 12% had been discharged back to the care of their GPs suggests that many of these patients were posing management problems even after

commencing ACE inhibitors and might have required referral to the clinic even if they had been started on ACE inhibitors by their GPs. It is certainly the case that for patients whose GPs are unable (or unwilling) to initiate ACE inhibitors in the community, referral to a hospital clinic will be necessary. In our study only 6% of referral letters contained any explicit concern about initiating ACE inhibitors, although previous work by us had indicated that concern about adverse events may also have been a factor, albeit unexpressed, in the other referrals¹⁶.

Do GPs have anything to fear from initiating ACE inhibitors? It is interesting to note that the incidence of adverse events among our patients was low, although admittedly the sample is small. Of 22 patients initiated on ACE inhibitors as a result of attending the clinic, only three were taken into hospital for test dosing. Of the other 19, the ACE inhibitors were successfully tolerated by 89%, despite the fact that most were in one or more of the groups recommended for initiation in hospital in the *British National Formulary*¹². Furthermore, in the SOLVD study, for example, symptomatic hypotension following the initiation of an ACE inhibitor (enalapril 2.5 mg twice daily) was seen in only 2.2% of patients⁷. These experiences suggest that further studies would be helpful to identify which patients are most at risk of adverse events upon commencing ACE inhibitors in the community.

Conclusions

Our audit has demonstrated that referral to a specialist heart failure clinic substantially improves the use of ACE inhibitors among patients with suspected heart failure. Whether similar improvements would have been seen had the patients been referred for open access echocardiography alone is a question that now needs to be addressed. Although many patients had their treatment changed as a consequence of being referred to the specialist clinic, our data, together with results from earlier studies, suggest that the majority could have been equally well managed by their GPs following an open access echocardiogram.

The most efficient use of resources may be to adopt a more selective approach, referring all patients with suspected heart failure for open access echocardiography in the first instance, and then to refer to a specialist clinic only those patients who are in need of further assessment or who require ACE inhibitor initiation in hospital. This would reduce the number of patients referred to clinic with normal echocardiograms and allow GPs to initiate ACE inhibitors in the

community if they feel able to do so. For such a policy to be effective, however, open access echocardiography will need to become more widely available and further research will be required to identify which patients should undergo ACE inhibitor initiation in hospital.

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