# Angiotensin-converting enzyme inhibitor prescription for heart failure in general practice, and the impact of a Rapid Access Heart Failure Clinic in Cardiff

**One of the factors that affects the prescription rates of angiotensin-converting enzyme inhibitors in heart failure is the difficulty in making a clinical diagnosis. In this study, introduction of a Rapid Access Heart Failure Clinic resulted in increased ACE inhibitor prescription rates among GPs who referred patients to the clinic.**


## Abstract

We assessed whether the presence of a Rapid Access Heart Failure Clinic (RAHFC) had an impact on the angiotensin-converting enzyme (ACE) inhibitor prescribing habits of primary care physicians. We selected 10 general practices (GP) that referred and 10 practices that did not refer patients to the RAHFC. The study covered a period of two years immediately preceding the commencement of the RAHFC and about 1.5 years afterwards. A total of 309 patients, divided into two groups, were studied. Cohort 1 consisted of 198 patients (103 from referring and 95 from non-referring GP) with a new diagnosis of chronic heart failure (CHF) made by the GP pre-RAHFC. Cohort 2 consisted of 111 patients (48 from referring and 63 from non-referring GP) diagnosed as having CHF post-RAHFC. In cohort 1, 27.1% of patients in the referring practices were on ACE inhibitor versus 40.0% in the non-referring practices (p=0.056).

ACE inhibitor prescription was reassessed 1.5 years post-RAHFC: it had significantly increased to 51.4% (p<0.001) in the referring practices, but not in the non-referring practices (43.1%, p=0.659). Interestingly, the increase in ACE inhibitor prescription among referring practices was predominantly due to initiation by the primary care physicians themselves (76% of cases) rather than by the RAHFC. The baseline trend of lower ACE inhibitor prescription rate in cohort 1 in the referring practices compared to non-referring practices was not seen in cohort 2 (54.1% *vs.* 50.7%, p=0.844).

Using ACE inhibitor prescription status as an indicator of diagnostic certainty of CHF by primary care physicians, it has sensitivity, specificity, positive and negative predictive values of 45.5%, 52.9%, 38.5% and 60.0%, respectively, for the presence of CHF as confirmed by the RAHFC.

> ***'ACE inhibitor prescription significantly increased in referring practices after introduction of the RAHFC'***

In conclusion, RAHFC facilitated increased ACE inhibitor prescription by primary care physicians. However, CHF was commonly misdiagnosed in the community and this might lead to inappropriate ACE inhibitor prescription.


**Key words:** angiotensin-converting enzyme inhibitors, general practice, heart failure.

*Br J Cardiol* 2004;**11**:243–5



## Introduction

Despite the clear benefits of angiotensin-converting enzyme (ACE) inhibitor therapy in patients with chronic heart failure (CHF),[1] a disappointingly low proportion of patients with established CHF receive them. Furthermore, because of the considerable difficulties involved in the clinical diagnosis of CHF, there is both underdiagnosis of CHF and inappropriate diagnosis and therapy. A Rapid Access Heart Failure Clinic (RAHFC) was established in Cardiff in November 1997 to aid in the diagnosis and to advise on the management of patients with suspected CHF. We assessed whether the presence of a RAHFC had an impact on the ACE inhibitor prescribing habits of primary care physicians.

## Methods

We selected 20 general practices (GP) in the South Glamorgan region at random, 10 of which referred and 10 of which did not refer patients to the RAHFC. For the purpose of this study, the diagnosis of heart failure based on history and clinical examination as documented by the GP was accepted. In addition, any ACE inhibitor prescription for each patient was noted. Patients with co-existent diabetes and hypertension were excluded. The study covered a period of two years immediately preceding the commencement of the RAHFC and about 1.5 years after its commencement.

A total of 309 patients fulfilled the above criteria, and were divided into two groups. Cohort 1 consisted of 198 patients (103 from referring and 95 from non-referring practices) with a new diagnosis of heart failure made by the GP over a two-year period prior to the introduction of the RAHFC. Cohort 2 consisted of 111 patients (48 from referring and 63 from non-referring practices) diagnosed as having CHF following the introduction of the RAHFC between November 1997 and June 1999.

The RAHFC served as the 'gold standard' for validating the diagnosis of CHF with its 'one-stop' clinical evaluation inclusive of echocardiographic examination. The heart failure diagnosis made in the RAHFC was based on clinical grounds (including electrocardiogram [ECG] and chest X-ray [CXR]), but was heavily weighted on expert echocardiographic examination done at the same time as the clinic appointment. Heart failure was defined by the presence of symptoms (± signs of fluid retention) in the presence of a dilated left ventricle or reduced ejection fraction. It was routinely classified as normal, mildly, moderately or severely reduced. In doubtful cases, we would carry out cardiopulmonary exercise testing and, if clinically indicated, cardiac catheterisation.

## Results

There were no significant differences in patients' ages and genders between referring (n=151) and non-referring (n=158) practices. Review of the 198 patients in cohort 1 (prior to the commencement of the RAHFC) showed that 27.1% (28/103) patients in the referring practices were on an ACE inhibitor, compared to 40.0% (38/95) in the non-referring practices (p=0.056). ACE inhibitor prescription was reassessed at the end of June 1999 following the introduction of the RAHFC. It had significantly increased to 51.4% (53/103, p<0.001) in the referring practices, but not in the non-referring practices (43.1% [41/95, p=0.659]). Interestingly, the increase in ACE inhibitor prescription among referring practices was predominantly due to initiation by the primary-care physicians themselves (76% of cases) rather than by the RAHFC. The baseline trend of a lower ACE inhibitor prescription rate in cohort 1 in the referring practices compared to non-referring practices was not seen in cohort 2 (54.1% [26/48] *vs.* 50.7% [32/63], p=0.844). Importantly, 100% of those patients who had a diagnosis of CHF confirmed at the RAHFC were taking an ACE inhibitor at the end of the study period (see below).

**Table 1.** Validation of heart failure diagnosis in referrals by RAHFC against GP prescribing of ACE inhibitor

| ACE inhibitor prescription by GP | RAHFC Heart failure diagnosis validation | | |
|---|---|---|---|
| | Confirmed | Refuted | Total |
| On ACE inhibitor | 5 | 8 | 13 |
| Not on ACE inhibitor | 6 | 9 | 15 |
| Total | 11 | 17 | 28 |

**Key:** RAHFC = rapid access heart failure clinic; ACE = angiotensin-converting enzyme; GP = general practitioners

> ***'The issue of the difficulty in making the diagnosis of CHF is often brushed aside'***

Of the 151 patients identified from the referring practices (cohort 1 and 2) as having a diagnosis of CHF, 18.5% were referred to the RAHFC. Table 1 summarises the ACE inhibitor prescription details against eventual confirmation or refutation of the diagnosis of CHF by the RAHFC. In this group of patients, 39.3% proved to have CHF. Patients with proven CHF who were not on an ACE inhibitor (a fifth of those referred) were all subsequently started on an ACE inhibitor whilst those on an ACE inhibitor with the diagnosis of CHF refuted (a quarter of those referred) had the treatment stopped. Using ACE inhibitor prescription status as an indicator of diagnostic certainty of CHF by primary care physicians, it has sensitivity, specificity, positive and negative predictive values of 45.5%, 52.9%, 38.5% and 60.0%, respectively, for the presence of CHF as confirmed by the RAHFC. ACE inhibitor prescription in the remaining 123 patients who were not referred to the RAHFC increased significantly from 33.3% to 55.3% (p=0.001).

## Discussion

Primary care physicians who referred patients to the RAHFC for assessment appeared to have an initial lower rate of ACE inhibitor prescription than those who did not use the RAHFC. Following the introduction of the RAHFC, however, referring primary care physicians markedly increased their ACE inhibitor prescription rates. This suggests a positive influence by the RAHFC, since the majority of patients started on an ACE inhibitor were not referred to the RAHFC. It was likely that use of the RAHFC helped to increase confidence in making the diagnosis of CHF and in the use of ACE inhibition in these patients, indicating an educational element in the interaction between referring primary care physicians and the RAHFC. In contradistinction, non-referring primary care physicians could be regarded as more self-assured in making the diagnosis and treating CHF. Their prescription patterns did not change during the period following the establishment of the RAHFC.

**Key messages**

- ACE inhibitor prescribing for heart failure in general practice varies widely
- In this study, a Rapid Access Heart Failure Clinic facilitated increased ACE inhibitor prescription by primary care physicians
- Heart failure is commonly misdiagnosed in the community, hence the need for tertiary support

In the push to increase ACE inhibitor prescription for CHF in the community, the issue of the difficulty in making the diagnosis of CHF is often brushed aside. The focus on ACE inhibitor underprescription in CHF recently has developed an almost evangelical tone, placing many physicians under considerable pressure to prescribe an ACE inhibitor.[2] Yet the diagnosis of CHF is difficult because of the lack of completely reliable bedside clinical signs. Hence, the need for more sophisticated investigative techniques, such as echocardiography, which are not at present available in the community, although this might change in the very near future with the introduction of low-cost portable echocardiography.[3]

In our study, only 40% of referred patients had CHF, a figure that is comparable to those reported elsewhere.[4,5] Of concern, use of an ACE inhibitor was a poor indicator of the presence of CHF: nearly 60% of patients could potentially be inappropriately prescribed an ACE inhibitor for a condition that they did not have. It has to be borne in mind, however, that the patients who were referred might be those which are more difficult to diagnose without the benefit of echocardiography. Also, the possibility that ACE inhibition normalised left ventricular function in some patients could not be completely discounted.

This study strongly highlights that primary care physicians need hospital-based support to improve their ability to diagnose CHF. Whilst open access echocardiography service has been suggested as a model, our data suggest that even if this were provided, ACE inhibitor prescription for CHF is likely to remain low (~ 50%). In contrast, the ACE inhibitor usage rate was 100% in those patients in whom the CHF diagnosis had been made in the RAHFC. This problem of underprescription will be even greater with beta blocker therapy.

> ***'An alternative paradigm may be to employ brain natriuretic peptide as a screen for patients with possible CHF'***

An alternative paradigm may be to employ plasma brain natriuretic peptide[6] as a screen for patients with possible CHF, allowing RAHFCs to see a much higher proportion of patients with CHF. Our data suggest that this paradigm would increase evidence-based prescription in CHF, as is presently being discussed in drawing up the second draft on the guideline for managing heart failure of the National Institute for Clinical Excellence (NICE).



## Conflict of interest

Servier and Roche Pharmaceuticals provided grants for this study. POL, JMT and MPF are supported by the British Heart Foundation.

***Pitt O Lim***
BHF Clinical Lecturer in Cardiology
***Gary Lane***
Heart Failure Nurse Specialist
***Jayne Morris-Thurgood***
Lecturer
***Michael P Frenneaux***
Sir Thomas Lewis BHF Chair in Cardiology
**Department of Cardiology, Wales Heart Research Institute, University of Wales College of Medicine, Heath Park, Cardiff, CF14 4XN.**

**Correspondence to: Dr PO Lim (email: pittlim@doctors.org.uk)**

## References

1. Garg R, Yusuf S. Overview of randomized trials of angiotensin-converting enzyme inhibitors on mortality and morbidity in patients with heart failure. Collaborative Group on ACE Inhibitor Trials. *JAMA* 1995;**273**:1450-6.
2. Houghton AR, Cowley AJ. Why are angiotensin converting enzyme inhibitors underutilised in the treatment of heart failure by general practitioners? *Int J Cardiol* 1997; **59**:7-10.
3. Xiao H. Hand-held echocardiography for primary care. *Br J Cardiol* 2003;**10**:235-40.
4. Toal M, Walker R. Angiotensin converting enzyme (ACE) inhibitors in the treatment of heart failure in general practice in north Cumbria. *Eur J Heart Fail* 2000;**2**:201-07.
5. Cowie MR, Wood DA, Coats AJ *et al*. Incidence and aetiology of heart failure; a population-based study. *Eur Heart J* 1999;**20**:421-8.
6. Cowie MR. BNP: soon to become a routine measure in the care of patients with heart failure? *Heart* 2000;**83**:617-18.