

Barriers to optimum management of heart failure by general practitioners

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SUMMARY

Background. Published research offers clear pointers to the management of heart failure; however, the evidence for implementation into practice is sub-optimal.

Aim. To identify the salient barriers to adopting evidence-based management of heart failure in the community.

Method. Structured interviews were used to elicit the views of a stratified sample of 100 general practitioners (GPs) about the diagnosis and treatment of heart failure. Responses to three heart failure case scenarios provided an indication of the degree to which GPs' knowledge of heart failure and trial results might be applied to diagnosis and treatment intentions.

Results. Participants were generally well aware of clinical trials that showed that prognosis could be improved by treatment, but trial results appeared to have little influence on treatment intentions in the three case scenarios. The major barriers to optimum management were the difficulties of differential diagnosis and the perceived properties of angiotensin-converting enzyme inhibitors (ACE-I) relative to diuretics. In the case scenarios, less than 30% reported that they would undertake basic investigations, such as chest X-ray or haemoglobin, or prescribe ACE-I. Over 70% perceived diuretics to be a useful diagnostic tool. The most frequent reasons for not prescribing ACE-I were the perceived inconvenience and risks of adverse effects (41%) and the view that most patients can be managed successfully on diuretics alone (27%). Over two-thirds of the sample were dissatisfied with the quality of information accompanying heart failure patients discharged from hospital.

Conclusion. Facilitating evidence-based management of heart failure in the community requires further support for GPs in the form of additional training in the diagnosis of heart failure and the optimum use of both ACE-I and diuretics, and by improved communication between GPs and hospital doctors on a case-by-case basis.

Keywords: heart failure; evidence-based practice; clinical trials; ACE-I; diuretics; prescribing.

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Introduction

HEART failure is a common disorder with a lower five-year survival rate than that reported for many malignant tumours.¹ Clinical trials provide consistent pointers to optimum management and show that the use of angiotensin-converting enzyme inhibitors (ACE-I) reduces morbidity and improves survival.²⁻⁴ However, evidence from clinical trials often fails to influence medical practice:⁵⁻⁷ heart failure is frequently misdiagnosed,⁸ under-investigated, or treated inappropriately.⁹ For example, Clarke and colleagues demonstrated that echocardiography was performed in less than 30% of cases investigated, and less than 20% of cases were receiving ACE-I.⁹ These findings fuel concerns that research supporting both the routine use of echocardiography and the more extensive use of ACE-I in the management of heart failure has not resulted in an appropriate change in clinical practice.⁹⁻¹¹

To design interventions that facilitate best practice, it is first necessary to identify the salient barriers to the implementation of research findings and to understand why doctors may not base their practice on published evidence.⁷ Barriers may occur at several stages; for example, a doctor may lack knowledge or have a poor understanding of the evidence or how to apply it. Alternatively, a well-informed doctor may not intend to base his practice on published evidence because it fails to persuade him that a change is justified on the basis of benefit, safety, or cost. The doctor may perceive a mismatch between the evidence and the clinical circumstances that he faces daily. Finally, other barriers — such as lack of resources — may limit the degree to which the doctor's stated intentions can actually be carried out.⁷

The aim of this study was to elicit general practitioners' (GPs') perceptions of heart failure and its management, and to identify the barriers in their perceptions and practise that inhibit the implementation of evidence-based medicine. The objectives were to describe GPs' attitudes towards the diagnosis and management of heart failure; to establish their management intentions, using three different case scenarios; and to explore the reasons why GPs select particular treatments.

Method

Participants

We set out to recruit a representative sample of 100 GPs working in England and Wales. Data on the demographic profile of GP practices in England and Wales in 1995, provided by the Department of Health Statistical Office (Leeds), were used to define the characteristics of a representative sample stratified according to the age and origin of qualification of the GP and the type of practice in which they worked (Table 1). A marketing research company, which employed 10 trained interviewers geographically spaced across England and Wales, assisted recruitment. The interviewers telephoned surgeries in their area to check whether a member of the practice was eligible for the study (i.e. whether they fitted the criteria for inclusion in the representative sample). In many cases, the practice receptionist dealt with this initial query. Eligible GPs were personally invited to take part in the study and were offered a token payment of £25 for the subsequent interview. GPs were asked to speak as an 'individual clinician' and not to attempt to summarize the policy

or approach of the practice as a whole. Interviews were limited to one GP per practice.

Eighty-three per cent of eligible GPs agreed to take part and all completed their interviews. We considered the final sample of 100 GPs to adequately represent the demographic profile of GPs in England and Wales, as illustrated in Table 1.

Interviews

A structured, face-to-face interview was conducted with 100 GPs in their surgeries, using a standardized questionnaire that was administered, taped, and transcribed by trained interviewers. The interview comprised three sections:

1. *GPs' attitudes to heart failure and awareness of 'best practice'*. These were quantified by their level of agreement, disagreement, or neutrality towards 21 statements (Table 2).
2. *Management intentions*. These were investigated by asking the GPs to state how they would manage three case scenarios (previously piloted on experienced clinicians to eliminate any ambiguities) detailed in Box 1. Case 1 was designed to represent a typical patient with congestive heart failure, the management of which should be familiar to most GPs. Cases 2 and 3 represented patients presenting with more unusual pathology and more complex symptomatology.
3. *Reasons for treatment choices*. These were elicited by asking the GPs to record their perception of the relative risk and benefit associated with diuretics, ACE-I, and digoxin respectively, for each of the three cases. GPs indicated the degree of risk as well as benefit for each drug by selecting a point between a horizontal risk axis (scored from 0 = no risk to 10 = maximum risk) and a vertical benefit axis (scored from 0 = no benefit to 10 = maximum benefit). The scores ranging from 0 to 10 were translated to low, medium, and high in the following way: 0 to 3 = low; 4 to 7 = medium; 8 to 10 = high. The salient barriers to ACE-I use were identified by ranking the eight statements shown in Table 3,

which were derived from the interviews and focus group described below. The relative importance of each barrier was assessed by asking the GPs to compare each statement with each other statement in random order and to express which conveyed the most important reason for not initiating ACE-I therapy in the community.

Questionnaire items were based on themes identified in previous open interviews with 11 GPs and four hospital physicians (senior house officers engaged in GP training but having no specialist interest in cardiology). Doctors were encouraged to talk freely about 'what they considered to be the main issues around heart failure in general practice'. A three-stage process derived the questionnaire statements. First, the interview transcripts were reviewed independently by three authors (RH, IC, JGD). In the second stage, four topic areas were identified by discussion and comparison of individual notes: conceptual model of heart failure, diagnosis, management, and the quality of communication between primary and secondary sectors. Additionally, a series of

Table 1. Sample stratification characteristics compared with 1995 Department of Health (DoH) figures.

	Sample (%)	1995 DoH figures (%)
Fundholding practice	34	39
Age (years)		
30 or less	2	2
30-39	36	35
40-49	35	35
50-59	21	22
60-69	6	6
Where qualified		
United Kingdom	76	81
India/Pakistan/Sri Lanka/Bangladesh	15	15
Other	9	4

Table 2. Responses to statements about management of heart failure (values represent actual numbers; n = 100).

Statement	Strongly agree/agree	Uncertain	Strongly disagree/disagree
Conceptual model of heart failure			
Heart failure is a progressive disease	87	8	5
Mortality from heart failure is much less than from common cancers	12	19	69
Diagnosis			
It is not important to discover the underlying causes of heart failure	16	5	79
Most of my patients get referred to a specialist for a full examination	22	24	54
I would prefer an echocardiogram if at all possible	67	17	16
Response to diuretics plays an important part in diagnosis	73	22	5
Management			
Managing heart failure is straightforward	21	29	50
Treating heart failure cannot change the prognosis	5	8	87
My main aim is to relieve my patients' symptoms	74	18	8
My main aim is to make my patients feel better	92	6	2
Decreasing mortality is more important than initial symptom relief	28	38	34
Relief of patient symptoms is more important than decreasing mortality	33	28	39
It is difficult to apply the findings of trials to my patients	22	42	36
The difficulties of initiating ACE inhibitors outweigh the likely benefits for most patients	16	8	76
Patient compliance is a barrier to adding in a drug to diuretics	36	27	37
The majority of patients are well managed on a diuretic	41	36	23
I think there is a lot more we could do to help patients with heart failure	73	19	8
Quality of communication between primary and secondary sections			
It would help if hospital doctors explained why they had changed treatment	83	14	3
Discharge information often arrives after I have seen the patient	83	9	8
Discussions with specialists are more helpful than written guidelines	51	32	17
I don't see the need for the sharing of care for patients with heart failure	11	24	65

statements were selected to represent the most commonly occurring themes under each of the four topic areas. Finally, the 'validity' of the topics and statements was verified by the focus group (comprising eight GPs who had not been involved in the interviews and one hospital doctor who had). This process resulted in 21 statements shown in Table 2 and a further eight statements representing barriers to using ACE-I, as shown in Table 3.

Case 1

Mrs JP is 75 years old and her daughter (who lives nearby) has asked you to visit. Mrs JP has become gradually more housebound because of an increase in weight, a recent swelling of the legs, and breathlessness. She has had no chest pains but has developed a cough.

She has not sought medical help for many years but remembers once taking methyldopa for high blood pressure. She is on no medication at present.

When you see her she is overweight and sitting in a chair, with obvious marked peripheral oedema and a high jugular venous pressure (are far as is possible to tell in a rather full neck). Pulse is 78 regular, blood pressure 190/80; the peripheries are cool. It is difficult to locate her apex beat but a quiet systolic murmur is present that is difficult to localize.

Case 2

Mr KT is a 55-year-old plumber who smokes 10 cigarettes per day and consults you because of breathlessness. Five or six weeks ago he had flu with a fever and cough that made him feel quite unwell for a day or two. However, since then his breathing has been worsening. In the past week he has woken a couple of times at night with a sense of suffocation and now finds it easier to sit up at night. His cough has returned, but with only a little clear sputum. There has been no haemoptysis and he denies chest pain at any stage.

He has tried to keep going to work but finds that he becomes readily exhausted and breathless. He also reports a reduced appetite and a feeling of abdominal discomfort, but there are no other symptoms of note. There is no past or family history of concern and he is on no regular medication (except for aspirin, which a friend recommended recently).

On examination he looks rather unwell and, though not breathless at rest, he becomes mildly dyspnoeic on simply walking across the room. He has cool peripheries, pulse is 115 regular, venous pressure is elevated to the jaw with a little peripheral oedema. Blood pressure is 110/80 and a gallop rhythm is detectable. There are no murmurs. The chest is clear but the abdomen feels full in the right upper quadrant with the patient reporting discomfort on palpation in this area.

Case 3

Mr CH is 65 years old and a regular attendee at surgery for review of his long-standing bronchitis and emphysema. He takes regular bronchodilators but consults you because there has been a deterioration in his breathing, together with newly-developed ankle swelling and the feeling of palpitations. He has a sedentary lifestyle, having taken early retirement from a modest rank in the police force.

On examination he is his usual breathless self, although not complaining of dyspnoea at the moment. Pulse is 142 and very irregular, blood pressure is on average 140/80. He has a widely swinging jugular venous pressure with newly-developed peripheral oedema at least to the thighs. The overlying skin appears reddened, with a rather dusky hue. Peripheral pulses were palpable.

As usual, it is impossible to feel the apex beat and his heart sounds were quiet. The chest is hyperinflated with slow expiration and only an occasional wheeze. Abdominal examination was unremarkable but the liver edge is firm and palpable about 5 cm below the right costal margin. It is not tender.

Box 1. Case scenarios.

Results

Attitudes to heart failure and its management (Table 2)

GPs' conceptual model of heart failure. The majority (87%) of GPs viewed heart failure as a progressive disease, and 69% disagreed with the statement that 'mortality from heart failure is much less than from common cancers'.

Diagnosis. Most (79%) GPs believed that it was important to discover the underlying cause of heart failure. Although the majority reported a preference for managing patients themselves, 22% indicated that they referred most of their heart failure patients to a specialist. The use of a diuretic was perceived as an important diagnostic tool by 73% of the sample. Most saw an echocardiogram as valuable, with 67% agreeing that they would request one if available.

Management. The potential for treatment to improve prognosis was clearly identified by most (87%) GPs. However, only 21% reported that the treatment of heart failure was straightforward. For most GPs, the main aim of treatment was to relieve symptoms (74%) and to make patients feel better (92%), with only 28% agreeing that decreasing mortality is more important than symptom relief. Although clinical trials have consistently shown the potential benefits of ACE-I in improving both symptoms and prognosis, 41% of the GPs in our sample reported their perception that the majority of patients can be well-managed on a diuretic alone. Moreover, only 36% disagreed with the statement: 'It is difficult to apply the findings of trials to my patients.' Despite the fact that most (76%) GPs believed that the benefits of ACE-I outweigh the difficulties associated with their use, over one-third of the sample thought that poor patient compliance was a barrier to ACE-I use. Most GPs appeared to be dissatisfied with the quality of heart failure management, with 73% agreeing that much more could be done to help patients with this condition.

Liaison between primary and secondary care. The participants were generally dissatisfied with the quality of information received from their hospital colleagues: 83% stated that discharge information often arrived after the patient had been seen in surgery. Additionally, most (83%) wanted hospital doctors to explain why treatment had been introduced or changed, and half thought that discussions with specialists were more valuable than generalized written guidelines.

GPs' treatment intentions in responses to case scenarios

The pattern of referral intentions varied widely between the three case scenarios: 30% of GPs stated that they would refer the first case, 73% the second, and 38% the third. GPs who chose not to refer often stated that they would provide further support to these patients by requesting a domiciliary visit (29%, 5%, and 11% for cases 1, 2, and 3 respectively). Where the GP elected to manage the patient, relatively few investigations were undertaken; for example, of the 70 GPs who chose to manage the 'typical heart failure patient' (case 1), only 54% requested a chest X-ray, 30% an electrocardiogram (ECG) and 20% an echocardiogram, while only 16% would measure the patient's haemoglobin.

Figure 1 shows the number of GPs who prescribed diuretics, digoxin, and ACE-I to manage non-referred patients in the three case scenarios. GPs were allowed to select more than one drug for each patient. Diuretic therapy was the preferred treatment option in all three cases. ACE-I were prescribed by only a minority of GPs; for example, in case 1, only 19/70 (27%) GPs, who stated that they would not refer the patient to a specialist, initiated an ACE-I. Five of the 27 GPs (19%) who chose to manage the

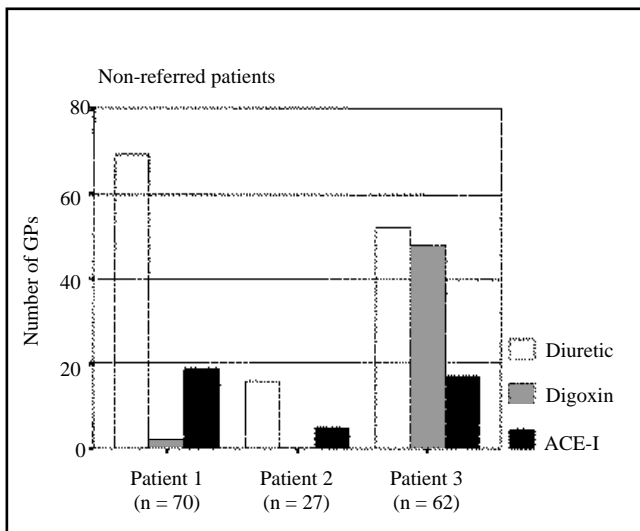


Figure 1. Drugs prescribed by GPs for case scenarios 1, 2, and 3.

patient with cardiomyopathy (case 2) stated that an ACE-I would be inappropriate. Except for the management of atrial fibrillation (case 3), digoxin was not generally seen as a useful therapeutic option for the treatment of heart failure.

GPs' ratings of risk and benefit associated with individual drug treatment options

Box 2 shows GPs' assessments of the risks and benefits of diuretics and ACE-I for each of the three case scenarios. GPs consistently rated diuretics as the most beneficial therapy associated with the lowest risk. Although ACE-I drugs were, on the whole, judged to be beneficial, they were also perceived to be associated with a higher degree of risk relative to diuretics. These findings are illustrated by examining the risk and benefit scores for Case 1 in Box 2. Both diuretics and ACE-I were perceived as highly beneficial by the majority of GPs (diuretics 66%; ACE-I 60%). However, diuretics were judged to be associated with lower risk than ACE-I (78% of GPs judged diuretics versus 33% who judged ACE-I to be a low-risk treatment).

Table 3 shows the frequency of responses when GPs were invited to select the most important barriers to initiating ACE-I. This shows that 41% identified the risk of adverse effects and logistics of monitoring ACE-I use as the most important reasons (Table 3, items 1 and 2). A further 27% believed that their patients were well controlled on diuretic therapy alone or did not require an ACE-I for some other reason (Table 3, items 3 and 5). Twelve per cent admitted to being unfamiliar with the usage of ACE-I in heart failure (Table 3, item 4) and 6% believed that ACE-I are less 'tried and tested' than diuretics (Table 3, item 8).

Discussion

DIURETICS			
<i>Case 1</i>			
High risk	0	1	2
Medium risk	1	7	11
Low risk	0	25	53
	Low benefit	Medium benefit	High benefit
<i>Case 2</i>			
High risk	0	2	1
Medium risk	1	14	5
Low risk	9	21	46
	Low benefit	Medium benefit	High benefit
<i>Case 3</i>			
High risk	0	0	1
Medium risk	0	16	11
Low risk	1	22	49
	Low benefit	Medium benefit	High benefit
ACE-I			
<i>Case 1</i>			
High risk	1	4	5
Medium risk	3	20	33
Low risk	0	11	22
	Low benefit	Medium benefit	High benefit
<i>Case 2</i>			
High risk	1	4	1
Medium risk	3	17	25
Low risk	5	13	30
	Low benefit	Medium benefit	High benefit
<i>Case 3</i>			
High risk	1	1	2
Medium risk	8	32	21
Low risk	4	15	16
	Low benefit	Medium benefit	High benefit

Box 2. GPs' assessment of risk and benefit of diuretics and ACE-I for the three case scenarios.

This study attempted to identify the salient barriers to adopting evidence-based management of heart failure in the community from a survey of a representative sample of GPs in England and Wales. Most participants were well aware of the serious nature of heart failure and of clinical trials indicating that prognosis can be improved by treatment. However, fewer were aware that this improvement can only be achieved by using ACE-I, as indicated by the fact that 41% of the sample believed that patients can be managed by diuretics alone. Moreover, knowledge about trial results had little influence on treatment intentions in three case scenarios. Many GPs relied upon the patient's response to a trial of diuretic therapy to confirm the diagnosis, and perceived diuretics to be the treatment of choice associated with good symptomatic relief and minimum risk. In contrast to diuretics, ACE-I drugs were viewed as problematic for both the patient and the doctor. In addition, trials demonstrating the benefits of digoxin in patients with sinus rhythm^{14,15} did not appear to have influenced treatment choices. We do not know why so many GPs chose to use a diuretic in this way. This may be a pragmatic

Table 3. Perceived barriers to prescription of ACE-I.

Rank	Most important reason for not initiating ACE-I therapy	Number of GPs
1	It is difficult to conduct tests and monitor patients on them	21
2	Initiation of treatment is a hassle	20
3	Most patients are comfortable on diuretics	16
4	I am unfamiliar with using them in heart failure	12
5	Most of my patients do not warrant their use	11
6	Widespread use would affect my drug budget	7
7	Many patients cannot tolerate them	7
8	They are less tried and tested than diuretics	6

response to patients presenting with early, poorly-defined symptoms, especially in the light of waiting times for both definitive investigation and specialist opinion. However, this strategy is problematic as it can lead to an inaccurate diagnosis in up to 50% of patients⁹ and may result in adverse drug reactions.^{12,13}

A major barrier to optimum management was that many GPs experienced difficulties in securing a confident diagnosis of heart failure. GPs often see patients when supporting evidence is masked by concomitant diseases or in the early stages when the clinical picture may be less distinctive. However, evidence from the case scenarios clearly demonstrated a gap between the GPs' appreciation of the importance of confirming the diagnosis and investigating underlying causes, and their intention to request an echocardiogram or undertake simple tests, such as chest X-ray, ECG, or haemoglobin. Only 20% of those who elected to manage the patient in case study 1 (a typical heart failure patient) said that they would use echocardiography to aid their diagnosis, even though this investigation is recommended by cardiologists as part of the routine evaluation of patients with heart failure.¹⁶ This finding has implications for strategies to facilitate the community management of congestive heart failure and is particularly relevant to the debate on open access echocardiography services.^{17,18} It also reinforces the notion that open access echocardiography could be used more effectively if GPs were first to screen patients using basic investigations, including ECG,^{19,20} chest X-rays, and blood tests.

This study did not set out to assess the practice of GPs. Rather, responses to case scenarios were used as indicators of the degree to which GPs' knowledge about heart failure and trial results might be applied to diagnosis and treatment intentions in a hypothetical situation where resources were unlimited. The responses to the case scenarios may therefore be viewed as a 'best case' indicator of the GP's practice. In a practical setting, several factors may inhibit the application of these intentions. One such organizational barrier identified by the GPs was the type and quality of information about patients transferred from secondary to primary care. In particular, the late arrival of information and the lack of specific explanations for treatment changes were seen as missed opportunities to learn from and collaborate more closely with their hospital colleagues.

Interventions to improve the management of heart failure in the community should focus on supporting GPs through training in its differential diagnosis by both simple screening and the use of echocardiography. Continued education on the relative use of ACE-I and diuretics in practice may also assist GPs in their management of heart failure. A new model of care should be developed in which GPs and hospital doctors should collaborate, not only on general policy guidelines, but also on the management of individual patients, sharing more detailed information on a case-by-case basis. Such schemes are likely to be more effective than information updates or general treatment guidelines alone.

References

1. Kalon KL, Anderson KM, Kannel WB, *et al*. Survival after the onset of congestive heart failure in Framingham Heart Study Subjects. *Circulation* 1993; **88**: 107-115.
2. SOLVD Investigators. Effect of enalapril on survival in patients with reduced left ventricular ejection fractions and congestive heart failure. *N Engl J Med* 1991; **325**: 293-302.
3. Cohn JN, Johnson G, Ziesche S, *et al*. A comparison of enalapril with hydralazine-isosorbide dinitrate in the treatment of chronic congestive heart failure. *N Engl J Med* 1991; **325**: 303-310.
4. Bowers PJ. Selections from current literature: treatment of congestive heart failure with angiotensin converting enzyme inhibitors. *Fam Pract* 1992; **9**(3): 362-366.
5. Anonymous. Clinical trials and clinical practice. [Editorial.] *Lancet* 1993; **342**: 877-878.
6. Haines A, Jones R. Implementing the findings of research. *BMJ* 1994; **304**: 1488-1492.
7. Haynes RB, Sackett DL, Guyatt G, *et al*. Transferring evidence from research into practice. 4. Overcoming barriers to application. *Evidence Based Medicine* 1997; **2**: 68-69.
8. Remes J, Miettinen H, Reunanen A, Pyorala K. Validity of clinical diagnosis of heart failure in primary health care. *Eur Heart J* 1991; **12**: 315-321.
9. Clarke K, Gray D, Hampton J. Evidence of inadequate investigation and treatment of patients with heart failure. *Br Heart J* 1994; **71**: 584-587.
10. Anonymous. Failure to treat heart failure. [Editorial.] *Lancet* 1992; **339**: 278-279.
11. Mair FS, Crowley TS, Bundred PE. Prevalence, aetiology and management of heart failure in general practice. *Br J Gen Pract* 1996; **46**: 77-79.
12. Williamson J, Chopin JM. Adverse reactions to prescribed drugs in the elderly: a multicentre investigation. *Age Ageing* 1980; **9**: 73-80.
13. McLennan WJ. Diuretics in the elderly: how safe? *BMJ* 1988; **296**: 155.
14. Packer M, Gheorghiane M, Young JB, *et al*. Withdrawal of digoxin from patients with chronic heart failure treated with angiotensin-converting-enzyme inhibitors. *N Engl J Med* 1993; **329**: 1-7.
15. Lubel D, Chamberlain DA. Rational use of diuretic therapy in the elderly. *Care of the Elderly* 1992; **July**: 311-314.
16. Dargie HJ, McMurray JJV. Diagnosis and management of heart failure. *BMJ* 1994; **308**: 321-328.
17. Francis CM, Caruana L, Kearney P, *et al*. Open access echocardiography in management of heart failure in the community. *BMJ* 1995; **310**: 634-636.
18. Colquhoun MC, Waine C, Monaghan MJ, *et al*. Investigation in general practice of patients with suspected heart failure. [Editorial.] *Br Heart J* 1995; **74**: 335-336.
19. Hampton JR, Barlow AR. Open access. *BMJ* 1995; **310**: 611-612.
20. Murphy JJ, Frain JP, Ramesh P, *et al*. Open-access echocardiography to general practitioners for suspected heart failure. *Br J Gen Pract* 1996; **46**: 475-476.

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