

## **A domiciliary ECG service for general practitioners**

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**A**N open referral service for electrocardiographs has been operating in Northampton for more than five years. It has worked well, providing a satisfactory service for outpatients. However, there is a group of patients whose condition makes a journey to hospital undesirable, and if an ECG is required for one of these patients a domiciliary visit by a consultant is normally the only way in which one can be done. This paper reports the experience of the first 18 months of a domiciliary ECG service in Northampton.

### **Method**

The hospital ECG technicians agreed to carry out the cardiographs outside working hours. They received a small fee for each visit made. Requests for the service were usually made in the mornings by telephone, so that most visits were made in the evenings or at lunchtime, and reported on next day. If the ECG showed a serious abnormality the practitioner was telephoned, but in every case a photostat copy of the trace and report was sent by post.

The technicians operating the service are familiar with common abnormalities of the ECG, and they usually obtained an urgent report if any rhythm abnormality was present. In order to keep down travelling time the service was offered to general practitioners in the town of Northampton only.

Shortly after an ECG request each practitioner was circularised and asked to return details of how he thought the ECG had helped his management. Some months later each practitioner was interviewed about the progress of the patients in an attempt to make an objective assessment of the value of the service.

### **Results**

There were 212 ECGs carried out on 180 patients. Of the 180 patients, 105 were men with an average age of 58.5 years (range 38–85), and 75 were women whose average age was 65.3 years (range 45–84). The reasons for requests are shown in Table 1.

TABLE 1  
REASONS FOR DOMICILIARY ECG

	<i>Number</i>	<i>Per cent</i>
Chest pain	161	76
Exacerbation or onset of heart failure	17	8
Rhythm abnormality	15	7
"Collapse" (sudden loss of consciousness or unexplained fall in blood pressure)	9	4
Other	10	4

*ECG diagnosis*

The ECG diagnosis is shown in Table 2. Most of the traces done were abnormal (78 per cent). It is to be expected that a domiciliary ECG service will produce a much higher proportion of abnormal traces than an outpatient referral service, but this proportion of abnormal traces was unexpectedly high. The number of recent episodes of myocardial infarction, 52 (25 per cent), was also higher than expected and 44 of these patients were treated at home. Seven (16 per cent) died, of whom four died at home and three died after transfer to hospital.

TABLE 2  
ECG DIAGNOSIS

	<i>Number</i>	<i>Per cent</i>
Highly-probable recent myocardial infarction (unequivocal Q waves with raised ST segments)	52	25
Changes compatible with ischaemia but no definite evidence of infarction	32	16
Atrial fibrillation only	12	6
Left bundle branch block	8	4
Right bundle branch block	4	2
Doubtful trace: repeat suggested	26	12
Non-specific abnormalities	9	4
Normal	48	22

There were 26 cardiographs showing doubtful abnormalities requiring a repeat trace. This was done in 17 cases, 11 of which showed no further change and nine showed changes of acute myocardial infarction.

*The ECG as an aid in management*

A few weeks after each cardiograph the practitioner concerned was asked to assess the value of the ECG in his management of the patient by selecting one of four categories. The replies, shown in Table 3, confirm the enthusiasm for the service expressed by virtually all the practitioners who used it.

TABLE 3  
THE ECG AS AN AID IN MANAGEMENT

	<i>Number</i>	<i>Per cent</i>
Invaluable	70	41
Helpful	89	53
Made no difference	4	3
Confused the picture	5	3

Several months after this, each practitioner was interviewed in person about the progress of his patients in an attempt to assess objectively the value of the service. On the basis of these interviews information was obtained on 168 patients, and could be divided into the two categories shown in Table 4. By this assessment, 117 (70 per cent) cardiographs were deemed to be of definite value in the management of the patient, and 51 (30 per cent) of 'no direct value'.

These are retrospective assessments, and inclusion of an ECG in the 'no direct value' group does not imply that the ECG need not have been done at home. Many 'ischaemic' cardiograms on patients who were treated as infarcts were accompanied by a raised serum dehydrogenase. In these circumstances the practitioner did not usually

TABLE 4  
THE VALUE OF THE ECG ASSESSED BY PATIENTS' PROGRESS

	Number	Per cent
<i>(a) ECG of no direct value or harmful</i>		
Patients with ischaemic ECG treated as myocardial infarction	24	14
Patients sent into hospital in any case	23	14
Patients with normal ECG treated as angina	2	1
Patients whose management was made more difficult	2	1
TOTAL	51	30
<i>(b) ECG of definite value</i>		
Patients reassured and mobilised	43	26
Patients with myocardial infarction treated at home with good results	35	21
Patients with abnormal ECG not treated as infarction	20	12
Patients whose normal ECG led to a change in diagnosis	8	5
Patients treated at home: died after 4th week	5	3
Patients treated at home: died in acute stage	4	2
Digitalis stopped because of ECG findings	2	1
TOTAL	117	70

request a second ECG since it would not affect his management. Many of those patients who were sent into hospital after a domiciliary ECG had suffered a deterioration in their clinical state, or a change in their relatives' willingness to look after them. Two patients were sent into hospital because the ECG showed a myocardial infarction when the clinical grounds for suspicion were not strong. Both the patients whose management was made more difficult by the ECG had a history of neurosis, and the cardiographs, done for reassurance, showed minor abnormalities.

#### *Work load*

During the 78 weeks on which this study is based the weekly average number of cardiographs carried out was 2.6, and the average time taken for each visit, including travelling, was 35 minutes. During the first six months, November 1969 to April 1970, 89 visits were made, while between November 1970 and April 1971, 75 visits were made. The figures suggest that the number of requests for domiciliary ECGs is steady, and that the service could be provided at the present rate of demand by two hours of a technician's time each week.

#### **Discussion**

One of the main objections to an open ECG referral service is that a proportion of patients referred are found to have evidence of recent myocardial infarction. The domiciliary ECG service in Northampton was begun in an attempt to avoid having patients walk into the ECG department a short time after their heart attack. Insofar as it is now rare for acute changes of infarction to be reported on an outpatient ECG, this aim has been met.

The service has also enabled a practitioner to improve the standard of care to his patients by enabling him to make a more accurate diagnosis. Serum enzyme (SHPD) estimations seem to be requested rarely by the general practitioners of Northampton. Only 20 were carried out on patients in this study. Levels were normal in two patients whose ECG showed an acute infarct, and raised in five patients whose ECG did not

show an infarct. Four of those five patients were treated as an acute infarction in spite of lack of ECG evidence for the diagnosis.

The enthusiasm of doctors for the service is reflected in the large number, 94 per cent who found the report 'helpful' or 'invaluable' in their management of their patients. In spite of this high percentage, 30 per cent of patients were either sent into hospital in any case, or were treated differently from the diagnosis suggested by the ECG. This suggests that practitioners did not rely blindly on the ECG report, but used the ECG as an aid to their clinical judgment.

The provision of an ECG service available to general practitioners has been a controversial issue. There is no doubt that most practitioners welcome the service when it is provided (Seymour *et al.*, 1968, Lorimer and Kennedy, 1968) and feel dissatisfied when it is not (British Medical Association, 1968). The BMA planning unit survey of 1969 (Irvine and Jefferys, 1971) found that of those doctors who felt that their local hospital diagnostic facilities were inadequate, 77 per cent complained of lack of access to ECG.

Three main objections have been raised to the provision of such a service (Short, 1971; Verel, 1971). The first, that patients who are acutely ill may present as outpatients, can be obviated by a domiciliary ECG service. The second objection is that a high proportion of cardiographs of patients with suspected coronary disease show non-specific abnormalities. The results of this study suggest that general practitioners do not trust blindly in an ECG report, but continue to exercise their clinical judgment. Two patients with normal cardiographs were treated for angina, and 24 patients with cardiographs suggesting ischaemic changes only were treated for myocardial infarction, whereas none of the patients whose cardiograms showed changes of acute infarction were treated otherwise.

The third objection is that patients whose ECGs show changes of coronary artery disease may be having symptoms due to another condition. This is an objection which could be raised to any diagnostic aid or physical sign, and should not justify the exclusion of general practitioners from an ECG service.

Whether the 44 patients who were treated at home for acute myocardial infarction should have been sent into hospital is a matter of opinion, but since the mortality rate (16 per cent) is not significantly different from that found by other practitioners who treated their patients at home (Sleet, 1968; Mather *et al.*, 1971; McCormick and Fry, 1972), and since Northampton does not have a coronary care unit, there is no evidence that any patient died as a result of being kept at home.

It is unlikely that in future general practitioners will be content to refer their patients to a physician solely in order to obtain an ECG. This means that the choice lies between the ownership of an ECG machine by an individual or his group, and the provision of a central, open ECG service. Only two practices in Northampton have ECG machines of their own, and doctors from these practices frequently made use of the domiciliary service. None of the other doctors using the service was keen to own his own machine. Most doctors felt that they were not likely to use an ECG machine often enough to become skilled in interpreting the trace, or in producing a trace of sufficiently high quality for someone else to report. A few doctors also commented that they did not feel that they should bear the cost of a machine, or that they would not have time to carry out an ECG.

Hence the almost universal preference of the practitioners of Northampton was for a central, open ECG service for ambulant patients with a domiciliary service for those not well enough to travel.

Our results suggest that such a service can operate successfully and economically

with only a small addition to the work load of the ECG department, although if the service were to be extended to include rural areas the additional travelling time involved would be considerable.

### Summary

The experience of the first 18 months of a domiciliary ECG service for general practitioners in Northampton is reported. During that time 212 traces were done on 180 patients. The results suggest that such a service is a valuable aid to the management of patients in the home, and that it can operate economically and successfully.

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