

# Comparison of anticoagulant control among patients attending general practice and a hospital anticoagulant clinic

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**SUMMARY.** Management of patients receiving oral anti-coagulant therapy was assessed in general practice and a dedicated hospital anticoagulant clinic. The demographic characteristics of patients in both groups were similar, as were the indications for anticoagulation therapy and the duration of treatment. General practice patients were reviewed significantly more frequently, with a median interval of 16 days compared with 42 days for hospital patients ( $P < 0.001$ ). Twenty four per cent of general practice visits and 26% of hospital attendances resulted in an alteration to the warfarin dosage. Overall, 52% of general practice thrombotest results lay within the ranges recommended by the British Society for Haematology, compared with 45% of hospital results ( $P < 0.001$ ). There was no difference in the rate of complications in general practice and the hospital clinic. In this study, the anticoagulant control achieved in a general practice setting was superior to that in a dedicated hospital outpatient clinic, although control was far from ideal in either setting.

**Keywords:** anticoagulant agents; cardiovascular diseases; management of disease.

## Introduction

THE role of anticoagulation in the prevention of thromboembolic complications is well established.<sup>1-5</sup> However, treatment is not without risk and therapeutic ranges are narrow. Under-anticoagulation may result in fatal thrombotic events, and over-anticoagulation carries the risk of life-threatening haemorrhage.<sup>1,6-8</sup> The optimal level of anticoagulation depends on the underlying condition.<sup>9-14</sup> National guidelines were proposed by the British Society for Haematology in 1984, based on a survey of prevailing practice and accumulated evidence from clinical trials,<sup>11</sup> and these remain the standard against which control is assessed.

The number of patients taking the anticoagulant drug warfarin has increased as the spectrum of indications for its use has widened.<sup>15-19</sup> Many of these patients are committed to life-long treatment, generating a considerable workload in the monitoring

of control and adjustment of dosage. The management of anticoagulant control is traditionally undertaken by dedicated hospital outpatient clinics. However, studies suggest that the control achieved by hospitals is often far from satisfactory,<sup>1,16</sup> with fewer than 50% of results falling within the therapeutic range and 30% of patients classed as poorly controlled.<sup>20,21</sup> Those patients not attending hospital clinics are monitored by their general practitioners, but there is little information available on general practice management of anticoagulant control and how it compares with that in hospital clinics. The aim of this study was therefore to carry out such a comparison.

## Method

The study practice is a semi-rural group practice in Cowdenbeath, Fife, with a population of 11 600 patients. The anticoagulant control of all patients receiving warfarin who are registered with this practice is managed by their general practitioner. A separate anticoagulant register is maintained, and updated as new patients register with the practice or existing patients are commenced on warfarin therapy. Although the practice does not generally apply a personal list system, patients' warfarin therapy is reviewed by the general practitioner with whom they are registered in order to disperse the workload and facilitate continuity of care. Patients failing to attend appointments for venepuncture are contacted by the practice to arrange another appointment. Those patients who have difficulty attending the surgery are offered home visits. Milesmark Hospital is the local district general hospital and it runs a weekly anticoagulant clinic for all patients in west Fife whose warfarin therapy is not being managed by their general practitioner.

In June 1991, data from the previous three years were obtained from the case records of all patients taking warfarin currently attending the Cowdenbeath practice or Milesmark Hospital. Over the period studied, both locations used venous thrombotest international normalized ratios.<sup>22</sup> Treatment with warfarin was always started while the patient was a hospital inpatient, so only maintenance management was compared. All of the patients had been receiving warfarin for at least three months at the time of the study.

Comparisons were made between the patient characteristics within the two groups obtained from the case notes, including age, sex, clinical indication for anticoagulation and intended duration of treatment. The intended duration of treatment was defined as long term if greater than 12 months and short term if 12 months or less. The patients' sex and the duration of treatment were compared by means of the *z* test for binomial proportions, and the indications for treatment by the chi square test. The patients' ages and the intervals between review appointments were compared using a Mann-Whitney test and the proportion of visits at which dosage was adjusted using the *z* test. Control was assessed by applying the guidelines of the British Society for Haematology (Appendix 1).<sup>11</sup> The percentage of results for patients with recommended international normalized ratios in the ranges of 2.0-3.0 or 3.0-4.5 were compared using a chi square test. Episodes of major haemorrhage were defined as bleeding of sufficient severity to necessitate hospital admission. These were also recorded and compared using a Fisher's exact test.

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## Results

There were 32 patients in the general practice group and 123 attending the hospital anticoagulant clinic. The sex and age distributions of the two groups were similar: 18 general practice patients (56%) and 70 hospital patients (57%) were women; the median age of general practice patients was 62 years (interquartile range 58–71 years) and of the hospital patients 63 years (56–70 years). There was no significant difference in the clinical indications for anticoagulation therapy between general practice and hospital patients (Table 1). Of the 32 general practice patients, 28 (88%) were on long-term treatment compared with 118 hospital patients (96%).

The median interval between appointments was 16 days for general practice patients (1088 appointments) and 42 days for patients attending the hospital clinic (2828 appointments) ( $P < 0.001$ ). The maximum review intervals were 63 and 252 days, respectively. The longest period between review appointments given to patients by their general practitioner was two months, whereas three month appointments were given on 171 occasions to 32 hospital patients whose anticoagulation was stable. The interval between appointments exceeded three months in 17 cases for hospital patients, all as a result of patients cancelling or failing to attend earlier appointments. On the 10 occasions when reasons were recorded, transport difficulties were cited as the cause.

Two hundred and sixty one of the 1088 general practice appointments (24.0%) resulted in adjustment of the dose of warfarin, compared with 726 of the 2828 hospital attendances (25.7%). Table 2 shows the distribution of general practice and hospital thrombotest results in relation to the recommended ranges. At 51.6% of general practice appointments and 45.5% of

hospital appointments, thrombotest results fell within the therapeutic ranges (difference 6.1%, 95% confidence interval 2.6 to 9.6,  $P < 0.001$ ). Of the results lying outwith the ranges recommended by the British Society for Haematology, 58.1% of general practice results and 55.4% of hospital results were sub-therapeutic. In the range of international normalized ratio 2.0–3.0, there was no significant difference in the control achieved in the two locations — 52.6% of general practice results and 51.2% of hospital results were within the range. For the 3.0–4.5 range, however, 51.0% of general practice results fell within the range, compared with only 36.0% of hospital results ( $P < 0.01$ ), the majority of hospital results (58.3%) being sub-therapeutic.

Over the period studied, four general practice patients had a single haemorrhagic episode which required hospital admission. Fourteen hospital patients were admitted on 19 occasions because of haemorrhage. There were 751 treatment months in the general practice group and 3633 in the hospital group, giving major haemorrhagic complication rates of 0.0053 and 0.0052 per treatment month, respectively.

## Discussion

Although the risks of warfarin treatment are well recognized, this study, in agreement with previous studies, shows that only about half the thrombotest results obtained in either general practice or a hospital anticoagulant clinic fell within the recommended ranges.<sup>1,20</sup> Maintenance of thrombotest results within the ranges recommended by the British Society for Haematology was significantly better in the general practice than hospital group, owing to greater control in patients for whom the recommended international normalized ratio was 3.0–4.5.

It has been suggested that good control can only be achieved if stable patients are reviewed at least every three weeks, and unstable patients weekly.<sup>7</sup> In this study, general practice patients were reviewed significantly more frequently than hospital patients. The limitations imposed on hospital review appointments by both large patient numbers and pressure of time have been highlighted elsewhere,<sup>7</sup> but a further factor may be the difficulty experienced by some patients in travelling to a more distant clinic.

There are other potential advantages inherent in general practice management of anticoagulant therapy. Knowledge of concomitant medical problems and medication is essential for the safe management of anticoagulation, and the general practitioner is in the ideal position to determine these facts. Also, patients can be managed for long periods of time by the same general practitioner, whereas hospital clinics are often staffed by junior doctors in rotating posts, making consistent management difficult. Over the period studied, a total of 10 junior doctors worked in the hos-

**Table 1.** Indications for anticoagulation therapy.

Indication for therapy	% of patients	
	General practice (n = 32)	Hospital (n = 123)
Prosthetic valve	34	25
Mitral valve disease/valvotomy	13	25
Thromboembolism	13	4
Atrial fibrillation	9	13
Arterial embolism	6	2
Recurrent thromboembolism	6	12
Transient ischaemic attacks	3	10
Other	16	9

n = total number of patients in group.

**Table 2.** Distribution of general practice and hospital thrombotest results in relation to the ranges recommended.

Thrombotest results at appointment	% of appointments		
	General practice	Hospital	Difference (95% CI)
<i>BSH range 2.0–3.0<sup>a</sup></i>	(n = 365)	(n = 1771)	
Below	8.5	13.5	5.0 (1.7 to 8.3)**
Above	38.9	35.3	3.6 (-1.9 to 9.0)
Within	52.6	51.2	1.4 (-4.2 to 7.1)
<i>BSH range 3.0–4.5<sup>a</sup></i>	(n = 723)	(n = 1057)	
Below	38.0	58.3	20.2 (15.6 to 24.9)***
Above	10.9	5.8	5.2 (2.5 to 7.8)**
Within	51.0	36.0	15.1 (10.4 to 19.7)**

BSH = British Society for Haematology. CI = confidence interval. n = total number of appointments where thrombotest results should be in this BSH range. <sup>a</sup>International normalized ratio. \*\* $P < 0.01$ ; \*\*\* $P < 0.001$  (chi square test).

pital anticoagulant clinic, with no allocation of patients to specific doctors, while each general practitioner managed his or her own patients, except during periods of absence.

The main disadvantage of general practice monitoring may lie in the management of housebound patients. Housebound patients are transported to the hospital clinic by ambulance, but require a home visit by their general practitioner, thus increasing general practitioner workload. However, provision of transport to the surgery or performance of venepuncture for thrombotest measurement by district nurses may be solutions to this problem.

The findings of this study suggest that the warfarin control achieved in a general practice setting was superior to that in a dedicated hospital anticoagulant clinic. Although an equal distribution of patients with problematic control in the two groups cannot be assumed in a retrospective study, significant bias appears unlikely — there were no significant differences in patient characteristics or indications for treatment. However, control was not ideal in either setting and the need to improve the training of junior hospital doctors in the management of warfarin therapy has been highlighted previously.<sup>20</sup> In view of the findings presented here this should be widened to include all doctors monitoring anticoagulant control.

General practitioners are currently being encouraged to widen the scope of services offered to patients<sup>23</sup> while hospital doctors are being asked to rationalize services and reduce waiting times.<sup>24</sup> One solution would be the referral of patients back to their general practitioner once established on warfarin therapy. This study suggests that this option is worth further consideration. However, there remains substantial room for improvement in both settings.

#### Appendix 1. Guidelines of the British Society for Haematology.

Clinical indication	Target range for international normalized ratio
Deep venous thrombosis prophylaxis, including high risk surgery	2.0–2.5
Treatment of deep venous thrombosis/pulmonary embolism	
Prevention of venous thromboembolism in myocardial infarction	
Transient ischaemic attacks	2.0–3.0
Recurrent deep venous thrombosis/pulmonary embolism	
Arterial disease including myocardial infarction	
Arterial grafts	
Cardiac prosthetic valves/grafts	3.0–4.5

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