Ann R Coll Surg Engl 1998; **80**: 55–57

Protocol violation in deep vein thrombosis prophylaxis

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Key words: Deep vein thrombosis; Audit; Guidelines; Prophylaxis

This study aimed to determine how closely deep vein thrombosis (DVT) prophylactic policies are adhered to in routine general surgical practice, to identify reasons for policy violations and to assess the effects of policy modification.

Eighty adult patients, sixty of whom had undergone an operation, under the care of six general surgeons, each with their own written DVT protocol, were studied on one weekday. Thirty patients (50%) did not receive DVT prophylaxis according to the policy of the relevant consultant. Most violations occurred for unacceptable reasons, mainly starting low-dose subcutaneous heparin or using thromboembolic stockings postoperatively. However, 43% of protocol violations occurred for acceptable clinical reasons.

Following the initial study, a uniform departmental DVT prophylaxis policy was introduced. Nursing and medical staff were thoroughly appraised of the new policy. In a repeat study of 75 patients 1 year later, there were 15 protocol violations among 58 patients who had undergone an operation (27%). However, there were no violations for acceptable reasons. The number of unacceptable protocol violations in the two studies was similar (24/60 and 17/56). The number of patients at moderate or high DVT risk who received no preoperative prophylaxis was the same in both studies (8/48 in both audits).

DVT protocol violations are common in routine general surgical practice. Policy modification and unification results in fewer violations, but made little impact on the level of thromboprophylactic care.

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The use of clinical guidelines is being increasingly encouraged *(1)*. Most general surgical consultants have written protocols regarding prophylaxis against deep vein thrombosis (DVT).

The aims of this study were to determine how closely DVT prophylactic policies are adhered to in routine practice, to identify reasons for policy violation and to assess the effects of policy modification.

Study 1

Patients and methods

All adult inpatients under the care of six general surgeons were studied on one weekday. There were 43 women and 37 men, median age 68 years (range 16–90 years). Each consultant had a written protocol for DVT prophylaxis. All relied on a combination of low-dose subcutaneous heparin, thromboembolic deterrent stockings (TEDS) and early mobilisation, although there were minor differences between consultants' protocols. Nursing and medical staff not involved in the studies were not forwarned that it was taking place. Age, mode of admission (elective/emergency), diagnosis, operations undertaken, risk factors for DVT and bleeding tendencies were recorded. Patients were allocated to low, moderate or high-risk groups *(2)*. Details of DVT prophylaxis were recorded. The timing of giving subcutaneous heparin or TEDS in relation to any operation was noted.

If thromboprophylaxis was not given according to protocol, reasons for this were noted. They were regarded as being acceptable or unacceptable. Included in the former were those circumstances where there was

clinical contraindication to prophylaxis, eg not giving subcutaneous heparin in the presence of a bleeding tendency or not giving TEDS to patients with peripheral vascular disease. Omission of prophylaxis was deemed unacceptable when it was not given despite there being no clinical contraindication.

Results

Sixty patients had undergone an operation, of whom 30 (50%) did not receive prophylaxis according to protocols (Table I). Most violations were unacceptable (Table II). However, many (43%) of the protocol violations occurred for acceptable clinical reasons. Heparin was omitted if bleeding was considered a particular risk (5), epidural catheterisation was planned (4), or the patient was pregnant (1). Either heparin (3) or TEDS (5) were omitted in some patients considered to be at low risk, even though this was technically a protocol violation.

Twenty patients (all emergency admissions) had not undergone an operation at the time of the study, although seven subsequently did so. Of the 20 patients, six received no DVT prophylaxis.

Study 2

Modification of DVT prophylaxis policy

After the initial study, a single departmental policy was developed, based largely on the THRIFT recommendations *(2)*. Nursing and medical staff were appraised of the new policy using a combined approach of written instructions, posters, lectures, tutorials and informal discussions. A second study was conducted in precisely the same way as the first, although it was delayed for 12 months so that initial 'enthusiasm' after introduction of the new policy would not influence the results.

Table I. Protocol violations according to DVT risk

	Low risk		*Moderate risk*		*High risk*	
Study	1st	2nd	1st	2nd	1st	2nd
Total number of patients having surgery	12	8	32	30	16	18
Patients with protocol violations	9	0	15	11	6	4

Table II. Reasons for protocol violations

	1st study	*2nd study*
Unacceptable		
No heparin*	8	4
Late heparin*	10	7
No TEDS*	5	5
Loose TEDS	1	0
Too tight TEDS	0	1
Acceptable		
High risk bleeding	5	0
Epidural catheterisation	4	0
Pregnancy	1	0
Low risk	8	0

*Heparin and TEDS were readily available to nursing staff throughout the study period

Results

In the second audit, 75 patients were studied (42 men, median age 62 years, range 18–86 years), of whom 56 had undergone surgery at the time of the study. The proportion of patients in the various risk categories was similar to the first study (Table I). Of patients undergoing surgery, 27% did not receive prophylaxis according to the new departmental protocol (compared with 50% in the first study). However, there were no violations for 'acceptable' reasons in the second study. The number of 'unacceptable' protocol violations in the second audit was similar to the first study (24/60 *vs* 17/56). Furthermore, the number of moderate/high-risk patients receiving no preoperative prophylaxis was the same in the two audits (8/48 in both audits).

Nineteen patients (16 emergency admissions) had not undergone surgery at the time of the second study, although nine subsequently did so. Of the 19, two received no DVT prophylaxis.

Discussion

Subcutaneous low-dose heparin *(3)* and graduated compression stockings *(4)* are established methods of reducing the incidence of postoperative DVT. However, there have been few studies of the adequacy of implementation of DVT prophylactic measures *(5,6)*. Avery *et al. (5)* first highlighted the problem of omission or late administration of heparin prophylaxis in surgical patients, particularly those undergoing emergency procedures. However, their study was based on a retrospective review of case notes and made no attempt to discover the reasons or to correct the problem.

Our first study showed that half of general surgical patients undergoing an operation did not receive DVT prophylaxis according to written protocol. Many of the violations occurred for sound clinical reasons, suggesting that the protocols were not flexible enough to cover all clinical circumstances. High-quality guidelines based on randomised controlled trials or at least on expert consensus opinions are likely to be superior to individually designed policies. However, introduction of a single departmental protocol based on THRIFT recommendations appeared merely to eliminate 'acceptable' protocol violations and had little impact on the more serious 'clinical error-type' violations at 12 month reassessment. In a similar audit study, Byrne *et al. (6)* found that 51% of at-risk general surgical patients did not receive appropriate prophylaxis. Introduction of a miniaturised risk assessment sheet, applied to the back of the standard prescription chart resulted in an improvement in administration of DVT prophylaxis. They did not re-

audit their results 1 year later. It would be interesting to know if the improvement is sustained in the long-term.

In our study, eight patients in both audits at moderate or high risk of developing a DVT (17%) received no prophylaxis. In the majority of such patients either TEDS or heparin was considered to be contraindicated. This suggests that the use of two approaches to thromboprophylaxis provides a safety margin, lest one modality is started late or omitted.

The written protocols in the first study did not cover patients undergoing investigation or being treated conservatively, who appeared to be particularly at risk of receiving no DVT prophylaxis. The modified departmental protocol recommended DVT prophylaxis for all patients on surgical wards, regardless of whether or not an operation was planned. The results of the second study suggest an improvement in prophylactic care for this subgroup of patients.

This study has demonstrated that written protocols do not guarantee clinical excellence. DVT protocol violations are common in routine surgical practice, leaving room for improvement by both nursing and medical staff. Protocol refinement and staff education reduced the number of violations but made little impact on the quality of DVT prophylactic care. Clinical guidelines or protocols are becoming popular. The legal implications should protocols be violated and problems arise have recently been discussed *(7)*. The present view is that guidelines are not incontestable in court; however, this may not always be the case. It is important that if guidelines exist they should be observed and audited regularly to confirm implementation.

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Received 23 July 1997