

# LECTURE 4

## Risk assessment of medical patients at risk of thrombosis

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Fatal venous thromboembolic events occur more frequently in medical than surgical patients. In a 25-year analysis of fatal PE conducted at King's College, London, the majority of PE-related deaths occurred in the non-surgical population and the level of venographically-detected DVT remained unchanged over 15 years in non-surgical patients, despite a significant fall seen in surgical patients.<sup>1</sup> We know that the risk of VTE in acutely medical patients is a clinical concern and equally as important as surgical patients. Acutely ill medical patients that have been enrolled in large, randomized placebo-controlled studies had rates of distal DVT of about 10% and of proximal DVT of about 5%, placing them at moderate to high risk of VTE according to accepted levels of risk.<sup>2-4</sup> At-risk medical patients should be identified and appropriately targeted for thromboprophylaxis implementation.

### Risk factors for venous thromboembolism

Identification of at-risk patient populations is required before effective approaches to VTE prevention can be implemented. Several studies have identified particular medical illnesses and risk factors that appear to predispose patients to VTE.

An analysis of the MEDENOX trial evaluated the effect of enoxaparin (40 mg, once-daily) on outcome in different types of acute medical illness (heart failure, respiratory failure, infection, rheumatic disorder and inflammatory bowel disease) and pre-defined risk factors (chronic heart and chronic respiratory failure, age, immobility, previous venous thromboembolism and cancer)(Figure 9).<sup>5</sup> There was a significant reduction in the primary efficacy endpoint in the main disease groupings treated with enoxaparin (40 mg, once-daily) and, in particular, patients with acute cardiopulmonary disease.

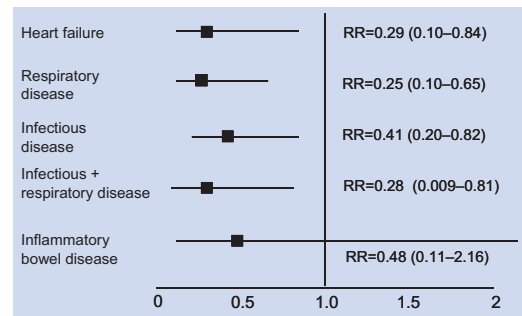


Figure 9. Relative risk of venous thromboembolism in MEDENOX subgroups.

Further analysis of the MEDENOX study described different types of acute medical illness and patient factors that were independent risk factors for VTE.<sup>6</sup> Multiple logistic regression indicated that the presence of an acute infectious disease, age above 75 years, cancer, and a history of VTE were independently associated with VTE (Figure 10).

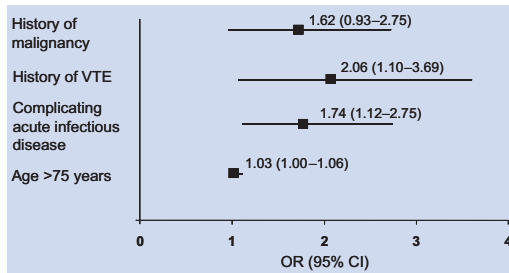


Figure 10. Venous thromboembolic risk factors in MEDENOX.

These findings are similar to a case control study (Sirius), designed to identify risk factors for DVT in medical outpatients. Sirius showed previous history of VTE, venous insufficiency, chronic heart failure, and obesity were significantly more common in the case patients than in the control group.<sup>7</sup>

Population-based studies have also provided important information on risk factors for VTE. Using data from a population-based, case control study of 625 residents of Olmsted County in the United States, investigators at the Mayo Clinic showed that hospitalization, either for surgery or

other reasons, accounted for 50% of all cases of VTE in the community (Table 5).<sup>8</sup> An analysis of 1231 consecutive patients treated for VTE, showed that 96% had >1 recognized risk factor (Table 6).<sup>9</sup>

Risk factor	AR	(95% CI)
Hospitalization with surgery	23.8	(20.3–27.3)
Hospitalization without surgery	21.5	(17.3–25.6)
Malignant neoplasm	18.0	(13.4–22.6)
CHF	9.5	(3.3–15.8)
Neurological disease with extremity paresis	6.9	(3.5–10.2)

AR: attributable risk; CHF: congestive heart failure

Table 5. Adjusted population attributable risk for VTE.

Risk Factor	Patients (%)
Age ≥ 40 years	88.5
Obesity	37.8
History of venous thromboembolism	26.0
Cancer	22.3
Bed rest ≥ 5 days	12.0
Congestive heart failure	8.2
Varicose veins	5.8
Stroke	1.8
Myocardial infarction	0.7

Table 6. Risk factors observed in 1231 consecutive patients treated for acute VTE.

### Risk assessment models

A number of risk assessment models (RAM) for medical patients have been developed, with the objective of increasing the use of appropriate

thromboprophylaxis. Two approaches have been taken in creating RAMs. The first is to use an algorithm that scores each risk factor present in an individual patient; patients exceeding a pre-determined score are candidates for prophylaxis. Examples include a German risk assessment scoring system, which was complex and not easy to adopt.<sup>10</sup>

“So I think there has been a shift in emphasis in the past year or two that perhaps we need a simpler, more robust and reliable approach to risk assessment.”

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The second method involves recommending thromboprophylaxis in all patients with one or more major target conditions (e.g., heart failure, prolonged immobility), unless a contra-indication exists. This favored approach has recently been developed into a RAM integrating this type of exclusion strategy.<sup>11</sup>

This RAM was recently published. Physicians are encouraged to assess all medical patients for thrombosis risk. Then, by progressing through simple yes or no steps to each question, including acute medical illnesses and known risk factors for VTE, a recommendation is made. The RAM is based on data from prospective studies in medical patients, or the consensus views of the authors. If patients are at risk, a recommendation for thromboprophylaxis is provided. The

recommendation also takes into account possible contraindications for pharmacological thromboprophylaxis. Benefits of this model include flexibility with respect to the inclusion of further data that accumulate and its transparency in justifying inclusion of risk factors. This model has been adapted for use at King’s College London, as shown below.

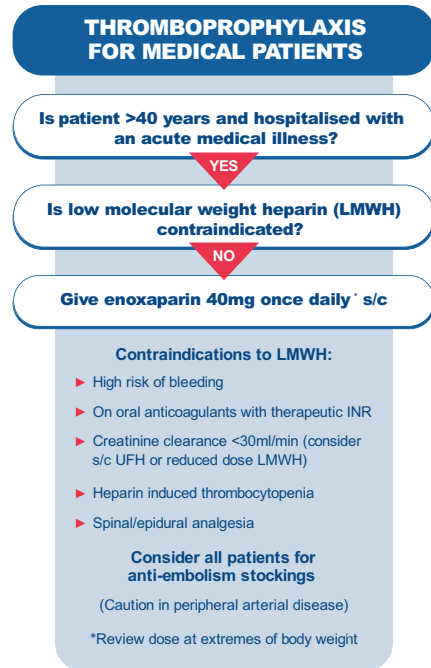


Figure 11. Risk assessment model employed for medical patients at King’s College, London.

## Electronic alerts improve patient outcome

Recently, the value of using a computer-based alert to highlight at-risk hospitalised patients, using a simple risk score based on eight principal risk factors, was validated and shown to improve patient outcome.<sup>12</sup> From a total of almost 14,000 patients at risk, 82% received some form of thromboprophylaxis. Almost 20% who had had no prophylaxis prescribed were randomized between two groups. An increased risk of VTE was defined as a cumulative risk score of at least 4. Patients were randomly assigned to the intervention group, in which the responsible physician was alerted to a patient's risk of DVT, or to a control group, in which no alert was issued. The computer alert reduced the risk of VTE at 90 days by 41% (hazard ratio, 0.59; 95% CI, 0.43 to 0.81;  $p=0.001$ ). An important element of this electronic alert was that it was imbedded within the hospital IT system, and was not dependent

on junior doctors knowing how to risk assess, and independent of the staff who would write scripts for thromboprophylaxis.

## Summary

Medical patients are at significant risk of developing VTE. Incidences of 14.9% total VTE and 4.9% proximal DVT were observed in the placebo arm of the MEDENOX study. The incidence of symptomatic VTE seems to be low in medical patients, but is similar to that observed in high-risk surgical patients. Despite recommendations that medical patients are assessed for thrombosis risk, a significant proportion does not routinely receive thromboprophylaxis. A RAM designed to assist clinicians in deciding whether an individual medical patient should receive thromboprophylaxis, should improve protection of this patient group.

## References

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