Expert Forum

VTE in New Zealand Hospitals

Making Education Easy

March 2011

This publication is a summary of the recent VTE Experts' Forum chaired by Dr Vinod Singh, chairman of the Steering Committee NZ Prevention Group. The forum's objectives included:

- sharing experiences in managing programmes for the prevention of in-hospital VTE
- discussing a national policy for effective VTE prophylaxis in NZ hospitals

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In this review:

Welcome

to this review of the recent NZ venous thromboembolism (VTE) Experts' Forum in Auckland. This review is a summary of the information presented at the forum regarding the status of VTE prophylaxis in NZ hospitals.

VTE prophylaxis in NZ hospitals – progress report

Dr Vinod Singh, FRACP, Chairman, Chairman, Venous Thromboembolism Prevention Group NZ, Honorary Clinical Senior Lecturer in Medicine, Consultant Physician in Internal Medicine and Stroke with the Waitemata DHB

Dr Vinod Singh

Since the last VTE Experts' Forum in Feb 2010, the Steering Committee has met several times to work through the guidelines and a road show. Anne Blumgart, secretary of VTE NZ, travelled to England to study the VTE prevention programme there. Dr Singh reported that his year has been busy, he answered more than 500 emails/phone calls and spent many hours addressing issues regarding VTE prophylaxis in NZ. Issues included planning and obtaining funding for the road show. Unfortunately the proposed road show in February did not happen, due to lack of funds.

The group has continued to lobby the authorities and further submissions were made to the Quality Improvement Committee (QIC) in October 2010, but this committee has since been disbanded and replaced with the Health Quality & Safety Commission (HQSC). Dr Singh said it was unfortunate that very little information on VTE prophylaxis was transferred from QIC to HQSC, and much of the work had to be redone. He believes that the HQSC represents the highest authority to make further progress on VTE prophylaxis, and he is pleased with its level of engagement to date. The upcoming policy and planning meeting will be attended by the Chief Medical Officer's leadership, who, along with HQSC representatives, will be advising the DHBs and the Minister of Health. Dr Singh believes VTE prophylaxis is a safety and quality issue. The Steering Committee has done almost all they can now, and he hopes that the HQSC will take over, or at least help in a substantial manner. He said that the Steering Committee will take on a 'watchdog' role. This would involve greater engagement with the public, so hospital patients know to ask about VTE prophylaxis at admission. It would have been inappropriate to start a public campaign before getting medical professionals ready first. By now all doctors should be aware of VTE prevention, or at least know where they can get information from. He thanked the members for their pioneering work on VTE prevention in NZ.

Overview of global VTE prevention in hospitalised patients

Dr Eileen Merriman, Haematologist, North Shore Hospital

In Australia, VTE is responsible for more deaths than breast cancer, road accidents and AIDS combined, and each case costs >AUD10,000; the costs in NZ are likely to be similar.[1,2] PE is the most common preventable cause of in-hospital death.[3] Most hospitalised patients have multiple risk factors for VTE, and hospital-associated cases account for around two-thirds of the entire population burden. Patients who have undergone total hip or knee replacement have a >50% risk of developing VTE if they do not receive thromboprophylaxis. Acutely ill medical patients who do not receive thromboprophylaxis have an estimated risk as high as 40%, and three times as many medical patients die from PE than surgical patients.[4] Moreover, nearly three-quarters of hospital-related VTE cases occur after discharge.[5]

VTE is associated with significant morbidity (much of which is not seen by the treating orthopaedic surgeons), and lower quality of life than osteoarthritis or chronic lung disease. Post-thrombotic syndrome occurs in 20–50% of patients, costing the Australian healthcare system ~AUD200 million per year.[6,7] Chronic thromboembolic pulmonary hypertension, which affects 2–4% of patients who develop PE, has a 2-year survival rate of 10% if not treated with pulmonary endarterectomy, for which 20–40% of patients are ineligible.

Thromboprophylaxis

A number of studies have demonstrated that thromboprophylaxis reduces the risk of DVT/PE by >60% across a broad spectrum of patients, with a very low risk of adverse events.[8] Low molecular weight heparins have largely replaced unfractionated heparin as the thromboprophylactic agent of choice. However, oral agents such as rivaroxaban and dabigatran have recently been approved in many countries, including NZ, for thromboprophylaxis following elective hip and knee replacement surgery. These offer the convenience of self-administration by the patient at home after discharge.

The current situation

Although the ACCP guidelines provide specific recommendations for patients according to risk,[3] a high proportion of VTE cases seen after hospital admission occur in patients who receive inadequate thromboprophylaxis. In many cases, patients receive aspirin only, particularly after hip/knee surgery, or an inadequate dosage or duration.

The ENDORSE study reported that of the 64% of surgical patients and 41.5% of medical patients at risk of VTE according to the ACCP 2004 criteria, only 58.5% and 39.5%, respectively, received thromboprophylaxis.[4] An audit performed by the Waitemata DHB from Oct 2006 to Apr 2007 found that of the 25% of medical patients who were eligible for thromboprophylaxis, only around 25% of those received it. While the figures were better for surgical patients, with 96% of those eligible (98%) receiving thromboprophylaxis, the dosage was suboptimal in almost half of them. In response to these findings, the 'Stop the Clot' campaign was introduced, which resulted in 90% and 73% increases in the use of enoxaparin 20mg and 40mg, respectively.

A number of ongoing challenges remain, including:

- many orthopaedic surgeons still relying on aspirin
- rotating house surgeons – conflicting guidelines among hospitals
- overestimation of patients' bleeding risks (e.g. malignancies)
- another form that needs to be filled out.

Advances

The 2008 ACCP guidelines include several important key recommendations (see **Table 1**) to improve the prevention of VTE in hospitalised patients.[3]

Table 1. Key recommendations from the 2008 ACCP guidelines for VTE prevention[3]

Every hospital develops a formal strategy to address VTE prevention (grade 1A recommendation)
Aspirin alone should not be used for thromboprophylaxis in any patient group
Policy should be documented
Policy should include strategies for quality improvement and to increase compliance

The US Surgeon General issued a call to action in 2008, with the aim of reducing morbidity and mortality due to VTE. Initiatives to help stakeholders develop a co-ordinated plan were outlined. Healthcare providers were asked to consistently track performance and policymakers were asked to review reimbursement policies. UK MPs also reaffirmed the priority for preventing hospital-acquired thrombosis in 2009 (see following presentation on VTE prevention in the NHS in England – Update on Progress).

A call to action is needed in NZ, and it was recommended that this should take a different direction, as progress thus far has been slow. Suggested steps forward include:

- elevate VTE prophylaxis to a key performance measure for DHBs
- make VTE prophylaxis policy a requirement for hospital accreditation
- increase the awareness of the problem among patients and the wider public
- collaboratively develop a unified, evidence-based national thromboprophylaxis protocol from RCT-derived data (to avoid conflicting guidelines).

A national thromboprophylaxis protocol should include assessment of baseline VTE risk at admission using a risk assessment tool, additional risk factors and bleeding risk for every patient. The risk level should be documented and prophylaxis prescribed if indicated, or reason(s) documented if contraindicated. Mechanical prophylaxis measures should also be recorded/charted. Documentation of further risk assessment should be undertaken when VTE risk changes (e.g. surgery, new malignancy diagnosis). Suggested measures to facilitate implementation include:

- utilising drug chart or admission proforma to record VTE risk assessment/prophylaxis
- including VTE prophylaxis guidelines in clinical pathways
- teaching (grand rounds, orientation, etc)
- appointment of a dedicated VTE prevention nurse
- provide feedback from regular audits.

Take-home points

PE is the most common preventable cause of hospital death
Thromboprophylaxis significantly reduces VTE across a broad spectrum of patients
A national thromboprophylaxis protocol should be urgently developed
Policies should include quality improvement strategies

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VTE prevention in the NHS in England

Update on progress

Tim Brown, VTE Prevention Policy Advisor, England

The NHS in England has pioneered a comprehensive healthcare systems approach to reducing avoidable death and chronic ill health from hospital-associated VTE. Details on the development of the national VTE Prevention Programme in England up until early 2010 are included in the VTE Experts' Forum, Feb 2010.

The focus of these development activities between 2005 (when VTE prevention was no priority at all across the NHS) to late 2009 was on:

i) identifying all available levers within the healthcare system in England that had the potential to make a contribution to VTE prevention and then,

ii) engaging all relevant organisations, including the charity sector and parliamentarians, in order to raise awareness of VTE prevention as a priority patient safety issue.

The steps taken during 2010 by the NHS Medical Director resulted in VTE prevention becoming the clinical priority for the NHS.

The architecture of this new challenging implementation phase includes: i) risk assessment on admission for all adult patients (including day cases) using national clinical criteria; ii) providing appropriate thromboprophylaxis according to national guidance; iii) increasing patient awareness and experience; iv) increasing professional awareness and engagement; v) an audit strategy of appropriate prophylaxis and root cause analysis of every hospital-associated VTE; and vi) benchmarking and measuring patient outcomes.

A national risk assessment tool, which set out clinical criteria that **must** be included in any locally developed VTE risk assessment protocol, was published in March 2010, and is fully aligned with the latest clinical guidelines from the National Institute for Health and Clinical Excellence (NICE) in England and Wales (http://guidance.nice.org.uk/CG92). Due to issues of demarcation of responsibilities, the development by the Department of Health of the national risk assessment tool was kept as a separate process from the clinical guidelines, which were developed by NICE (although Department of Health and NICE colleagues worked as a team to develop the national tool). As a result, the national VTE risk assessment tool focuses on a patient's thrombotic and bleeding risks, with the decision as to what then constitutes appropriate prophylaxis left as a matter for the individual clinician based on national guidelines from NICE. This approach has proved particularly effective in developing an initial focus on establishing and embedding a culture of VTE risk assessment of all adult patients on admission throughout the NHS in England.

A great deal has been achieved in the NHS in England over a relatively short period. From 1 April 2010, there has been a contractual requirement in place for all providers of NHS acute care to: i) report local audits of the percentage of patients risk-assessed for VTE who received appropriate prophylaxis; and ii) carry out a root-cause analysis of all confirmed cases of hospital-acquired PE and DVT. Many coroners in England are now considering a fatal PE where the patient did not undergo a risk assessment and be considered for appropriate prophylaxis as a potential unnatural death.

An effective commissioning lever has been the introduction in 2010 of a VTE prevention Commissioning for Quality and Innovation (CQUIN) goal, which triggers local funding for those providers of NHS acute services achieving a target of 90% VTE risk assessment of all adult patients on admission. At the same time, a national mandatory VTE prevention data collection was introduced, which is used to evidence local achievement of the national VTE prevention CQUIN goal.

This mandatory data collection for all providers of NHS acute services is census (not sampled) data, and has signalled a new level of national priority for VTE prevention in the NHS in England. Between July and December 2010, 53 hospitals achieved the target of 90% of patients receiving a risk assessment for VTE on admission. Further information on the mandatory VTE prevention data collection can be found at http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsStatistics/DH_122283. These census data on VTE prevention risk assessment are internationally important; for example they provide patients, policy makers and clinicians with robust information for the first time on the overall numbers of patients at a national scale who are at risk of VTE on admission to hospital.

Professional leadership for VTE in England is uniquely being provided by the Academy of Medical Royal Colleges, the Royal College of Nursing and the Royal Pharmaceutical Society.

The National VTE Prevention Exemplar Network hosted by the Kings Thrombosis Centre http://www.kingsthrombosiscentre.org.uk/cgi-bin/kingsthrombosis/index.pl shares best practice and improves patient care through more effective prevention and treatment of VTE. The national website integrates resources of the National VTE Exemplar Centre Network, the National Nursing & Midwifery Network and the National VTE Prevention Programme, to offer a single resource for healthcare professionals involved in thrombosis management. The Network would be delighted to share resources with colleagues in NZ, as well as promote learning for the work of the NZ VTE Expert Groups and individual hospitals.

A significant development for the VTE prevention was the publication of a VTE Prevention Quality Standard in June 2010 by NICE (see **Table 2**). The NICE VTE Prevention Quality Standard, which will be at the heart of commissioning requirements for VTE prevention activity as the NHS moves into a new outcome focussed environment, represents a unique synthesis of national VTE prevention policy and clinical guidelines in England.

As we move towards 2012, the focus of the National VTE Prevention Programme will increasingly be developing and benchmarking patient outcomes as set out in the NHS Outcomes Framework 2011/12 (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_122944).

Table 2. NICE VTE Prevention Quality Standard[1]

All patients, on admission, receive an assessment of VTE and bleeding risk using the clinical risk assessment criteria described in the national tool
Patients/carers offered verbal and written information on VTE prevention as part of the admission process
Patients with anti-embolism stockings have them fitted and monitored in accordance with NICE guidance
Patients re-assessed within 24h of admission for risk of VTE and bleeding
Patients assessed to be at risk of VTE are offered VTE prophylaxis in accordance with NICE guidance
Patients offered verbal and written information on VTE prevention as part of the discharge process
Patients offered extended (postdischarge) prophylaxis in accordance with NICE guidance

1. National Institute of Clinical Excellence (NICE). Quality standard for venous thromboembolism - prevention. Available from http://www.nice.org.uk/media/7F5/32/VTEQualityStandard.pdf

Report from VTE Exemplar Centres in the UK

Anne Blumgart, Principal Pharmacist DUE, Counties Manukau DHB

A number of NHS Trusts in England have been named as VTE Exemplar Centres in recognition of their excellent track record with VTE prevention and management. During November 2010, Anne Blumgart visited four NHS Trusts and attended a risk and patient safety conference in London, which included a presentation of the NHS South West VTE prophylaxis programme.

Two of the NHS trusts visited are VTE Exemplar Centres: Salisbury District Hospital (Salisbury NHS Foundation Trust) and Derriford Hospital (Plymouth Hospitals NHS Trust). These centres utilise evidence-based VTE prophylaxis policies and interdisciplinary groups to drive VTE prophylaxis; including, a Thrombosis Committee that meets regularly, smaller subworking parties responsible for day-to-day implementation activities, and doctors, nurses and pharmacists on the wards. All adult patients are VTE risk assessed on admission by doctors, with periodic review, and a cohort approach is utilised as regards the need for risk assessment for low-risk patient groups. VTE risk assessment tools and prescribing guidance are integrated into drug charts, with an opt-out approach utilised for the prescribing of thromboprophylaxis. Any contraindications to pharmacoprophylaxis are required to be documented on the drug chart. On a daily basis, pharmacists ensure that VTE risk assessments have been carried out and appropriate prophylaxis prescribed. At Salisbury NHS Trust, VTE risk assessment must be completed before any medications can be dispensed for a patient.

Monthly audits are carried out of compliance with VTE risk assessment on admission (minimum acceptable rate >90%), and appropriateness of prophylaxis prescribing and the associated key performance indicators (KPIs) are reported and tracked by Trust and nationally. Audit data are entered into the 'UNIFY' NHS database. The Trusts provide wards with rewards (e.g. chocolates, kudos) when 100% compliance with risk assessment on admission is achieved. Any VTE events that occur are investigated with a root-cause analysis process, with details entered into the 'VERITY' VTE registry and communicated to relevant clinicians.

At Salisbury NHS Trust, patients also complete a VTE self-assessment checklist. Patient information is provided to the bedside, and patients are also encouraged to ask if they have been properly risk assessed for VTE.

Powerful drivers at Trusts include: i) active involvement of senior leadership; ii) patient stories (particularly of staff members who have experienced a VTE event); iii) control charts (of monthly data and KPIs); and iv) regular education for staff. Both NHS Trusts have reported substantial reductions in VTE events as a result of these measures.

Another hospital visited was Musgrove Park Hospital (Taunton and Somerset NHS Trust), which has a very active VTE prophylaxis programme and is actively striving for exemplar status. Its VTE risk assessment compliance had improved from 65% to 86% between June and November 2010. A visit to the Hereford Hospital NHS Trust, which is still in an early formative phase of the VTE prophylaxis journey, involved attending a clinical board meeting where existing barriers to achieving the requirements and strategies necessary to facilitate compliance were discussed.

VTE prophylaxis and risk stratification in medical patients

Dr Sharon Jackson, Haematologist, Middlemore Hospital

Around 50% of VTEs are related to hospitalisation, and medical patients contribute to around a third to a half of these cases.[1] In terms of absolute numbers, around one in every 300 hospitalisations for ≥48 hours was associated with a risk of DVT or PE presentation in an audit of Middlemore Hospital data. Moreover, in addition to patients who present with a clinical VTE event, there are many more with asymptomatic disease. About half of patients presenting with a significant proximal thrombosis will have an asymptomatic PE. An estimated 10–20% of patients who do not receive thromboprophylaxis develop evidence of DVT on venography, but the rates are higher in some subgroups.[2] A study of 200 consecutive medical patients reported a fatal PE rate of 2.5%,[3] although data from more recent studies suggest that the rate is probably not that high.

Evidence for thromboprophylaxis

It is important to consider that the studies often used as the basis for recommending thromboprophylaxis in medical patients (MEDENOX, ARTEMIS, PREVENT and MAGELLAN) enrolled patients hospitalised for relatively long durations (>4–6 days) and who were immobile for ≥3–4 days and had significant congestive heart failure and acute respiratory disease. One of the key factors to be considered is assessments of mobility used in these studies, with some of the later studies grading mobility as grades 1 (confined to bed) and 2 (in bed, but able to get out to use the bathroom). Two of the studies (MEDENOX and PREVENT) also allowed participants to have an acute inflammatory or infective illness with a number of predefined risk factors for VTE, particularly age ≥75 years, cancer or history of VTE, which appear regularly in the literature as strong VTE predictors. Strict exclusion criteria also resulted in a quite selected study population, with all studies excluding participants who had: i) undergone major recent surgery; ii) significant renal dysfunction; iii) thrombocytopenia; or iv) increased bleeding risk. The MEDENOX (enoxaparin 40mg), ARTEMIS (fondaparinux 2.5mg) and PREVENT (dalteparin 5000IU) studies all reported significant reductions in total VTE events (venographically determined in MEDENOX and ARTEMIS) compared with placebo, with respective numbers needed to treat of 10, 20 and 45 (see **Table 3**).[4–6] While the numbers of symptomatic events in these studies were too small to show significance, a meta-analysis has shown that thromboprophylaxis results in 58% and 53% reductions in PE and symptomatic DVT, respectively.[7] In terms of safety, while the MEDENOX, ARTEMIS and PREVENT studies did not report significantly increased incidences of major bleeding compared with placebo, a suggestion of slightly greater background rates can be seen, although the overall death rates were still lower or equivalent in the active treatment groups.

Table 3. Main efficacy and safety findings from the MEDENOX (enoxaparin 40mg), ARTEMIS (fondaparinux 2.5mg) and PREVENT (dalteparin 5000IU) studies[4–6]

Study	Active treatment	Placebo	Active treatment	Placebo
Efficacy	**Total VTE**		**Symptomatic VTE**	
MEDENOX	5.5%	14.9%	0.3%	1.7%
ARTEMIS	5.6%	10.5%	0.0%	1.2%
PREVENT	2.8%	5.0%	0.7%	1.1%
Safety	**Major bleeding**		**Death**	
MEDENOX	1.7%	1.1%	11.4%	13.9%
ARTEMIS	0.2%	0.2%	3.0%	6.0%
PREVENT	0.49%	0.16%	2.3%	2.3%

Assessing risks of VTE…

The patients seen in medical wards are quite different to study participants, with many having multiple comorbidities, significant renal and/or hepatic impairment and increased risk of bleeding. Targeting the medical patients who are at the highest risk for VTE prophylaxis is important. The Padua Prediction score assigns values to individual risk factors (see **Table 4**) to derive a total score for an individual patient.[8] To evaluate these scores, they were assigned to 1180 consecutive, evaluable patients and VTE events were monitored over 100 days. The results showed participants who had been categorised as high risk (score ≥4) and received chemoprophylaxis (started within 48 hours of admission and received for ≥80% of hospital stay) had a VTE event rate of ~3%, similar to those categorised as low risk (score <4), while those categorised as high risk but who did not receive thromboprophylaxis experienced more VTE events (~11%).

Table 4. The Padua prediction score ratings

Baseline features	Score
Active cancer	3
Previous DVT	3
Reduced mobility	3
Already known thrombophilic condition	3
Recent (<1 month) trauma and/or surgery	2
Age ≥70 years	1
Heart and/or respiratory failure	1
Acute myocardial infarction or ischaemic stroke	1
Acute infection and/or rheumatologic disorder	1
Obesity (BMI ≥30kg/m^2)	1
Ongoing hormonal treatment	1

… and bleeding

The Padua risk score does not provide any information on the risks of bleeding. Data from the IMPROVE registry (n>10,000) showed that the in-hospital rates of major and major/clinically significant bleeding were around 1.2% and 3.2%, respectively.[9] These investigators undertook analyses to develop a fairly complex risk score for bleeding (see **Table 5**); the tool for calculating risk scores is available at http://www.outcomes-umassmed.org/improve/bleeding_risk_score.htm. Patients with scores >7.0 had risks of experiencing major and clinically significant bleeds within 14 days of admission of around ~4% and ~8%, respectively, while the risks were <2% for those with a score <7.0.

Table 5. IMPROVE bleeding risk scores[9]

Bleeding risk factors	Score
Active gastroduodenal ulcer	4.5
Bleeding ≤3 months prior to admission	4
Platelet count <50 ×10^9/L	4
Age >85 years	3.5
Liver failure	2.5
GFR <30 mL/min/1.73m^2	2.5
ICU/CCU admission	2.5
Central line	2
Rheumatic disease	2
Current cancer	2
Age 40–84 years	1.5
Male	1
GFR 30–59 mL/min/1.73m^2	1

VTE vs. bleeding

Some degree of clinical judgement is still required when weighing up the risk of clots against the risk of bleeding with thromboprophylaxis. For patients at high risk of bleeding, consider mechanical prophylaxis, which does reduce DVT rates by around 50% in surgical patients (no RCTs have been conducted in medical patients). A post-hoc analysis of MEDENOX data showed that early ambulation also reduced the likelihood of DVT by around 50%.[10]

Practical issues

Continuation of thromboprophylaxis after discharge is an important factor to consider, particularly in patients who have a short hospital stay, as the data from the studies mentioned are based on ≥7–10 days of thromboprophylaxis.

In order to make them easy to use, thromboprophylaxis guidelines should consist of an initial section to assess risk of VTE and mobility. A second section should allow an easy assessment of

bleeding risk; if the bleeding risk is high, consider compression stockings if no contraindications, otherwise, if bleeding risk is low, chart chemoprophylaxis, providing information on what to chart and how long for.

Valuable information to help with the identification of patients who are likely to obtain the greatest benefit from extended thromboprophylaxis comes from subgroup analyses of data from the EXCLAIM study, in which medical patients who had received 10 days of enoxaparin were randomly allocated to receive 28±4 days of additional enoxaparin or placebo.[11] The only subgroups of participants who experienced a benefit with extended thromboprophylaxis were: i) those confined to bed and ii) sedentary patients with bathroom privileges who also had one of the additional risk factors (advanced age, active cancer, VTE history).

Thromboprophylaxis uptake is not guaranteed just by providing the forms, etc. Getting compliance is quite a complex problem, as many individuals are involved (e.g. nurses/physiotherapists are appropriate for assessing mobility, but they do not chart thromboprophylaxis). Standardisation of risk assessment tools and protocols helps improve compliance. However, measures must also be put in place to ensure that prophylaxis is continued as patients move between departments, and that it is modified as necessary as the clinical status of the patient changes.

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VTE in orthopaedics and oral anticoagulants in VTE prevention – Waitemata DHB

Key evidence and update

Thromboprophylaxis in orthopaedic surgery

Dr David Simpson, Haematologist, North Shore Hospital

An analysis of data from North Shore hospital showed that around 200 of the 600 VTEs each year are orthopaedic related, with about 100 being within 12 weeks of orthopaedic surgery (unpublished data). Nearly one third of orthopaedic-related VTE events are PE, another third are distal DVT and most others are proximal DVT.

A meta-analysis of various agents for VTE prevention showed that all except aspirin reduced the risk of proximal venous thrombosis (risk differences 0.09–0.18; all p values <0.05).[1] Only low-molecular-weight heparin and stockings reduced the risk of PE, both with risk differences equal to 0.02. However, more recently oral drugs, e.g. rivaroxaban, have become available. Studies have demonstrated that providing longer courses of these agents provide superior protection against VTE than injectable agents, which are typically only given for shorter courses (see **Table 6**). The data suggest that 35 days of any thromboprophylactic agent is needed for the prevention of blood clots following hip arthroplasty, while a shorter duration (2 weeks) appears to be adequate following knee arthroplasty. Overall, there is a tendency for rivaroxaban to be associated with slightly lower VTE rates, with the added benefit of oral administration, making it particularly suitable for postdischarge thromboprophylaxis. From a haematologist's perspective, the recommended regimens are rivaroxaban 10mg for 14 and 35 days for knee and hip arthroplasty, respectively.

There are a few emerging issues: i) patients with a history of blood clot should probably receive 6 weeks of thromboprophylaxis, a duration not currently funded by Pharmac; ii) studies have not provided data on patients who undergo nonelective arthroplasty; iii) limited trial data for trauma and Achilles tendon rupture cases.

Table 6. Summary of studies comparing oral versus injectable agents

Study	Agents investigated	All thrombosis/ symptomatic VTE rates (%) (relative risk reductions)*	Major bleeding rates
After hip arthroplasty			
RECORD1[2]	Rivaroxaban 10mg OD vs. Enoxaparin 40mg OD (35d)	–2.6(70%)/–0.2	+0.2
RECORD2[3]	Rivaroxaban 10mg OD (31–39d) vs. Enoxaparin 40mg OD (10–14d)	–7.3(79%)/–1.0(80%)	0
RE-NOVATE[4]	Dabigatran 220mg vs. Enoxaparin 40mg (34d)	–0.7/+0.5	–0.3
	Dabigatran 150mg vs. Enoxaparin 40mg (34d)	+1.9/+0.5	–0.3
After hip arthroplasty			
RECORD3[5]	Rivaroxaban 10mg OD vs. Enoxaparin 40mg OD (10–14d)	–9.3(49%)/–1.3(66%)	+0.1
RECORD4[6]	Rivaroxaban 10mg OD vs. Enoxaparin 30mg BID (10–14d)	–2.4(31%)/–0.4	+0.4
RE-MODEL[7]	Dabigatran 220mg vs. Enoxaparin 40mg (6–10d)	–2.0/–1.1	+0.2
	Dabigatran 150mg vs. Enoxaparin 40mg (6–10d)	+2.0/–0.8	0

*Rate differences: oral vs. injectable

VTE prophylaxis: trauma and orthopaedic policy

Jodie Orchard, Trauma Nurse Specialist, North Shore Hospital

Sign off for the development of the VTE prophylaxis trauma and orthopaedic policy at North Shore Hospital was achieved in 2007, 2 years after the idea was proposed. Oral anticoagulants were incorporated during a regular review in 2010 when they were introduced, and sign off of the final policy was achieved in December 2010. The consultation required for the development of the policy involved input from orthopaedic surgeons, haematology department, pharmacy, cardiology, anaesthetics (pain service) and general medicine. Orthopaedic surgeons had anxieties around getting it right, as although they may not see the DVTs and PE, they do see the wound infections and their associated ongoing problems.

The final 'cascade' policy included the use of the assessment tool to determine risk to ensure any thromboprophylaxis received is appropriate. The recommended agents are enoxaparin for thromboprophylaxis in hospital for around 24–48 hours postsurgery, and rivaroxaban for subsequent thromboprophylaxis after discharge. Aspirin was included in the policy, but could only be considered for patients with very low risk. Aspirin also needs to be withheld in any patient who is receiving, or being considered for, anticoagulation with other agents. Rivaroxaban was chosen as the oral anticoagulant of choice to minimise risks. Administration around removal of epidural catheters was an issue that needed to be considered. The recommendation was to contact the pain team prior to commencing anticoagulation, and to ensure that catheters are not removed <18 hours after administration of the last rivaroxaban dose and that the next dose is not administered <6 hours after catheter removal.

Rivaroxaban at Waitemata DHB

Claire McGuinniety, Pharmacist, North Shore Hospital

The Waitemata DHB VTE prophylaxis protocol was updated and sent out for consultation in April 2010, 3 months after the first request for rivaroxaban was made. Sign-off of the updated protocol, which included approval for rivaroxaban use within the Waitemata DHB in orthopaedic inpatients following total hip or knee replacement surgery, occurred in December 2010 and this coincided with Pharmac funding of rivaroxaban under special authority following total hip or knee replacement surgery.

At the time of reporting, 30 patients at the Waitemata DHB had been prescribed the agent (18 inpatient and 18 outpatient prescriptions), a number of whom had needle phobia. There have also been a number of requests for off-licence use, with only 15 prescriptions for the approved indications. The indication was acute VTE in two patients. One of them had PE and heparin-induced thrombocytopenia, and received only one dose of rivaroxaban before being switched to fondaparinux. The other, who had a family member who worked for the drug's manufacturer, received the agent for DVT. Five patients received rivaroxaban prescriptions for overseas travel, four of whom had a history of DVT or PE. The orthopaedic service accounted for 17 prescriptions, with general surgery, medical and rehabilitation services each accounting for <5; 12 prescriptions at the outpatient pharmacy were from private practices. The cost of rivaroxaban is $10 per tablet at the Waitemata DHB, although half the prescriptions had a special authority number.

Among the 13 rivaroxaban recipients who underwent total knee replacement surgery, 8 received the Pharmac-approved duration of therapy (2 weeks), 3 with histories of DVT/PE (including one with a history of heparin-induced thrombocytopenia) received 6 weeks, 1 received 5 weeks, and another started 6 weeks, but was discharged on aspirin only.

Issues identified with rivaroxaban use within the Waitemata DHB include: i) education and awareness of the agent; ii) off-licence/off-formulary use; iii) getting special authority applications completed in time (Pharmac takes about 48 hours to approve an application); and iv) providing 6 weeks of treatment after total knee replacements in patients with a history of VTE.

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Updates from DHBs

Capital Coast

Dr Chris Cameron, Physician

The process of developing a VTE prophylaxis policy at Capital Coast DHB has been ongoing for 3 years. An audit in 2006/7 found: i) 50% adherence to the pre-existing protocol used in the gynaecological department, with many high-risk patients with malignancies not receiving low-molecular-weight heparin; and ii) 17% of orthopaedic patients were receiving low-molecular-weight heparin, with none prescribed postdischarge.

At the time of reporting, VTE prophylaxis guidelines had just been approved. There were difficulties getting everything on one form for all departments, so general surgery, orthopaedics, gynaecology, oncology/haematological and obstetrics each have their own form.

A 2010–2011 audit (prior to the introduction of the new guidelines) revealed that 55%, 56% 42% and 31% of medicine, obstetric, general surgery and orthopaedic patients, respectively, were receiving appropriate thromboprophylaxis, but the respective rates in high-risk patients were consistently lower at 21%, 36%, 10% and 0%. Possible factors to explain the low rates in high-risk patients that were considered included: i) a higher bleeding risk in these patients; ii) surgeons being concerned about bleeding; iii) anaesthetists concerned about spinal anaesthesia; and iv) patients not being informed about VTE risks.

Overall, progress is steadily ongoing, and phase II is about to be launched. Additional measures being developed include: i) an awareness campaign; ii) stickers for charts; iii) appointment of a clinical nurse champion; and iv) an information pamphlet to be handed to patients at admission. Ongoing concerns that have been identified are: i) whether aspirin should be discontinued in patients receiving the agent on admission when thromboprophylaxis is started; and ii) the effects of prescribing blood thinning agents to patients with hypertension/COPD.

Summary points

- High risk patients are missing out on thromboprophylaxis
- VTE prophylaxis guidelines recently approved
- Phase II to be launched shortly
- Some concerns still need to be addressed

Hawkes Bay

Johanna Lim, Clinical Pharmacist

The results of an audit presented at last year's forum showed that only 8.9%, 13.3% and 20.7% of medical, surgical and orthopaedic patients, respectively, received thromboprophylaxis according to the ACCP guidelines. Since then, the audit results have been presented at grand rounds to increase physician awareness. A VTE policy was developed and approved in November 2010, and this was followed by the launch of a 'Stop the Clot' campaign in late January 2011, which involved a stand outside the cafeteria to increase awareness among all the healthcare workers as well as patients and visitors. Overall, the interest from doctors, nurses and allied health professionals has been positive.

Two risk assessment forms were developed – one for medical patients and one for surgical/orthopaedic patients. At the time of reporting, the risk assessments had been implemented only on the cardiology ward, as other projects had recently been implemented on the other wards. The next ward in which implementation was planned was the general medical ward.

Two stickers were developed for the ward pharmacists, a larger one that gets attached to the patient notes, and a smaller sticker that gets put on the patient chart to remind doctors to consider thromboprophylaxis; however, there has been some confusion about where the larger sticker should be placed in the patient notes and this still needed to be resolved. Tags were developed and handed out to doctors to remind them about risk factors and contraindications to look out for, and a patient information leaflet was also developed.

The overall procedure involves:

1. risk assessment on admission for every patient, with the form completed by a doctor, nurse or pharmacist
2. placement of the sticker on the notes
3. sign off by whoever completed the assessment
4. administration of appropriate thromboprophylaxis.

A re-audit is planned for later in 2011.

Summary points

- Policy approved in November 2010
- Campaign launched in January 2011
- Formal risk assessment of all patients on cardiology ward has been implemented – other wards to follow
- Re-audit later in 2011

Waitemata

Elizabeth Brookbanks, Pharmacist

VTE prophylaxis at the Waitemata DHB was launched with a 'Stop the Clot' campaign in 2008, which was a multidisciplinary effort, and the introduction of a risk assessment tool. Since then, pharmacists were identified as most suitable to champion the campaign to increase awareness of VTE prophylaxis, as they have a great deal of interaction with other healthcare workers at the ideal opportunities. Pharmacists actively promote VTE prophylaxis in patients identified as at risk, and they have recorded 1334 interventions for enoxaparin from a total of 35,399 recorded interventions over the last year. Ensuring new staff members are trained in VTE prophylaxis is also important.

In the North Shore Hospital surgical wards, there have been dramatic increases in the use of enoxaparin 40mg syringes since the 'Stop the Clot' campaign, while use of the 20mg syringes has decreased, indicating not just greater overall use, but also more appropriate use. A similarly dramatic increase in the use of 40mg syringes has also been seen in the orthopaedic wards. During this time, the numbers of patients admitted to these wards have remained fairly constant. The number of patients admitted to medical wards at North Shore Hospital has increased by around 9% over this period, while the number of prescriptions for both syringes of enoxaparin has increased by around 45%, with the largest increase being for 40mg syringes. Similarly, enoxaparin prescriptions for patients admitted to medical wards in Waitakere Hospital and the assessment, treatment and rehabilitation services, which often end up with a number of medical patients, have also increased for both syringes.

Summary points

- Pharmacist identified as champions of VTE prophylaxis
- Enoxaparin prescriptions have increased since VTE prophylaxis campaign

Counties Manukau

Gordon Royle, Haematologist

Retrospective audit data have shown that the VTE prophylaxis compliance rate at Middlemore Hospital is low (~60% of patients had not received any form of prophylaxis), but this does help to provide valuable information on the situation prior to the introduction of VTE prophylaxis policies and protocols.

In Counties Manukau DHB, there are approximately 1225 hospital-related deaths per year. Historical autopsy data suggest that 5–10% of hospital deaths are VTE-related, equating to up to ~100 deaths annually. Alternatively, based on UK death certificate data, about 35 VTE-related deaths would be expected per year at Middlemore Hospital. The actual data show that among the 140 hospital-associated clots (including ≤3 months after discharge) seen per year, orthopaedic, nonorthopaedic surgery and general medical were each responsible for around one third. In surgical and orthopaedic patients, around half were PEs, and most of the rest were significant proximal DVTs. Assuming a 10% fatality rate for PEs, the expected number of deaths annually would be only 8. A likely reason for this discrepancy is that the 10% estimate for VTE-related hospital deaths is no longer accurate, probably because data used to calculate this estimate came from older papers, and practices have changed (e.g. earlier mobilisation following surgery). Using current guidelines, data suggest that thromboprophylaxis would be indicated in 8500 patients in the general medical wards at Middlemore Hospital, and this would result in the prevention of around 12 DVTs and 12 PEs (i.e. one fatal PE). This relatively low yield highlights the point of carefully targeting patients who are at the greatest risk. More orthopaedic and nonorthopaedic surgery patients are at risk (95% and 71%, respectively), so it is likely that thromboprophylaxis would prevent relatively more clots in these departments.

One initiative that has been implemented for all patients who present with a VTE following hospitalisation within the previous few months is to send a (polite) letter to those who were involved in their previous treatment. Although there have been some defensive responses, overall it seems to be working. The admission-to-discharge planner has also been changed to include a VTE risk assessment tool. Ongoing work includes incorporating the data gathered so far into a case-control study to compare VTE risk, eligibility for thromboprophylaxis and whether it was administered and what the dose was between patients in the general inpatient population and those who present to clinics with a clot.

Summary points

- Discrepancy between estimated and actual VTE-related deaths
- VTE prevention approach and effectiveness would vary between departments
- Ongoing case-control study

Ethnic differences

The audits conducted at Middlemore Hospital revealed lower VTE event rates among Māori and Polynesian populations compared with Europeans. It is not known why this is, but possible explanations put forward by various forum attendees included:

- thrombophilic disorders
- age, younger at hospitalisation
- genetic differences
- diagnostic bias (more asymptomatic patients being missed).

Lower BMI does not appear to be responsible, as few VTEs are seen in such patients.

VTE – a patient's perspective

Two case reports

Case 1: A 20-year-old woman underwent anterior cruciate ligament reconstruction in her left leg in the mid 1980s; she was otherwise healthy and receiving oral contraception. Postoperatively, she was on bedrest except for bathroom privileges and 2 hours each day on a continuous passive movement device. She was discharged 7 days postsurgery on crutches. Over the following days, her mother noticed that she was a bit 'spacey' and possibly short of breath. She presented to an emergency department with bilateral clots and only about two-thirds of her lungs fully functional. She received heparin via infusion and oxygen, and remained hospitalised for 6–7 days. She was then discharged on warfarin, which she continued for 6 months (with regular INR testing), and she recovered fully. 'Alarm bells' have gone off each time she has undergone subsequent procedures, and as a result receives vigilant attention under specialist care with enoxaparin administered beforehand. She has commented that she feels very fortunate to still be alive, but also wonders if any long-term effects that might reduce her life expectancy have occurred as a result.

Case 2: A man had undergone a ~2-hour total knee replacement in September 2010. Postoperatively, he received aspirin, foot pumps and 2 days of analgesia via an epidural catheter. He was on bedrest with bathroom privileges. On postoperative day 2, he collapsed after being assisted out of bed to exercise his knee. His oxygen saturation was low and he lost consciousness. Enoxaparin was started immediately, and a CT scan revealed four clots bilaterally. He was discharged on postoperative day 5 receiving enoxaparin and warfarin, with the latter continued for 6 months. However, he commented that he was a bit vague about what had happened, and had to rely on his partner to process much of the information provided. He also continued to experience severe pain after discharge due to the recent removal of his catheter. He was prescribed diclofenac and tramadol, which was then changed due to potential for a drug-drug interaction. He felt that the thrombosis nurse provided excellent support postdischarge, but he did not like injections and therefore found the regular INR checks unpleasant. He also felt that his recovery was inhibited by not being able to take anti-inflammatories initially, but he was eventually allowed to receive them with a concomitant proton-pump inhibitor. He made a complete recovery.

Issues identified by his partner included: i) not starting an oral antithrombotic agent due to epidural catheter; ii) lack of patient understanding of what was going on and having to rely on trust in the health professionals treating him; iii) no formal VTE risk assessment was undertaken, and the pre-emptive attitude of nurse during preoperative assessment; and iv) ongoing management issues for future procedures (including dental).

Comments: These two patients' accounts were narrated by a nonmedical presenter. The first case highlights the agony a patient suffered apart from the VTE itself: "will I survive this clot or what will be the long-term effect, even the life expectancy". The second case highlights VTE prevention in orthopaedic patients.

VTE prevention guidelines development – workshop

Discussions on guidelines have been ongoing for 3 years now, and the more it is investigated, the more complex it becomes. At this point, it is considered wise to use existing resources rather than 'reinventing the wheel'.

The Australia and New Zealand Working Party on the Management and Prevention of Venous Thromboembolism (including two members from NZ) published a Summary of Best Practice Recommendations (5th edition) in October 2010. On the whole, the Steering Committee members have been impressed with these recommendations, as it was felt that they cover a lot of basic questions. However, a couple of concerns have been raised about the flow chart for medical patients: i) 20mg for <50kg patients; and ii) no guide for overweight patients. The booklet containing the recommendations has been very widely disseminated in Australia and NZ, although it is still unknown how widely the recommendations are actually followed.

The need for further involvement from other stakeholders if guidelines are to be made national was raised, with any developments/changes discussed with a wider audience. It was proposed that the HQSC could use the information in the Australia and New Zealand Working Party booklet, and create or use the existing two flow charts for surgical and medical patients. Several attendees raised concerns about integrating the risk assessment and guidelines together up front, and that the focus should be on getting risk assessments done for now and allow individual hospitals to develop their own protocols for managing patients at risk. However, it was pointed out that something should also be developed on a national level for smaller institutions that may not have the resources or expertise to develop such protocols. It was also pointed out that national guidelines may help gain compliance among physicians who are not convinced about the value of thromboprophylaxis.

Take home points

- Much progress made since last year
- Steering Committee hopes to hand over guideline development to the HQSC (replaced the QIC last year), and assume a 'watchdog' role
- Experiences in the UK have provided valuable information
- NZ situation improving, but still suboptimal – a number of challenges and barriers still to be overcome
- Australia and NZ Working Party guideline booklet could be modified for the NZ setting
- Key stakeholders are now involved, and the future of VTE prevention in NZ looks bright

Steering Committee members, invited guests and other attendees – VTE prophylaxis policy and planning meeting

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