Blood Coagulation and Fibrinolysis, September 2014, vol./is. 25/6(571-576)

Abstract: Venous thromboembolism (VTE) is a common and important cause of death in hospital patients. We therefore investigated possible associations between the introduction of the compulsory national VTE risk assessment tool in England in 2010 and patient outcomes. A retrospective database study, using data from the Health and Social Care Information Centre and Office of National Statistics, was undertaken. The main outcome measures were VTE-related secondary diagnosis rates, 30-day and 90-day readmission rates and mortality rates. The observed mean VTE-related secondary diagnosis rate for 2011-2012 was 91% of the rate estimated from a linear regression model of the data for 2006-2007 to 2010-2011. Similarly, the observed mean 30-day VTE-related readmission rate for 2011 was 96% of the estimated rate and the observed mean 90-day VTE-related readmission rate for 2011 was 96% of the estimated rate. The observed annual VTE-related national mortality rate was 91% of the estimated rate for 2011 and 92% of the estimated rate for 2012. This study shows a reduction in VTE-related secondary diagnoses and readmissions among adults admitted to hospital, and a reduction in VTE-related population mortality, since the introduction of a national VTE risk assessment screening tool in England. Despite some study limitations, this suggests that the concerted effort made by NHS England to improve prevention of hospital-acquired VTE has been successful.
External validation of the risk assessment model of the international medical prevention registry on venous thromboembolism (IMPROVE) for medical patients in a tertiary health system, Rosenberg D.; Eichorn A
Journal of the American Heart Association, 2014, vol./is. 3/6

Abstract: Background-Hospitalized medical patients are at risk for venous thromboembolism (VTE). Universal application of pharmacological thromboprophylaxis has the potential to place a large number of patients at increased bleeding risk. In this study, we aimed to externally validate the International Medical Prevention Registry on Venous Thromboembolism (IMPROVE) VTE risk assessment model in a hospitalized general medical population. Methods and Results-We identified medical discharges that met the IMPROVE protocol. Cases were defined as hospital-acquired VTE and confirmed by diagnostic study within 90 days of index hospitalization; matched controls were also identified. Risk factors for VTE were based on the IMPROVE risk assessment model (aged >60 years, prior VTE, intensive care unit or coronary care unit stay, lower limb paralysis, immobility, known thrombophilia, and cancer) and were measured and assessed. A total of 19,217 patients met the inclusion criteria. The overall VTE event rate was 0.7%. The IMPROVE risk assessment model identified 2 groups of the cohort by VTE incidence rate: The low-risk group had a VTE event rate of 0.42 (95% CI 0.31 to 0.53), corresponding to a score of 0 to 2, and the at-risk group had a VTE event rate of 1.29 (95% CI 1.01 to 1.57), corresponding to a score of >3. Low-risk status for VTE encompassed 68% of the patient cohort. The area under the receiver operating characteristic curve was 0.702, which was in line with the derivation cohort findings. Conclusions-The IMPROVE VTE risk assessment model validation cohort revealed good discrimination and calibration for both the overall VTE risk model and the identification of low-risk and at-risk medical patient groups, using a risk score of >3. More than two thirds of the entire cohort had a score <2.

Venous thromboembolism (VTE) risk assessment and prophylaxis: A comprehensive systematic review of the facilitators and barriers to healthcare worker compliance with clinical practice guidelines in the acute care setting, Young A
JBI Database of Systematic Reviews and Implementation Reports, 2012, vol./is. 10/57(3812-3893)

Abstract: Background: Even though guidelines for venous thromboembolism risk assessment and prophylaxis are available, patients with identifiable risk factors admitted to acute hospitals are not receiving appropriate prophylaxis. The incidence of venous thromboembolism in hospitalized patients is higher than that of people living in the community who have similar demographics. Knowledge of barriers to healthcare professional compliance with clinical practice guidelines and facilitators to improve compliance will aid appropriate use of venous thromboembolism clinical practice guidelines. Objectives: The main objective of this review was to identify the barriers and facilitators to healthcare professional compliance with clinical practice guidelines for venous thromboembolism assessment and prophylaxis. Studies were considered for inclusion regardless of the designation of the healthcare professional involved in the acute care setting. Focus of the review: The focus of the review was compliance with venous thromboembolism clinical practice guidelines and identified facilitators and barriers to clinical use of these guidelines. Results: Twenty studies were included in the review. Reported compliance at baseline ranged from 6.25% to 70.4% and compliance postintervention ranged from 36% to 100%. Eight main categories of barriers and nine main categories of facilitators were identified. The studies all had components of education involved in their intervention and the review found that passive dissemination or one mode of intervention was not enough to affect and sustain change in clinical practice. Conclusions: This review identified 20 studies that assessed compliance with venous thromboembolism clinical practice guidelines, and identified barriers and facilitators to that compliance. The studies showed that many different forms of intervention can improve compliance with clinical practice guidelines. They provided evidence that interventions can be developed for the specific audience and setting they are being used for, and that not all interventions are appropriate for all areas, such as computer applications not being suitable where system capacity is lacking. Implications for practice: Healthcare professionals need to be aware of venous thromboembolism clinical practice guidelines and improve patient outcomes by using them in the hospital setting. There are a number of interventions that can improve guideline compliance, keeping in mind the barriers and adjusting practice to avoid them. Implications for research: Venous thromboembolism compliance within rural Australian hospitals has not been determined, however as inequalities have been identified in other areas of healthcare between urban and rural regions this would be a logical area to research.
Further evidence of the very low risk of subclinical deep venous thrombosis among patients with haemophilia undergoing major orthopedic surgery, Hermans C. Haemophilia, May 2014, vol./is. 20/(62)

Abstract: Deep venous thrombosis (DVT) is a common postoperative complication in patients undergoing major orthopedic surgery of the lower limbs, such as total hip replacement (THR), total knee replacement (TKR), or hip fracture surgery (HFS). In the absence of thromboprophylaxis, subclinical venous thrombosis rates as high as 60% have been reported when using systematic bilateral phlebography after orthopaedic surgery. As a result, routine pharmacological thromboprophylaxis with low-molecular-weight heparin or a new oral anticoagulant agent is strongly recommended in patients undergoing these procedures. With the availability of efficient and safe clotting factor concentrates, THR, TKR, as well as ankle arthrodesis are frequently performed in subjects with hemophilia suffering from chronic hemophilic arthropathy. Yet, pharmacological prophylaxis of venous thrombembolism (VTE) in this patient group remains controversial. With the exception of retrospective case reports and small series, the incidence of VTE disease in hemophilic patients after major orthopaedic surgery is still unclear. Materials and Methods: In 2002, we initiated a prospective study in order to evaluate by systematic US-Doppler imaging the incidence of subclinical deep venous thrombosis (DVT) in consecutive hemophilic patients referred to our centre for major orthopedic surgery. In 2010, we reported that three out of 22 patients undergoing 29 major orthopedic surgeries developed subclinical distal DVT. The overall incidence of DVT of 10% found in our study was significantly lower than that reported in nonhemophilic patients. The study has been prospectively continued and has until September, 2013 included 36 different patients (32 HA, 4HB) undergoing 47 major orthopedic procedures of the lower limbs. Most were treated with continuous infusion of clotting concentrates and all did not receive antithrombotic pharmacological prophylaxis. Results: This follow-up study did not reveal any new case of clinical and subclinical of DVT screened by bilateral US-doppler of the lower limbs. The overall incidence of DVT recalculated on the whole population is 6%. Conclusions: These data provide additional evidence that the risk of DVT following major orthopedic surgery among patients with hemophilia is very low and that systematic pharmacological thromboprophylaxis in this specific population is, for most patients, not required.

Thrombosis and cancer, Young A.; Chapman O. Nature Reviews Clinical Oncology, August 2012, vol./is. 9/8(437-449)

Abstract: Venous thromboembolism (VTE) is a potentially life-threatening condition that can be associated with significant morbidity. Thrombosis and cancer are linked by numerous pathophysiological mechanisms; the frequency of VTE and the recurrence rate are increased in the cancer population in comparison with other patient groups. VTE is the second most common cause of death in patients with cancer, but can also be the initial presenting complaint in patients with an occult malignancy. Risk factors for cancer-related VTE include tumour type, surgery, chemotherapy and the use of central venous catheters; predictors of VTE for individuals are only now beginning to emerge. Patients with cancer who develop symptomatic VTE during chemotherapy are at a greater risk of early mortality than those without VTE. The apparent impact of VTE on early mortality in patients with cancer raises the question of whether anticoagulation might improve long-term survival in this population, by direct tumour biology-modifying mechanisms. There are widely published guidelines that highlight the benefits of effective VTE strategies in patients with cancer. In partnership with the patient and their carers, the clinical team can improve patient outcomes with optimal risk assessment and concordance with national and international guidelines in the prophylaxis and treatment of VTE.

A study of compliance with the protocol for thromboembolic prophylaxis in a university hospital, Mort J.E.; Daw K. British Journal of Oral and Maxillofacial Surgery, June 2011, vol./is. 49/(S84-S85)

Abstract: In 2010 NICE published its guidelines on reducing the risk of venous thromboembolism (VTE including deep vein thrombosis and pulmonary embolism) in patients admitted to hospital. A trust risk assessment form was introduced and all in-patients mandatorily risk assessed for VTE within 24 h of admission. We present the initial findings of a study looking at compliance of risk assessment and prophylaxis for adult in-patients in the maxillofacial unit at a university hospital, in accordance with the NICE recommendations. Method: 67 adult patients, admitted in a single month, were included in the study and their case notes audited. These parameters were checked against the gold standard: (1) risk assessment completed (within 24 h), (2) risk factors for VTE identified and (3) appropriate VTE prophylaxis regime implemented. Following the 1st cycle changes were implemented to improve compliance. A 2nd cycle was then completed using approximately the same number of patients and the results compared. In the first cycle compliance was poor. Three simple interventions were introduced over a month period, which vastly improved most of the parameters measured. We discuss these interventions and the need to monitor compliance in maxillofacial units. Clinical relevance: According to the American College of Chest Physicians 2004, "pulmonary embolus is the most preventable cause of hospital death and the number one strategy to improve patient safety in hospitals". Simple interventions can improve compliance with evidence based local protocols, which if implemented fully will have a significant impact on patient outcomes.
An audit of hospital-acquired venous thromboembolism (HAT) rates according to medical specialty, at the Great Western Hospital, Swindon, Swan D.; Rhodes S
British Journal of Haematology, 2012, vol./is. 157/(37)
Abstract: Hospital acquired venous thromboembolism (HAT) represents a major source of potentially avoidable mortality and morbidity Worldwide. NICE have provided guidance on reducing venous thrombo-embolism (VTE) risk by assessing patients on admission to hospital, after 24 hours and whenever the clinical situation changes. In this audit, we reviewed all 65 cases of HAT that were identified between June and December, 2010, to see whether patients had been appropriately VTE risk assessed, and whether rates of HAT varied significantly between specialties (general surgery, trauma and orthopaedics (T&O), medicine, obstetrics and gynaecology, day surgery and day orthopaedics). Overall, 92.3% had an initial VTE risk assessment, but only 25.9% were reassessed after 24 hours, and only 31% were reassessed every 72 hours. Assessments were correct in 87.7%, and pharmacological prophylaxis was prescribed unless contraindicated in 89.7%. Rates of HAT were similar throughout the specialties, with the exception of T&O, which was significantly greater. Initial assessment was poorer in this group (88.9%), but 100% received pharmacological prophylaxis. Surprisingly, the HAT rate was not significantly less for day surgery patients than general surgery ones despite an average hospital stay of 1 day compared with 12.2 days. The percentage of HAT was actually higher in the day surgery group. These patients were the least accurately assessed, with 50% being incorrectly placed in the low risk group, and therefore not given pharmacological prophylaxis on discharge. This audit has shown the need to improve reassessment, which was consistently poor. T&O patients had the highest risk of HAT, despite prophylaxis, and day surgery conferred a greater than expected risk, possibly partly attributable to inaccurate assessment and consequent inadequate prophylaxis.

Practical management of rivaroxaban for the treatment of venous thromboembolism, Imberti D
Clinical and Applied Thrombosis/Hemostasis, May 2015, vol./is. 21/4(309-318)
Abstract: Traditional anticoagulants, such as low-molecular-weight heparin and vitamin K antagonists, have been the mainstay for the treatment of venous thromboembolism (VTE) in the hospital setting and after discharge. These anticoagulants are effective but are associated with some limitations that may lead to their underuse. Based on the results of the EINSTEIN clinical trial program, the oral, direct factor Xa inhibitor rivaroxaban is approved for the treatment of acute deep vein thrombosis (DVT) and pulmonary embolism (PE) and for the prevention of recurrent VTE. The single-drug approach with rivaroxaban is now available in both the hospital and the outpatient settings and may overcome some of the limitations of traditional agents. This review provides hospital physicians with an overview of the practical management of rivaroxaban and a critical evaluation of its use for the treatment of DVT and PE, including in specific clinical settings and special patient populations.

New developments in pediatric venous thromboembolism and anticoagulation, including the target-specific oral anticoagulants, Lyle C.A.; Sidonio R.F
Current Opinion in Pediatrics, February 2015, vol./is. 27/1(18-25)
PURPOSE OF REVIEW: Pediatric venous thromboembolism (VTE) can affect children of all ages, requiring considerable pharmacologic intervention and is often associated with significant morbidity. Current research efforts are directed toward the development of risk-stratified VTE prevention strategies employing pharmacologic thromboprophylaxis, the optimization of conventional anticoagulation, and the investigation of the safety and efficacy of target-specific oral anticoagulants (TSOACs) in children. RECENT FINDINGS: Recent research has considerably improved the understanding of risk factors of hospital-acquired VTE and how these factors may be employed in risk-stratified paradigms for VTE prevention in children. Additional insight has been gained in the optimization of conventional anticoagulants in special populations such as neonates and children with inflammatory conditions, and in improving the overall safety and compliance with periprocedural anticoagulation and the use of home International Normalized Ratio monitoring. Furthermore, the use of TSOACs has been described in children and is the focus of numerous ongoing clinical trials that are evaluating the safety and efficacy of these agents in children with VTE. SUMMARY: Identification of hospital-acquired VTE risk factors may inform pediatric VTE prevention strategies. Although initial use of TSOACs may be promising, investigation of safety and efficacy in children is still underway.
appropriate thromboprophylaxis. * We aimed to compare current practices employed in this hospital to the recommendations outlined in the latest NICE clinical guidelines. * We wish to recommend methods of improving doctor compliance with prescription of prophylactic therapies. Methodology: * All general surgical inpatients in Sligo Regional Hospital were assessed on the basis of a hospital chart, drug kardex and clinical review on a single date in November 2013. * A pro forma based on NICE Clinical Guidelines 92, "Venous thromboembolism; reducing the risk", Jan 2010, was used as the auditing tool. * Risk factors for VTE and bleeding, outlined in Table 1, were included. The date of initiation of pharmacological and/or mechanical treatment was noted as well as the dose of pharmacological VTE prophylaxis. Results: * The average age of the 33 patients included in this study was 66-years-old; with ages ranging from 35 to 92 years. * All patients were assessed for VTE/bleeding risk. 30 % of patients had at least one risk factor for bleeding and 100 % had at least one risk factor for VTE. * 38 % of patients were classified as high risk for VTE, with the remainder being of moderate risk. * VTE prophylaxis was given appropriately to 72 % of patients. * Of the patients provided with appropriate thromboprophylaxis, 38 % had no prophylactic cover for 24 h or more due to delayed prescription. * The dosing was not always appropriate. * 28 % of patients were in receipt of inappropriate prophylaxis, with almost half of this cohort receiving no prophylactic therapy whatsoever. Conclusion: * Despite long-standing recognition of the risk of VTE in surgical patients, venous thromboprophylaxis remains underutilized. * Passive dissemination of guidelines alone is unlikely to improve VTE prophylaxis practice. * A number of active strategies are required, such as a specialised segment on the drug kardex, clinician education workshops and frequent auditing. * We suggest that all drug kardexes remain invalid until a VTE risk assessment has been conducted and appropriate prophylactic cover prescribed by the relevant member of the treating team. This would ensure that at-risk patients receive appropriate care with the added benefits of shorter hospital stays and reduced overall cost.

Venous thromboembolism prophylaxis: Differences in practice patterns in two institutions within a single health system, Kulkarni N.; Koller S. Annals of Surgical Oncology, February 2015, vol./is. 22/1 SUPPL. 1(S139)

INTRODUCTION: Venous thromboembolism (VTE) is a major cause of preventable death in hospitalized patients. The American College of Chest Physicians (ACCP) and National Comprehensive Cancer Network (NCCN) guidelines for patients with major abdominopelvic surgery, especially with cancer recommend undergoing extended post discharge VTE prophylaxis for four weeks. We sought to look at practice patterns with the use of perioperative VTE prophylaxis in two institutions, an NCI designated cancer center (Hospital 1), and an academic hospital and level one trauma center (Hospital 2). An IRB approved electronic survey was sent to surgeons of all specialties at both institutions querying the use of pre and post-operative thromboprophylaxis, concerns, awareness of the ACCP/NCCN guidelines and adherence to them in the post-operative setting, and results were compared. RESULTS: Surgeon response was 100% (26/26) in Hospital 1 and 41% (47/115) in Hospital 2. All surgeons in Hospital 1 were multispecialty oncologic surgeons, while hospital 2 consisted of surgeons from varied subspecialties. Post-operative DVT chemoprophylaxis was used by 96.1% surgeons at Hospital 1, which was significantly more than 78.2% surgeons at hospital 2. Only 56% surgeons at Hospital 1 and 39% at Hospital 2 acknowledged using preoperative DVT chemoprophylaxis with major concerns including intra and postoperative bleeding complications. When queried about their awareness of guidelines 96% surgeons in Hospital 1 expressed awareness, compared to only 60% in Hospital 2. Nonetheless, only 32% surgeons in Hospital 1 and 40% in Hospital 2 actually follow the guidelines. About 70% surgeons in hospital 1 and 75% in hospital 2 expressed the willingness to follow these guidelines in the future. CONCLUSIONS: Disparities between awareness of current guidelines and practice patterns can be explained in part by the difference in the population of patients and subspecialties in the two institutions. However there needs to be a concerted effort to adhere to national performance initiatives and standardize approaches for perioperative VTE prophylaxis.
New oral anticoagulants in the treatment of heparin-induced thrombocytopenia, Bay C.; Vajo Z
Thrombosis Research, April 2015, vol./is. 135/4(607-609)

Heparin induced thrombocytopenia (HIT) is a potentially catastrophic syndrome with a high incidence of vascular thrombosis. There are little data on the efficacy of new oral anticoagulants (NOAC) in this setting. This study reports on the outcome of patients with HIT, treated with NOAC. Materials and Methods: We retrospectively identified 22 patients with HIT who were treated by our group with a combination of NOAC and a short course of argatroban. These patients were evaluated in a prospective fashion for development of outcomes at a mean follow up of 19 +/- 3 months. Results: There were a total of 5 deep and 2 superficial vein thromboses diagnosed at index hospitalization. No patient developed arterial thrombosis. All patients tolerated NOAC and their platelet count normalized before discharge. At 19 months of follow-up, 6 patients had died of non-thrombotic causes. There was no bleeding, limb loss or recurrent venous thromboembolism in any patient. Conclusions: In patients with HIT, a short course of parenteral treatment with argatroban followed by administration of a NOAC is highly safe and effective in prevention of thrombosis and normalization of platelet count. Development of HIT however, portends a poor prognosis independent of vascular thrombosis.

Antifactor Xa monitoring in patients on IV unfractionated heparin, John S.M.; Lisi D
U.S. Pharmacist, 2015, vol./is. 40/3

Although the introduction of newer anticoagulants has revolutionized the treatment of venous thromboembolism, IV unfractionated heparin (UFH) continues to be widely prescribed in hospitalized patients because of its pharmacokinetic profile. The activated partial thromboplastin time (aPTT) test has been used to monitor outcomes in patients receiving UFH, but significant issues, such as varying aPTT reagents, instrumentation procedures, and interpatient variability, are associated with the test. Antifactor Xa monitoring of patients on continuous IV UFH may better correlate with heparin concentrations, determine therapeutic ranges for aPTT, and result in fewer testing procedures for patients and personnel. Despite the introduction of newer anticoagulants, IV unfractionated heparin (UFH) is one of the most commonly used parenteral anticoagulants for preventing and treating venous thromboembolism (VTE). The activated partial thromboplastin time (aPTT) test has been used to monitor outcomes inpatients receiving UFH, but it has been associated with significant problems, such as varying aPTT reagents, instrumentation procedures, and interpatient variability.1,2 The monitoring of antifactor Xa in patients on continuous IV UFH is being considered by some institutions.

Venous thromboembolism during hip plaster cast immobilisation: Review of the literature, Struijk-Mulder M.C.
Netherlands Journal of Medicine, January 2014, vol./is. 72/1(17-19)

Abstract: Introduction: There is a paucity of data regarding the risk of deep vein thrombosis during hip plaster cast immobilisation. The purpose of this article was to review the available evidence regarding the incidence of symptomatic venous thromboembolism (VTE) during hip plaster cast immobilisation. Methods and Materials: All papers describing hip plaster cast immobilisation published in the English literature retrieved from PubMed, EMBASE and the Cochrane database were reviewed. Articles regarding children, hip dysplasia, congenital hip dislocation and Legg-Calve-Perthes were excluded. A total of three papers were available for analysis. We also describe a case of pulmonary embolism during hip cast immobilisation. Results: The overall incidence of symptomatic VTE during hip plaster cast immobilisation was 0% in 343 patients. The incidence of symptomatic VTE in hip cast brace was 2.3% (range 0-3%). Discussion: Our systematic review of the literature showed a paucity of data regarding the incidence of VTE during hip plaster cast immobilisation. We describe the first case of pulmonary embolism during hip plaster cast immobilisation. We recommend that patients who are fitted with a hip plaster cast should be routinely screened for additional risk factors. When risk factors are present, patients should be considered for pharmacological thromboprophylaxis.
Infection type and severity are risk factors for hospital-acquired venous thromboembolism in medical inpatients, Merrill S. Circulation, 2015, vol. /is. 131

Hospital-acquired venous thromboembolism (HAVTE) leads to increased length of stay, cost, morbidity, and is a target of government quality measures. How infection relates to HAVTE risk is unknown. We wished to identify infection-related risk factors for HAVTE to help identify at-risk patients and to guide prevention efforts. Hypothesis: We hypothesized that increased infection severity, affected organ system, and positive microbiology culture results were associated with HAVTE in medical inpatients. Methods: HAVTE between 2009-2012 were identified by ICD-9 codes with confirmatory imaging at a 500 bed teaching hospital. ICD-9 codes, microbiology results, lab and vital sign data, and medication records were used to classify infections as presented in the Table. Logistic regression was used to determine odds ratios (OR) and 95% confidence intervals (CI) for HAVTE adjusting for known HAVTE risk factors in the MITH score, a previously developed HAVTE risk score for medical inpatients. Results: In 20,327 medical admissions there were 113 hospital-acquired HAVTE (incidence: 0.56%). Septic shock (OR 7.48), sepsis (OR 5.9), and MSSA culture isolate(OR 6.39) had the greatest point-estimates of HAVTE after adjusting for known HAVTE risk factors. Conclusions: Infection severity, affected organ system, and microbiology were risk factors for HAVTE after adjusting for known risk factors. The relationship between these risk factors and thrombosis is likely complex, but these risk factors are easily measureable using the electronic health record. These results may help facilitate HAVTE prevention by further identifying high risk patients.

Multicentric study evaluating venous thrombosis among patients with haemophilia undergoing major orthopaedic surgery, Hermans C.R.; Lambert C. Blood, December 2014, vol./is. 124/21

Abstract: Deep venous thrombosis (DVT) is a common postoperative complication in patients undergoing major orthopaedic surgery of the lower limbs, such as total hip replacement (THR), total knee replacement (TKR), or hip fracture surgery (HFS). In the absence of thromboprophylaxis, subclinical venous thrombosis rates as high as 60% have been reported when using systematic bilateral phlebography after orthopaedic surgery. As a result, routine pharmacological thromboprophylaxis with low-molecular-weight heparin (LMWH) or a new oral anticoagulant agent is strongly recommended in patients undergoing these procedures. With the availability of efficient and safe clotting factor concentrates, THR, TKR, as well as ankle arthrodesis are frequently performed in subjects with haemophilia suffering from chronic haemophilic arthropathy. Yet, pharmacological prophylaxis of venous thromboembolism (VTE) in this patient group remains controversial. With the exception of retrospective case reports and small series, the incidence of VTE disease in haemophilic patients after major orthopaedic surgery is still unclear. Surveys suggest that more than half of hemophilia treatment centers in the United States and Europe use thromboprophylaxis in patients with haemophilia (PWH) who require major orthopedic surgery. However, this is not supported by evidence or surgical practice guidelines, and simply increases the risk of bleeding in such patients. Given the aging nature of the haemophilia population and the incidence of joint disease, the question of the thrombotic risk associated with major orthopaedic surgery and joint replacement surgery in particular is highly relevant. We here report the results of 2 parallel and independent prospective studies from Belgium and Norway currently evaluating by systematic US-Doppler imaging the incidence of subclinical deep venous thrombosis in consecutive haemophilic patients referred for major orthopaedic surgery. In Belgium, the study has so far included 36 different patients (32 HA, 4HB) undergoing 50 major orthopaedic procedures of the lower limbs. In Norway, the study has involved 29 patients (26 HA, 3 HB, all with severe haemophilia) undergoing 29 orthopaedic procedures, most of the lower limbs. In both countries, most patients were treated with continuous infusion of clotting factor concentrates and none of them did receive antithrombotic pharmacological prophylaxis. In the 2 studies that included in total 65 patients undergoing 79 major orthopaedic procedures, no case of clinically patent DVT or PE was detected (Table 1). In total there were 5 cases of DVT evidenced by US imaging which were all distal, not complicated by PE and treated with a short course of low-molecular weight heparin in most cases. The overall incidence of subclinical DVT calculated on the whole population was 6%. In conclusion, these data provide for the first time multicentric and imaging-based evidence that the risk of DVT following major orthopaedic surgery among patients with haemophilia undergoing major orthopaedic surgery is very low and that systematic pharmacological thromboprophylaxis in this specific population is for most patients not required.
**Thromboprophylaxis: Striking a balance between undertreatment and over-treatment**, Rajapakse S.  
International Journal of Clinical Practice, January 2015, vol./is. 69/1(4-5)  
**Abstract:** Venous thromboembolism (VTE) is an important cause of morbidity and mortality among patients admitted to hospital. Pulmonary embolism results in 5-10% of deaths, and is the commonest cause of preventable deaths in hospitalised patients (1,2). In addition, considerable morbidity results from VTE, such as post-thrombotic syndrome and chronic thromboembolic pulmonary hypertension. The economic burden resulting from VTE and its complications is high.

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**Rivaroxaban-a bleeding problem?** Owen E.; Roberts A.  
Anaesthesia, January 2015, vol./is. 70/(25)  
**Abstract:** Oral direct factor Xa inhibitors such as rivaroxaban are increasingly widely used. Rivaroxaban is approved by NICE for a variety of indications including the treatment and prevention of venous thromboembolism, and prevention of stroke in patients with atrial fibrillation (AF). In contrast to warfarin, dose adjustment and monitoring are not required, making anticoagulant treatment less disruptive for patients. However standard coagulation tests do not correlate with the degree of anticoagulation and there is to date little clinical experience in the reversal of anticoagulation if complications occur. Description An 82-year-old woman presented with an upper gastrointestinal bleed after recently starting rivaroxaban for stroke prevention in AF. Her past medical history included Parkinson’s disease, hypertension and heart failure, and she had been an inpatient in a rehabilitation hospital for the past month following falls. Following multiple episodes of haematemesis, she was in hypovolaemic shock with initial blood tests showing Hb 37 g.l⁻¹, thrombocytopenia and deranged PT and APTT. Bleeding was profuse per rectum with oozing from all sites of venepuncture. Surgery was considered but not felt to be survivable with the degree of coagulopathy and patient comorbidities. Resuscitation and correction of coagulopathy was attempted, in order to allow endoscopy. The patient received 14 units RBC, 16 units FFP, two platelets, 4 g fibrinogen and 4000 units of prothrombin complex concentrate (PCC). Endoscopy was then performed which showed a large duodenal ulcer (D1), which was injected with adrenaline. Treatment continued with a proton pump inhibitor, but a fatal rebleed occurred 36 h later. The adverse drug reaction was reported to the Medicines and Healthcare products Regulatory Agency. Discussion This case demonstrates the complexity of treating a patient on rivaroxaban if a life threatening bleeding episode occurs. There is no specific antidote, but correction of PT with 50 units.kg⁻¹.PCC has been demonstrated in 20 healthy volunteers [1]. PCC, APCC and rFVIIa should be considered for ongoing life-threatening bleeding [2]. Algorithms have recently been developed for patients bleeding on newer oral anticoagulants, and these may help guide the treatment of patients in the future [3]. Although rivaroxaban and other direct factor Xa inhibitors have many advantages for patients, reversal of anticoagulation for life-threatening bleeding or emergency surgery poses significant challenges for the anaesthetist.

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**Thromboprophylaxis for medical patients with cancer: What do the guidelines say?** Ihadaddene R.; Carrier M.  
Clinical Practice, 2014, vol./is. 11/2(155-168)  
**Abstract:** Venous thromboembolism (VTE) is frequent in cancer patients and is one of the leading causes of death in this population. Hospitalized cancer patients and those receiving chemotherapy are at the greatest risk of developing VTE. Many randomized controlled trials in a variety of patient populations have demonstrated that primary prophylaxis is effective in reducing the risk of VTE among cancer patients. Pharmacological thromboprophylaxis is recommended in all hospitalized medically ill cancer patients without a contraindication to anticoagulant therapy. Thromboprophylaxis in ambulatory patients undergoing chemotherapy is only considered in those at high risk of VTE. In this article, we evaluate the different clinical practice guideline recommendations for primary VTE prophylaxis in hospitalized medically ill patients with cancer and ambulatory patients undergoing chemotherapy.


**Improving the use of thromboprophylaxis in hospitalized medical patients: A retrospective-prospective assessment through the Padua Prediction Score, Marrone E.**

*Thrombosis Research, November 2014, vol./is. 134/(S67)*

**Abstract:** Introduction: Venous thromboembolism (VTE) occurs frequently in at risk hospitalized medical patients. Pharmacological thromboprophylaxis (PhT) in these patients is largely underused. Patients and methods: We evaluated the use of PhT in patients admitted to an Internal Medicine Department (Umberto I Hospital, Nocera Inferiore, Italy), comparing a retrospective cohort of 116 patients (64 men, 52 women; mean age 68.99+/−17.12 years), admitted between July and September 2012, and 180 patients (90 men, 90 women; mean age 68.4+/−15.1 years) prospectively evaluated between October 2012 and March 2013, who received PhT according to the Padua Prediction Score (PPS >4), unless exceeding bleeding risk. Exclusion criteria were current anticoagulant treatment, severe anemia (Hb <8g/dl) and glomerular flow rate <30 ml/min. Results: In the retrospective cohort, 55/116 (47%) received PhT, including 4/20 (20%) of low-risk patients (PPS<4) and only 51/96 (53%) of those at high VTE risk (PPS >4). Among high VTE risk patients not receiving PhT, a concomitant high bleeding risk was detectable only in 19 (42%). In the prospective cohort, the average PPS was 4.65+/−2.19, being 128 patients (71%) classified at high VTE risk. Among the latter, PhT was adopted in 93 patients (73%), the remaining (35/128, 27%) being excluded because of bleeding risk. Three VTE complications (1 deep vein and 2 superficial vein thrombosis; 2 in patients not receiving PhT, of whom 1 with PPS >4) and 2 bleeding events (both in patients not receiving PhT) were reported in the retrospective cohort. One prospective patient (receiving PhT) experienced a superficial vein thrombosis while 5 bleeding events occurred (3 in patients not receiving PhT). Conclusions: The application of PPS is helpful for improving the appropriate use of PhT in hospitalized medical patient with high VTE risk. The low rate of VTE complications in this relatively small study population hampers definite conclusions concerning the impact on prevention of such adverse events.

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**Venous thromboembolism after total joint arthroplasty: Results from a Japanese multicenter cohort study, Migita K.**

*Arthritis Research and Therapy, July 2014, vol./is. 16/4, 1478-6354;*

**Abstract:** Introduction: Real-world evidence of the effectiveness of pharmacological thromboprophylaxis for venous thromboembolism (VTE) is limited. Our objective was to assess the effectiveness and safety of thromboprophylactic regimens in Japanese patients undergoing joint replacement in a real-world setting. Method: Overall, 1,294 patients (1,073 females and 221 males) who underwent total knee arthroplasty (TKA) and 868 patients (740 females and 128 males) who underwent total hip arthroplasty (THA) in 34 Japanese national hospital organization (NHO) hospitals were enrolled. The primary efficacy outcome was the incidence of deep vein thrombosis (DVT) detected by mandatory bilateral ultrasonography up to post-operative day (POD) 10 and pulmonary embolism (PE) up to POD28. The main safety outcomes were bleeding (major or minor) and death from any cause up to POD28. Results: Patients undergoing TKA (n = 1,294) received fondaparinux (n = 360), enoxaparin (n = 223), unfractionated heparin (n = 72), anti-platelet agents (n = 45), or no medication (n = 594). Patients undergoing THA (n = 868) received fondaparinux (n = 261), enoxaparin (n = 148), unfractionated heparin (n = 32), anti-platelet agents (n = 44), or no medication (n = 383). The incidence rates of sonographically diagnosed DVTs up to POD10 were 24.3% in patients undergoing TKA and 12.6% in patients undergoing THA, and the incidence rates of major bleeding up to POD28 were 1.2% and 2.3%, respectively. Neither fatal bleeding nor fatal pulmonary embolism occurred. Significant risk factors for postoperative VTE identified by multivariate analysis included gender (female) in both TKA and THA groups and use of a foot pump in the TKA group. Only prophylaxis with fondaparinux reduced the occurrence of VTE significantly in both groups. Propensity score matching analysis (fondaparinux versus enoxaparin) showed that the incidence of DVT was lower (relative risk 0.70, 95% confidence interval (CI) 0.58 to 0.85, P = 0.002 in TKA and relative risk 0.73, 95% CI 0.53 to 0.99, P = 0.134 in THA) but that the incidence of major bleeding was higher in the fondaparinux than in the enoxaparin group (3.4% versus 0.5%, P = 0.062 in TKA and 4.9% versus 0%, P = 0.022 in THA). Conclusions: These findings indicate that prophylaxis with fondaparinux, not enoxaparin, reduces the risk of DVT but increases bleeding tendency in patients undergoing TKA and THA.

The prevalence of venous thromboembolism (VTE) is on the rise in critically sick hospitalized children. It is one of the most common hospital acquired complications (HAC) and Joint Commission for Accreditation for Hospitals has mandated to develop institutional guidelines to prevent VTE. It is recommended to use pharmacologic thromboprophylaxis (PTP), the most effective intervention for VTE prevention, for eligible adult population. Unfortunately this strategy is not systematically evaluated in children due to sample size and recruitment issues. Therefore the risks and benefits of universal PTP in critically sick children are unclear specifically in the context of exposure to acquired risk factors including central venous lines (CVLs), age, cancer, infection and trauma/surgery. We sought to understand expert clinical decision-making. Aims: To understand the current practice patterns of pharmacological thromboprophylaxis and the perceived risks of VTE in hospitalized children. Methods: This cross-sectional self-administered multiple-choice survey questionnaire was administered to pediatric hematologists who are members of Hemostasis Thrombosis Research Society (HTRS) with at least 5 years of experience. Results: The response rate was 47.3%. Only 44% of respondents were in favor of adoption of universal PTP policy for children and 65% of them didn’t support thromboprophylaxis for CVL. Only one third of the participants had established policy for PTP mainly for intensive care unit, orthopedic and trauma patients. Almost all respondents (98 %) used PTP for a select patient population based on following risk factors: known inherited thrombophilia, morbid obesity, chronic inflammatory condition, history of idiopathic deep venous thrombosis (DVT), CVL related DVT, detected antiphospholipid antibody and teenagers with DVT risk factors. The factors that were not important for thromboprophylaxis included: underlying malignancy, positive blood culture, diabetic ketoacidosis, immobilization and CVLs, whether being critically sick newborns or not. Four different adolescent, child, and infant scenarios were answered by 94 % of respondents. Case (1) A newborn on mechanical ventilation with sepsis, thrombocytopenia and femoral line dysfunction without CVL-thrombosis. About 72% of respondents didn’t consider AC, 68% of them didn’t consider mechanical thromboprophylaxis. If developed MRSA sepsis and right hip osteomyelitis later on, only 42% of all respondents would not consider AC. So, in the newborns, PTP may not benefit for CVL malfunction but may be beneficial in the setting of osteomyelitis. LMWH was the preferred choice of PTP. Case (2): A 10 years old boy with a fracture femur with 4 weeks immobilization, 66 % of respondents were not in favor of AC, 69 % of them didn’t consider mechanical thromboprophylaxis. If, Mechanical thromboprophylaxis was preferred over PTP in orthopedic patients. Case (3): An overweight teenager girl with Down syndrome on mechanical ventilation for pneumonia and receiving mechanical thromboprophylaxis, 46% of all respondents considered AC and only 34% of them would continue AC post-discharge. If she has been on oral contraceptive pills (OCPs), 68% would prescribe TPT. So, PTP in critically ill teenagers is equipoise even with overweight and immobilization. OCPs were perceived as important risk factor for VTE. Case (4): A child with ALL who had an acute stroke following induction chemotherapy including Asparginase, 82% of all respondents would consider AC for re-induction regimen containing Asparginase. So, PTP is recommended in children with ALL and Asparginase related strokes if re-exposed. Conclusions: The results of survey revealed that despite concerns about rising VTE prevalence, there is equipoise about the adoption of a universal PTP policy for children. Experts take into consideration multiple risk factors when deciding about primary thromboprophylaxis. The variability in clinical thromboprophylaxis practices highlights the need for rigorous prospective randomized trials so as to develop evidence-based VTE prevention strategies for children.

Obstetric thromboprophylaxis: The Swedish guidelines, Lindqvist P.G.; Hellgren M.
Advances in Hematology, 2011, vol./is. 2011/, 1687-9104

Abstract: Obstetric thromboprophylaxis is difficult. Since 10 years Swedish obstetricians have used a combined risk estimation model and recommendations concerning to whom, at what dose, when, and for how long thromboprophylaxis is to be administrated based on a weighted risk score. In this paper we describe the background and validation of the Swedish guidelines for obstetric thromboprophylaxis in women with moderate-high risk of VTE, that is, at similar or higher risk as the antepartum risk among women with history of thrombosis. The risk score is based on major risk factors (i.e., 5-fold increased risk of thromboembolism). We present data on the efficacy of the model, the cost-effectiveness, and the lifestyle advice that is given. We believe that the Swedish guidelines for obstetric thromboprophylaxis aid clinicians in providing women at increased risk of VTE with effective and appropriate thromboprophylaxis, thus avoiding both over- and under-treatment.
Routine, structured assessment for venous thromboembolism risk in surgical admissions to a tertiary children's hospital, Mann J.P.; Wong J. Archives of Disease in Childhood, April 2014, vol./is. 99/(A106)

Abstract: Aims Prevalence of paediatric venous thromboembolism (VTE) is estimated at 5.3 per 10,000 hospital admissions. There is a bimodal distribution of incidences with peaks in the neonatal period and in adolescence. 90% of events are related to underlying risk factors, of which, central venous lines are the most important but surgery and trauma are also included. Adolescent VTE comprises 40% of all paediatric VTE event; they tend to be in the lower-limb and symptomatic. VTE is extremely rare from 1 month of age until the onset of puberty. A number of tertiary children's hospitals have implemented and published guidelines for structured risk assessment and prophylaxis of VTE in children. We aimed to assess whether routine assessment of all surgical admissions for VTE risk would benefit patient care.

Methods All admissions (elective and emergency) to orthopaedic and general surgery paediatric wards at a tertiary children's hospital over 31 days were included. Neonatal admissions were excluded. All patients underwent a VTE risk assessment. The assessment used a structured pro-forma, based on existing published protocols. Data was collected on details of any VTE events, risk factors for thrombosis or bleeding, reason for admission and/or operation, and whether any VTE prophylaxis was given. Results Orthopaedics: 56/80 admissions (median 9 years); no VTE events during study period. 80% (45/56) had no risk factors for VTE. The remainder had on average 1 risk factor for thrombosis ('Reduced mobility' or 'Lower limb orthopaedic surgery'). 2/56 (4%) exceptional cases received pharmacological thromboprophylaxis: both were >15-years old, one with bilateral femoral fractures; the other had a familial thrombophilia. General surgery: 24/80 admissions (median 7 years); no VTE events occurred. 88% (21/24) had no risk factors for VTE. The remaining 3/24 were considered low risk. No patients were prescribed VTE prophylaxis. All patients under 15-years (74/80) were 'low-risk', whereas 2/6 (33%) patients over 15-years required thromboprophylaxis. Conclusion We found that routine, structured assessment of VTE risk in children under 15-years is not necessary. There are selected adolescents who may benefit from prophylactic measures, thus VTE risk assessment is recommended in patients >15-years.

Efficacy of obstetric thromboprophylaxis and long-term risk of recurrence of venous thromboembolism, Lindqvist P.; Acta Obstetricia et Gynecologica Scandinavica, June 2011, vol./is. 90/6(648-653)

Abstract: Objective. To study the efficacy of thromboprophylaxis with low molecular weight heparin (LMWH) in pregnant women with one previous venous thromboembolic event (VTE). Secondary aims were to study the long-term risk of secondary recurrence, bleeding and obstetric complications. Design. A prospective national study of long-term LMWH thromboprophylaxis in Sweden. Settings. All hospitals in Sweden during January 1998-December 2002, Participants. Pregnant women with one previous VTE and controls drawn from the Swedish Medical Birth Registry. The women were cross-matched with the Swedish Hospital Discharge Register to identify all recurrences and to ascertain the annual risk of recurrence. Main Outcome Measures. Recurrence of VTE, bleeding complications at delivery and obstetric complications. Results. 326 of 393 registered women could be evaluated. The relative risk reduction in VTE was 88%. There was an absolute increased risk of VTE during the thromboprophylaxis period: 1.2% compared to 0.2% among controls. The risk during the immediate post-treatment period (43-100 days post-partum) was increased 28-fold. The annual incidence of VTE after delivery was 1%. The risk of hematoma and major blood loss at delivery was increased during thromboprophylaxis. There were no differences in the incidences of preeclampsia, intrauterine growth restriction or placental abruption. Conclusions. The relative risk reduction in VTE during thromboprophylaxis was 88%. After pregnancy, the annual long-term risk of recurrence was 1%. The risk was most pronounced in the post-treatment period. There was an increased risk of bleeding complications among women given LMWH, but there was no effect on obstetric complications.
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