Preventing Hospital Acquired Thrombosis
Acknowledgements
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We would particularly like to thank healthcare organisations in Wales and their teams for their work in implementing these interventions and also feeding back lessons and experiences gained as a result.

1000 Lives Plus is run as a collaborative, involving the National Leadership and Innovation Agency for Healthcare, the National Patient Safety Agency, Public Health Wales and the Clinical Governance Support and Development Unit.

We wish to thank and acknowledge the Institute for Healthcare Improvement (IHI), Patient Safety First and The Health Foundation for their support and contribution to 1000 Lives Plus.

Date of publication
This guide was published in April 2010 and will be reviewed in April 2012. The latest version will always be available online on the programme’s website: www.1000livesplus.wales.nhs.uk

The purpose of this guide
This guide has been produced to enable healthcare organisations and their teams to successfully implement a series of interventions to improve the safety and quality of care that their patients receive.

This ‘How to Guide’ must be read in conjunction with the following:

- Leading the Way to Safety and Quality Improvement
- How to Improve

Further guides are also available to support you in your improvement work:

- How to Use the Extranet
- A Guide to Measuring Mortality
- Improving Clinical Communication using SBAR
- Learning to use Patient Stories
- Using Trigger Tools
- Reducing Patient Identification Errors

These are available from the 1000 Lives Plus office, or online at www.1000livesplus.wales.nhs.uk

We are grateful to The Health Foundation for their support in the production of this guide.
Improving care, delivering quality

The 1000 Lives Campaign has shown what is possible when we are united in the pursuit of a single aim: the avoidance of unnecessary harm for the patients we serve. The enthusiasm, energy and commitment of teams to improve patient safety by following a systematic, evidence-based approach has resulted in many examples of demonstrable safety improvement.

However, as we move forward with 1000 Lives Plus, we know that harm and error continue to be a fact of life and that this applies to health systems across the world. We know that much of this harm is avoidable and that we can make changes that reduce the risk of harm occurring. Safety problems can’t be solved by using the same kind of thinking that created them in the first place. To make the changes we need, we must build on our learning and make the following commitments:

- Acknowledge the scope of the problem and make a clear commitment to change systems.
- Recognise that most harm is caused by bad systems and not bad people.
- Acknowledge that improving patient safety requires everyone on the care team to work in partnership with one another and with patients and families.

The national vision for NHS Wales is to create a world class health service by 2015: one which minimises avoidable death, pain, delays, helplessness and waste. This guide will help you to take a systematic approach and implement practical interventions that can bring that about. The guide is grounded in practical experience and builds on learning from organisations across Wales during the 1000 Lives Campaign and also on the experience of other campaigns and improvement work supported by the Institute for Healthcare Improvement (IHI).

Where reference is made to 1000 Lives Plus, this includes the work undertaken as part of the 1000 Lives Campaign and the second phase of this improvement programme - 1000 Lives Plus.

The guide uses examples from the former NHS organisational structures, and where possible this has been acknowledged.
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Introduction

In late 2009, Sir Liam Donaldson and John Smith (MP) reaffirmed the priority of preventing hospital acquired thrombosis (HAT), in their foreword in Venous Thromboembolism Prevention (DH 2009) they stated:

“In 2007 there were 16,670 recorded deaths in England and Wales where Pulmonary Embolism and Deep Vein Thrombosis (VTE) were mentioned on the death certificate (Office of National Statistics).

However, the overall death rate from VTE in hospital and the community is likely to be significantly higher since the condition is often clinically silent and deaths are not being identified due to a reduction in post-mortem examinations.

The emerging picture of death and acute and chronic disability (such as chronic venous insufficiency, venous leg ulcers and pulmonary hypertension) leaves no room for complacency when low-cost effective preventative treatments are available.

VTE prevention is, above all, about saving lives and reducing long term ill-health. This is common and often avoidable.

We have long known of safe, effective and straightforward methods of prevention and will continue to work towards widespread recognition that VTE prevention is one of the most important new patient safety issues ...”

In 2005, the Health Select Committee identified that:

- VTE is the immediate cause of death in 10% of all patients who die in hospital.
- That there were around 25,000 deaths each year from VTE in hospitals in England.
- That the total cost (direct and indirect) of treating the long-term disability caused by VTE was around £640 million a year.

Even more alarming than the scale of the problem is the fact that VTE in hospitalised patients is largely preventable, through the use of thromboprophylaxis during the hospital stay of the patient and, in some cases, treatment continuing after discharge.

A study in over 4,000 patients who died of Pulmonary Embolism following major surgery, demonstrated that the use of perioperative low dose heparin reduced the frequency of fatal PE from 8 per 1000 to 1 per 1000 patients operated. Thus thousands of lives could readily be saved by the use of a tried and tested treatment”.¹
In 2007 the Society of Hospital Medicine stated that over one year:

- A 300-bed hospital that lacks a systematic approach to VTE prevention can expect roughly 150 cases of hospital-acquired VTE.
- Approximately 50-75 of those cases will be potentially preventable through opportunities to provide appropriate prophylaxis.
- Approximately 5 of those patients will die from potentially preventable PE.²

A recent report¹, which explored the care of patients who died within four days of admission to hospital, found that only 55% of patients admitted under a surgeon and 38% of patients admitted under a physician received venous thromboembolism prophylaxis.

There is extensive evidence to assert that patients must be assessed for their risk of a HAT and where appropriate should receive a form of prophylaxis suitable to their personal risk and existing conditions.

NICE guidance for surgical patients was issued in 2007 (National Collaborating Centre for Acute Care 2007), which made several recommendations on the assessment and prevention of VTE for patients undergoing surgery. This guideline has now been reviewed and extended to incorporate any adult patients admitted into hospital (Jan 2010).

Why is it important?

Mrs X has had several Deep Vein Thrombosis (DVT) and Pulmonary Embolisms (PE). The last PE was life threatening and she spent seven days in a CCU and according to the consultant who treated her in CCU, she is lucky to be alive.

“When I had my first DVT my family and I knew next to nothing about thrombosis. The clot moved from my calf to my lungs and I had to stay in hospital on blood thinning drugs and took warfarin for months afterwards.”

“Because of my experience I decided to read up about it on the ‘net. After gathering information, every time I saw a consultant or doctor at a hospital I mentioned that I suffered from DVTs and PEs and thought by giving this information to them it would not happen again. I was wrong… no two hospitals treat their patients the same regarding thrombosis, and some hospitals don’t treat the problem at all!”

“It has changed my life. I have been advised to take warfarin for life, which means regular blood tests at the local hospital and even a visit to the dentist is not straightforward. If I hurt myself I have to make sure I don’t bleed too much; if I do I have to get to the hospital quickly.”

Source: www.thrombosis-charity.org.uk
References


3 NCEPOD (2009). Caring to the End? A review of the care of patients who died in hospital within four days of admission, National Confidential Enquiry into Patient Outcome and Death
Preventing Hospital Acquired Thrombosis

Driver Diagram

- **Content Area**
  - Reduce Deaths & Harm from Hospital Acquired Thrombosis

- **Drivers**
  - Assessment of Risk
  - Prophylactic Treatment
  - Patient Involvement

- **Interventions**
  - Documented Risk Assessment on admission
  - Documented action required
  - Reassessment of Risk every 48 hours/Change in Condition
  - Mechanical Methods
  - Pharmacological Methods
  - Early Mobilisation
  - Patient Education
  - Patient Awareness of Risks & Symptoms of HAT
  - Patient Involvement in Care
Have you set up your team?

You need to consider three different dimensions:

- Organisational level leadership
- Clinical or technical expertise
- Frontline leadership and team membership

See the ‘Leading the Way to Safety and Quality Improvement’ How to Guide; and Appendix E for further information.

Do you know how you will measure outcomes?

For this content area, you should use the following outcome measure:

- Incidence of hospital acquired thrombosis

See Appendix C for further information.

Do you and your team understand how to apply the Model for Improvement?

The Model for Improvement is a fundamental building block for change and you need to understand how to use it to test, implement and spread the interventions in this guide.

See the ‘How to Improve’ Tools for Improvement guide and Appendix E for further information.

How are you going to measure process reliability?

In order to improve outcomes for your patients you need to demonstrate you are using these interventions reliably. This means that all the elements of the interventions are performed correctly on 95% or more of the occasions when they are appropriate. You need to do this by using the process measures in this guide.

See the ‘How to Improve’ Tools for Improvement guide and Appendix C for a summary of all process measures.

How will you share your learning?

Contact 1000 Lives Plus for details of mini-collaboratives and other ways to share your learning and to learn about the progress of other teams.
Drivers and Interventions

This section details the interventions highlighted in the driver diagram which evidence has shown to be effective in this content area. You should use the Model for Improvement to test, implement and spread each intervention, using the listed process to monitor progress.

Driver: Assessment of Risk

Intervention:

1. Every patient admitted or pre-assessed for admission to hospital should have a documented risk assessment to identify those at increased risk of HAT including pregnant women (Appendix B).

2. Every patient identified at risk, should also have a documented risk assessment of the complications of thromboprophylaxis (Appendix B).

3. Every in-patient should have a documented reassessment for the above every 48 hours or if their condition changes e.g. post operatively.

*For in-patient pregnant women only, for all other pregnant women please see RCOG risk assessment guide (RCOG 2009).

Measures:

For this intervention, use the following process measures:

- % of surgical patients who have a documented assessment for the risk of developing a HAT.
- % of medical patients who have a documented assessment for the risk of developing a HAT.
- % of in-patients whose risk assessment is reviewed at 48 hours and documented.

Applying the Model for Improvement

For elective surgical patients many organisations believe that the pre-assessment clinic appointment is an ideal time to undertake this assessment.

Plan - Identify one nurse or junior doctor who is happy to test the draft format of a separate risk assessment on clerking (or nursing admission?) the patient on admission.

Do - Use the appropriate risk assessment on clerking / nursing admission.

Study - At an appropriate point in the day talk to nurse / doctor involved about how ‘user friendly’ the risk assessment was.
Did it fit into the normal pattern of clerking / admission?
Was there anything they would like to see added? How long did it take?
Did it pick up any ‘glitches’?
How could we make the form or the process better next time?

**Act** - Make refinements based on the discussion. If the refinements may take time to implement such as creating a new form, arrange to do this but agree how you could carry on the testing by making refinements as you go along, testing again each time until you can do this successfully for a 24 hour period.

Now test with another nurse / junior doctor. It may help if the first tester identifies and discusses the risk assessment with a willing colleague.

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**Top Tips**

Map current processes for risk assessments.

A single risk assessment format or model at the point of entry to hospital for all is advantageous. The link between the output of the risk assessment and the intervention must be clear.

Standardisation of processes will get you 80% towards reliability.

Keep it simple and easy to use.

The risk assessments provided in this guide can be adapted to the local organisations policy and formulary.

Ensure the risk assessment process is built into the normal flow of work, e.g. ensure it is undertaken at a logical point in the admission of the patients.

Test the best place to record the risk assessment in the medical / nursing records and link this to the prophylaxis prescribed.

Link the patients risk assessments together, e.g. if a patient is at risk of a pressure sore (Waterlow score above 14) then this should prompt that they are also at risk of a HAT.

Where appropriate ensure nurse prescribers / medic writes up prophylaxis at the time of admission, as soon as the risk assessment is done.

Make risk assessment an opt-out rather than opt-in model of care.

Use your early warning score charts to trigger reassessment every 48 hours.

Staff education should highlight why patients who are admitted into hospital are at risk in particular e.g. using Virchow’s Triad (see glossary).

Any transfer of care should prompt reassessment of risk, e.g. discharge from ITU to ward.

Use link nurses on each ward as nurse champions.
Driver: Prophylactic Treatment

All organisations should develop a thromboprophylaxis policy, based upon the best current evidence for the treatments available. The prevention of HAT with thromboprophylaxis involves three methods: mechanical, pharmacological and early mobilisation of the patient. The risk assessment of both the development of HAT and complications of treatment dictates the combination of prophylactic treatment for patients.

Interventions

**Mechanical:** Mechanical intervention should be used to complement pharmacological ones. Patients who are unable to receive pharmacological interventions should have one of the following mechanical methods:

- Graduated compression stockings (surgical patients only)*
- Foot impulse device
- Intermittent pneumatic compression device

*Contraindications include: arterial insufficiency, cutaneous infections, peripheral neuropathy and recent skin grafts.

**Pharmacological:** Unless contraindicated pharmacological prophylaxis should be given to all ‘at risk’ patients. The choice of agent will depend on the underlying reason for the patient’s admission, e.g. acute / elective surgery or medical, the risk assessment and the local formulary. The main agents and considerations are:

- Dalteparin (Fragmin) 5000 units s/c od
- Tinzaparin (Innohep) 500 - 4500 units s/c od (depending on indication)
- Bemiparin (Zibor) 2500 units s/c od
- Fondaparinux sodium (Arixtra) 2.5mg s/c od
- Unfractionated Heparin (UFH) 5000 units s/c bd
- Enoxaparin (Clexane) 4000 units (40mg) od
- Dabigatran etexilate (Pradaxa) 110-220mg po od
- Rivaroxaban (Xarelto) 10mg od

Pharmacological considerations

- Decrease LMWH dose if creatinine clearance <30ml/min or use Un Fractured Heparin (UFH)
- Patients receiving LMWH or UFH need platelet count checking on Day 6
- Consider dose increase in-patients >110kg
- Consider dose reduction in-patients <50kg
Early mobilisation

Patients should be encouraged to mobilise as soon as safely possible after their surgery or their acute illness. Although some patients have only short admissions into hospital e.g. day case surgery, consideration should be given to how much a patient will mobilise at home during the first few days of recovery and prophylaxis should be considered.

Measure:

For this intervention, use the following process measure:

% of in-patient receiving appropriate HAT prophylaxis.

Applying the Model for Improvement

Plan - Identify one nurse or junior doctor who is happy to test the use of a sticker for prescribing the appropriate prophylaxis on clerking the patient on admission

Do - Use the sticker on clerking / nursing admission, after the risk assessment

Study - At an appropriate point in the day talk to nurse / doctor involved about how ‘user friendly’ the sticker was.

■ Did it fit into the normal pattern of clerking / admission?
■ Was there anything they would like to see added? How long did it take?
■ Did it pick up any ‘glitches’?
■ How could we make the sticker or the process better next time?

Act - Make refinements based on the discussion. If the refinements may take time to implement such as creating a new sticker, arrange to do this but agree how you could carry on the testing in its current state. Test again. Making refinements as you go until you can do this successfully for the whole day.

Now test with another nurse / junior doctor. It may help if the first tester discusses the use of stickers with a willing colleague. You might decide to abandon this approach as a sticker might not be appropriate for the process of working in the area.
**Example of how to change practice**

**Orthopaedic thromboprophylaxis policy - Dr Tim Nokes**

The DVT clinic at Derriford Hospital used Venous Thromboembolism Registry (VERITY) data as a driver for change in thromboprophylaxis practice after orthopaedic surgery. They identified from their local data a problem of high rates of symptomatic VTE after major orthopaedic surgery. VERITY confirmed symptomatic DVTs in orthopaedic patients totalled a mean of 2.3 patients/month over a two-year period.

There was an agreement to set up a standard approach to thromboprophylaxis. An orthopaedic VTE champion was identified and a comprehensive literature review was conducted.

Agreement for a unified approach from orthopaedic surgeons was obtained and a multidisciplinary team consisting of an orthopaedic surgeon, a haematologist, an anaesthetist, a medical clinician and pharmacists (local + community) was established. The coroner was also consulted.

The protocol they developed assumed risk in all patients undergoing orthopaedic surgery and therefore all patients to receive a standard prophylactic regimen. Very-high risk patients (those with previous or strong family history of VTE, active cancer or gross obesity) were assigned a more intensive regimen. Recent data from the DVT clinic now shows DVTs <1 per month in orthopaedic patients when protocols are adhered to. They have identified that ongoing audit is needed, with continuous review of policies and further use of data from VERITY required verifying effectiveness of this protocol.

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**Raising awareness of Prophylaxis**

Abertawe Bro Morgannwg University Health Board’s anticoagulation nurse specialist has developed an educational programme for pre-registration medical students and FP1 doctors. This competency-based programme links with the national key competencies they have to demonstrate and also meets the some of the requirements of the NPSA Anticoagulation Alert (2007).
Top Tips

- Use local champions in the different areas, e.g. surgical, medical and obstetric.
- Develop a HAT protocol using your organisation Thrombosis Committee and endorsed by your Health Board or Trust.
- Map the current processes for linking risk assessment and administering prophylaxis.
- Redesign care delivery processes to include high-reliability features that promote adherence to best practices.
- Develop and implement educational/outreach plans to ensure buy-in from key stakeholders.
- Use stickers or other active reminders on prescription charts and medical records to ensure appropriate prescribing of pharmacological prophylaxis.
- Develop feedback mechanisms for medical teams so they can identify their own HAT rates and compliance with risk assessment and prophylaxis.
- Use resources such as the VTE e-learning package, linked to PDPs.
- Ensure nursing and support staff are educated in the correct application of compression stockings.
- Collect, analyse and report outcome data.
- Use Global Trigger Tool data to identify readmissions.
- Ensure regular assessment of medication, sedation and immobility.
- Ensure discharge summaries identify risks and ongoing treatment where necessary.
- Facilitate continuing treatment in primary care with shared care protocols.
- Facilitate feedback from primary care on incidents of HAT.
Driver: Patient Involvement

Interventions

Risk Assessment: Good quality and consistent education play a vital role in helping patients take responsibility for their own health including preventing illness. This is true for the prevention of HAT. Patients should be made aware of their risks of developing a HAT and the risk assessment should be undertaken in partnership with the patient, whether that is at a pre-assessment clinic, a GP practice during a referral or at admission to hospital, and an explanation given of the risks and what can be done to prevent the development of a HAT. Lifeblood have developed a leaflet specifically for patients. Visit www.thrombosis-charity.org.uk for more details.

Patient Awareness: Patients should be educated in the various methods of prophylactic treatments to ensure compliance. For example, the correct application of stockings, including life span and washing instructions if discharged home with treatment, will ensure the stockings are effective. Patients can also be trained on how to self-administer subcutaneous injections if longer term treatment is needed, e.g. 30 days post-operation. The importance of early mobilisation should be stressed to patients and if weight bearing can not be initiated early on, then patients should be taught how to do leg exercises whilst in bed or in a chair.

Patient Education: Recognition: Patients should be made aware of how a DVT or PE presents and the importance of obtaining early medical treatment stressed.

Model for Improvement Example

Plan - Identify one nurse or junior doctor who is happy to test the patient information on risk assessment with the patient at pre-assessment.

Do - Use the appropriate patient information leaflet at pre-assessment clinic.

Study - At an appropriate point in the day talk to the nurse / doctor involved about how ‘user friendly’ the information leaflet was to go through with the patient.

- Did it fit into process of pre-assessment?
- Was there anything they would like to see added or did the patient ask for further information that wasn’t included? How long did it take?
- Did it pick up any ‘glitches’? Also, ask the patient if they understood the information and how it was presented.

Act - Make refinements based on the discussion. Test again. Make refinements as you go until you can do this successfully for the whole day.

Now test with another pre assessment nurse. It may help if the first tester identifies and discusses the patient information with a willing colleague.
**Helpful Resources**

**1000 Lives Plus**
www.1000livesplus.wales.nhs.uk

**National and international online resources**
Agency for Healthcare Research and Quality
www.ahrq.gov/QUAL/vtguide/

**Department of Health Resources:**
Venous Thromboembolism Prevention: a Patient Safety Priority (June 2009)

Published jointly between the All Party Parliamentary Thrombosis Group and the Department in June 2009 following the National Leadership summit for the NHS, this document provides:

- an overview and progress of the English National VTE Prevention Programme.
- links to VTE Prevention resources for the NHS including Commissioning for VTE.

**National VTE Exemplar Centre Network**
www.kingsthrombosiscentre.org.uk/cgi-bin/kings/exemplarcentres.pl

The mission of the National VTE Exemplar Centre Network is to share best practice and improve patient care through more effective prevention and treatment of VTE. This website provides a home for resources of the National VTE Exemplar Centre Network, the National Nursing Network and the National VTE Prevention Programme, and offers a single resource for healthcare professionals involved in thrombosis management.

**South West SHA VTE Prevention Initiative**
Providing a practical approach to the implementation of national guidance, the initiative is aimed at ensuring that all hospitals providing inpatient care in NHS South West develop a systematic approach to the prevention of venous thromboembolism. The initial focus has been a review of VTE prevention strategies across all acute Trusts, independent sector treatment centres and Primary Care Trust provider services (community hospitals). Learning from this regional approach can be found at
www.kingsthrombosiscentre.org.uk/cgi-bin/kings/swsha.pl
VERITY
www.verityonline.co.uk/modules/publicsite/index.aspx

Map of Medicine VTE Prevention Pathway
http://healthguides.mapofmedicine.com/choices/map/index.html
The Map of Medicine has published a new pathway for the prevention of Venous Thromboembolism (VTE) in hospital patients in support of the National VTE Prevention Programme. It is now available online to NHS staff in England and Wales and will be made available to patients on Map of Medicine Healthguides, which are accessed via the NHS Choices website.

E-learning on venous thromboembolism: e-VTE
www.e-lfh.org.uk/projects/vte/launch/
An e-learning programme has been developed by the Chief Medical Officer’s VTE Implementation Working Group in partnership with e-Learning for Healthcare. Available to all, but of particular interest to health professionals, e-VTE aims to raise awareness of VTE prevention in the hospital setting as well as exploring the challenges in primary care.

e-VTE consists of a pre-learning questionnaire and a post-learning assessment, together with four sessions of e-learning (around 20 mins each) that cover:
- demographics, epidemiology and risk of VTE
- methods of thromboprophylaxis
- implementation of thromboprophylaxis in hospitals
- implementation of thromboprophylaxis in primary care

Reducing death from blood clots in hospitals: the role of NHS Boards - NHS Confederation briefing
www.nhsconfed.org/Publications/Documents/Briefing_183 Reducing_deaths_from_blood_clots_in_hospitals.pdf
www.hospitalmedicine.org/ResourceRoomRedesign/RR_VTE/VTE_Home.cfm
Appendix A - Glossary

Venous Thrombosis (VT): A condition in which a blood clot (thrombus) forms in a vein.

Deep Vein Thrombosis (DVT): venous thrombosis that occurs in the “deep veins” in the legs, thighs, or pelvis.

Pulmonary Embolism (PE): A blood clot that breaks off from the deep veins and travels round the circulation to block the pulmonary arteries (arteries in the lung). Most deaths arising from DVT are caused by PE.

Venous Thromboembolism (VTE): The blocking of a blood vessel by a blood clot dislodged from its site of origin. It includes both DVT and PE.

Prophylaxis: A measure taken for the prevention of a disease.

Thromboprophylaxis: A measure taken to prevent thrombosis.

Post-thrombotic (Post-phlebitic) Syndrome: Chronic pain, swelling, and occasional ulceration of the skin of the leg that occur as a consequence of previous venous thrombosis.

Virchow’s triad: Professor R Virchow identified three contributory factors which resulted in the development of a thrombus; abnormalities of the vessel wall, abnormalities of the blood components and abnormalities of the blood flow through the vessels.

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<td>Femoral vein damage in total hip replacement</td>
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<td>Blood flow stats</td>
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<td>More time for clotting</td>
<td>Sitting still</td>
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<td>Small thrombi not washed away</td>
<td>Limb paralysis</td>
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<td>Viscosity increased</td>
<td>Heart Failure</td>
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<td>Coagulability</td>
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<td>Increase in tissue factor</td>
<td>Surgery</td>
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<td>Presence of activating factors</td>
<td>Cancer</td>
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<tr>
<td>Decrease in coagulation inhibitors</td>
<td>Inherited AT III deficiency</td>
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THROMBOPROPHYLAXIS FOR MEDICAL (NON AMBULANT) ADMISSIONS

RISK FACTORS
Is patient under 40 with one of the following?
- Acute or exacerbation of heart failure
- Acute infection including pneumonia
- Active cancer or cancer treatment
- Dehydration
- Known thrombophilia
- Obesity (BMI > 30 kg/m²)
- Personal or family history of VTE
- Pregnancy or ≤ 6 weeks post partum
- Use of hormone replacement therapy
- Use of oestrogen-containing contraceptive therapy
- Varicose veins with phlebitis.

IS PATIENT AGED 40 OR OVER? NO → YES

Does patient have contraindication to pharmacological thromboprophylaxis? NO → YES

PHARMACOLOGICAL METHODS*
Prescribe one of the following according to local formulary and licensed indications:
- Enoxaparin (Clexane) 4000 units (40mg) od
- Dalteparin (Fragmin) 5000 units s/c od
- Fondaparinux sodium (Arixtra) 2.5mg s/c od
- Unfractionated heparin 5000 units s/c bd

Pharmacological considerations
- Decrease LMWH dose if creatinine clearance <30ml/min or use unfractionated heparin
- Consider dose increase in patients >110kg
- Consider dose reduction in patients < 50kg

Patients receiving LMWH or UFH need platelet count checking on day 6.

ENCOURAGE EARLY MOBILISATION AND REASSESS IN 48 HOURS

*Contraindications to pharmacological thromboprophylaxis (tick box)
- Active bleeding or at risk of bleeding
- Already having therapeutic anticoagulation
- Uncontrolled systolic hypertension ≥ 160mmHg
- Bacterial endocarditis, pericarditis or thoracic aneurysm
- New-onset stroke or risk of central nervous system bleed e.g. head injury or previous SAH
- Severe liver disease
- Known bleeding disorder; discuss with haematologist
- Thrombocytopenia: platelet count < 70 x 10⁹ / l
- Previous heparin induced thrombocytopenia (use Fondaparinux)
- Known heparin allergy (use Fondaparinux)
- Admitted for terminal care or on end of life pathway

Clinician Name
Clinician Signature
Date

www.1000livesplus.wales.nhs.uk
THROMBOPROPHYLAXIS FOR ELECTIVE SURGICAL ADMISSIONS (NON-ORTHOPAEDIC)

Unless contraindicated:

All patients admitted for elective surgery lasting more than 30 minutes should receive combined thromboprophylaxis with:

- Mechanical methods from admission, until mobile
  AND
- Pharmacological thromboprophylaxis* starting 6-12 hours after surgery until mobile

Consider extended thromboprophylaxis for major abdominal or pelvic cancer surgery.

PHARMACOLOGICAL THROMBOPROPHYLAXIS

Does patient have contraindication to pharmacological thromboprophylaxis*?

PHARMACOLOGICAL METHODS*

Prescribe one of the following according to local formulary and licensed indications:

- Enoxaparin (Clexane) 4000 units (40mg) od
- Dalteparin (Fragmin) 5000 units s/c od
- Tinzaparin (Innohep) 4500 units s/c od
- Beparin (Zibor) 25000 units s/c od
- Fondaparinux sodium (Arixtra) 2.5mg s/c od
- Unfractionated heparin 5000 units s/c bd

Pharmaceutical considerations:
- Decrease LMWH dose if creatinine clearance <30ml/min or use UFH
- Consider dose increase in patients >110kg
- Consider dose reduction in patients < 50kg

Patients receiving LMWH or UFH need platelet count checking on day 6.

MECHANICAL METHODS*

Choose one of the following:

- Anti-embolism stockings
- Foot impulse devices
- Intermittent pneumatic compression devices

*Contraindications to mechanical methods

- Arterial insufficiency
- Cutaneous infections
- Peripheral neuropathy
- Recent skin graft

*Contraindications to pharmacological thromboprophylaxis (tick box)

- Active bleeding or at risk of bleeding
- Uncontrolled systolic hypertension ≥ 180mmHg
- Bacterial endocarditis, pericarditis or thoracic aneurysm
- New-onset stroke or risk of central nervous system bleed e.g. head injury or previous SAH
- Severe liver disease
- Known bleeding disorder: discuss with haematologist
- Thrombocytopenia: platelet count < 70 x 10⁹/L
- Previous heparin induced thrombocytopenia (use Fondaparinux)
- Known heparin allergy (use Fondaparinux)
- Admitted for terminal care or on end of life pathway

For surgery under spinal/epidural anaesthesia:
- Stop pharmacological thromboprophylaxis at least 12 hours prior to neuraxial blockade.
- Do not remove epidural catheter within 4 hours of pharmacological thromboprophylaxis

Clinician Name    Clinician Signature    Date

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THROMBOPROPHYLAXIS FOR ACUTE ORTHOPAEDIC ADMISSIONS

Unless contraindicated:
All patients admitted following orthopaedic trauma should receive combined thromboprophylaxis with pharmacological and mechanical methods from admission until mobile.

---

PHARMOCOLOGICAL THROMBOPROPHYLAXIS
Does patient have contraindication to pharmacological thromboprophylaxis? Yes +

---

PHARMACOLOGICAL METHODS*

Prescribe one of the following according to local formulary and licensed indications:
- Enoxaparin (Clexane) 4000units (40mg) od
- Dalteparin (Fragmin) 5000units s/c od
- Tinzaparin (Innohep) 4500units s/c od
- Fondaparinux sodium (Arixtra) 2.5mg s/c od
- Unfractionated heparin 5000units s/c bd
(Aspirin is not recommended for thromboprophylaxis.)

Pharmacological considerations:
- Decrease LMWH dose if creatinine clearance <30ml/min or use UFH
- Consider dose increase in patients >110kg
- Consider dose reduction in patients < 50kg

Patients receiving LMWH or UFH need platelet count checking on day 5.

---

MECHANICAL METHODS

Choose one of the following
- Anti-emboilism stockings
- Foot impulse devices
- Intermittent pneumatic compression devices

*Contraindications to mechanical methods
- Arterial insufficiency
- Cutaneous infections
- Peripheral neuropathy
- Recent skin graft

---

For surgery under spinal/epidural anaesthesia
- Stop pharmacological thromboprophylaxis at least 12 hours prior to neuraxial blockade.
- Do not remove epidural catheter within 4 hours of pharmacological thromboprophylaxis

---

<table>
<thead>
<tr>
<th>Clinician Name</th>
<th>Clinician Signature</th>
<th>Date</th>
</tr>
</thead>
</table>

www.1000livesplus.wales.nhs.uk
THROMBOPROPHYLAXIS FOR ELECTIVE ORTHOPAEDIC ADMISSIONS

Unless contraindicated:

All patients admitted with elective hip or knee surgery should receive combined thromboprophylaxis with:

- Mechanical methods from admission, until mobile

AND

- Pharmacological thromboprophylaxis* starting 6-12 hours after surgery
- Knee replacement surgery: continue for 10 days post-surgery
- Hip replacement surgery: continue for 28-35 days post surgery
- Other: continue until discharge.

PHARMACOLOGICAL THROMBOPROPHYLAXIS

Does patient have contraindication to pharmacological thromboprophylaxis??

**PHARMACOLOGICAL METHODS**

Choose one of the following according to local formulary and licensed indications:

- Enoxaparin (Clexane) 4000 units (40mg) od
- Dalteparin (Fraxiparin) 5000 units s/c od
- Tinzaparin (Innohep) 4500 units s/c od
- Betimarin (Zíker) 3500 units s/c od
- Fondaparinux sodium (Arixtra) 2.5mg s/c od
- Unfractionated Heparin 5000 units s/c bd
- Dabigatran etexilate (Pradaxa) 110-220mg po od
- Rivaroxaban (Xarelto) 10mg od

(Aspirin is not recommended for thromboprophylaxis.)

Pharmacological considerations:

- Decrease LMWH dose if creatinine clearance <30ml/min
- Consider dose increase in patients >110kg
- Consider dose reduction in patients < 50kg

Patients receiving LMWH or UFH need platelet count checking on day 5.

**MECHANICAL METHODS**

Choose one of the following:

- Anti-embolism stockings
- Foot impulse devices
- Intermittent pneumatic compression devices

*Contraindications to mechanical methods:

- Arterial insufficiency
- Cutaneous infections
- Peripheral neuropathy
- Recent skin graft

*Contraindications to pharmacological thromboprophylaxis (tick box):

- Active bleeding or at risk of bleeding
- Bacterial endocarditis, pericarditis or thoracic aneurysm
- New-onset stroke or risk of central nervous system bleed e.g. head injury or previous SAH
- Severe liver disease
- Known bleeding disorder: discuss with haematologist
- Thrombocytopenia: platelet count < 70 x 10^9 /L
- Previous heparin induced thrombocytopenia (use Fondaparinux)
- Known heparin allergy (use Fondaparinux)
- Uncontrolled systolic hypertension ≥ 180mmHg

For surgery under spinal/epidural anaesthesia:

- Stop pharmacological thromboprophylaxis at least 12 hours prior to neuraxial blockade for LMWH or 24hrs for fondaparinux.
- Do not remove epidural catheter within 4 hours of giving pharmacological thromboprophylaxis.
- If using fondaparinux, withhold dose for at least 12 hours after catheter removal.

Clinician Name  Clinician Signature  Date
## Appendix C - Measures (1)

<table>
<thead>
<tr>
<th>Measure type</th>
<th>Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Related content area / driver</td>
<td>Reduce avoidable death, disability and chronic ill health from Hospital Acquired Thrombosis.</td>
</tr>
<tr>
<td>Description</td>
<td>% of all adult in-patients who have had a HAT risk assessment on admission to hospital using the national tool.</td>
</tr>
<tr>
<td>Rationale</td>
<td>The measure assesses whether units are complying with evidence-based practice. The implication is that high compliance should prompt the appropriate treatment of at-risk patients and therefore reduce the risk of developing a HAT.</td>
</tr>
<tr>
<td>Numerator</td>
<td>Number of adult in-patient admissions reported as having had a documented HAT risk assessment on admission to hospital using the national tool.</td>
</tr>
<tr>
<td>Data Source</td>
<td>Local Audit</td>
</tr>
<tr>
<td>Denominator</td>
<td>Number of adults who were admitted as in-patients (includes day-cases, maternity and transfers; both elective and non-elective admissions) in your pilot population in a month.</td>
</tr>
<tr>
<td>Data Source</td>
<td>Local Audit, PEDW data.</td>
</tr>
<tr>
<td>Method of calculation</td>
<td>Calculate the actual percent of eligible in-patients risk assessed by dividing the numerator by the denominator and then multiplying the resulting proportion by 100.</td>
</tr>
<tr>
<td>Collection guidance</td>
<td>Create a system to track this measure prospectively in 100% of relevant pilot population. If you start measuring this in a pilot population, you will have annotate your charts every time you add another area to your population.</td>
</tr>
</tbody>
</table>
## Appendix C - Measures (2)

<table>
<thead>
<tr>
<th>Measure name</th>
<th>% receiving appropriate HAT prophylaxis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure type</td>
<td>Process</td>
</tr>
<tr>
<td>Related content area / driver</td>
<td>Reduce avoidable death, disability and chronic ill health from Hospital Acquired Thrombosis</td>
</tr>
<tr>
<td>Description</td>
<td>The percentage of in-patients receiving the prophylaxis identified by their risk assessment.</td>
</tr>
<tr>
<td>Rationale</td>
<td>Compliance for in-patients receiving HAT prophylaxis will prevent acute events and post thrombotic syndrome.</td>
</tr>
<tr>
<td>Numerator</td>
<td>The total number of in-patients receiving the prophylaxis identified by their risk assessment.</td>
</tr>
<tr>
<td>Data Source</td>
<td>Local Audit</td>
</tr>
<tr>
<td>Denominator</td>
<td>The total number of eligible in-patients in your pilot population during the month.</td>
</tr>
<tr>
<td>Data Source</td>
<td>Local Audit</td>
</tr>
<tr>
<td>Method of calculation</td>
<td>Calculate the actual percent of eligible in-patients receiving appropriate HAT prophylaxis by dividing the numerator by the denominator and then multiplying the resulting proportion by 100.</td>
</tr>
<tr>
<td>Collection guidance</td>
<td>Create a system to track this measure prospectively in 100% of relevant pilot population. Review a minimum of 20 randomly selected case notes per month of in-patients. The key question is how many of these patients received the prophylaxis identified from their risk assessment. If you start measuring this in a pilot population, you will have annotate your charts every time you add another area to your population.</td>
</tr>
</tbody>
</table>
## Appendix C - Measures (3)

<table>
<thead>
<tr>
<th>Measure name</th>
<th>% reassessed for risk of HAT at 48 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure type</td>
<td>Process</td>
</tr>
<tr>
<td>Related content area / driver</td>
<td>Reduce avoidable death, disability and chronic ill health from Hospital Acquired Thrombosis</td>
</tr>
<tr>
<td>Description</td>
<td>Percent of in-patients whose risk assessment is reviewed and documented at 48 hours.</td>
</tr>
<tr>
<td>Rationale</td>
<td>The measure assesses whether units are complying with evidence-based practice. The implication is that high compliance should prompt the appropriate treatment of at risk patients and therefore reduce the risk of developing a HAT and minimising inappropriate treatment.</td>
</tr>
<tr>
<td>Numerator</td>
<td>The total number of in-patients reassessed (documented) for risk 48 hours post initial assessment in the pilot population.</td>
</tr>
<tr>
<td>Data Source</td>
<td>Local Audit</td>
</tr>
<tr>
<td>Denominator</td>
<td>The total number of in-patients in your pilot population during the month.</td>
</tr>
<tr>
<td>Data Source</td>
<td>Local Audit</td>
</tr>
<tr>
<td>Method of calculation</td>
<td>Calculate the actual percent of eligible patients reassessed by dividing the numerator by the denominator and then multiplying the resulting proportion by 100.</td>
</tr>
<tr>
<td>Collection guidance</td>
<td>Create a system to track this measure prospectively in 100% of relevant pilot population. Records review of admission over 72 hours. If you start measuring this in a pilot population, you will have annotate your charts every time you add another area to your population.</td>
</tr>
</tbody>
</table>
### Appendix C - Measures (4)

<table>
<thead>
<tr>
<th>Measure name</th>
<th>% patients developing a HAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure type</td>
<td>Outcome</td>
</tr>
<tr>
<td>Related content area / driver</td>
<td>Reduce avoidable death, disability and chronic ill health from Hospital Acquired Thrombosis.</td>
</tr>
<tr>
<td>Description</td>
<td>The percentage of patients who have been in hospital in the last 3 months that develop a DVT or PE.</td>
</tr>
<tr>
<td>Rationale</td>
<td>The measure assesses whether units are complying with evidence-based practice. The implication is that a low rate of HAT is reflective of effective assessment and prophylaxis.</td>
</tr>
<tr>
<td>Numerator</td>
<td>The total number of discharged patients identified as having a DVT / PE within 3 months of hospital admission.</td>
</tr>
<tr>
<td>Data Source</td>
<td>Local Audit, death certificates, Post mortem results, Coroners reports, readmission data, radiology reports.</td>
</tr>
<tr>
<td>Denominator</td>
<td>The total number of patients admitted in your pilot population during the month.</td>
</tr>
<tr>
<td>Data Source</td>
<td>Local Audit</td>
</tr>
<tr>
<td>Method of calculation</td>
<td>Calculate the actual percent of eligible patients risk-assessed by dividing the numerator by the denominator and then multiplying the resulting proportion by 100.</td>
</tr>
<tr>
<td>Collection guidance</td>
<td>Create a system to track this measure prospectively in 100% of relevant pilot population. If you start measuring this in a pilot population, you will have annotate your charts every time you add another area to your population.</td>
</tr>
</tbody>
</table>
Appendix D - Literature

- Government Response to the House of Commons Health Committee Report on the Prevention of Venous Thromboembolism in Hospitalised Patients


  www.hospitalmedicine.org/AM/Template.cfm?Section=QI_Current_Initiatives_and_Training_Opportunities&Template=/CM/HTMLDisplay.cfm&ContentID=14406


- www.nice.org.uk/nicemedia/pdf/VTEFullGuide.pdf

- RCOG (2009) Thrombosis and Embolism during Pregnancy and the Puerperium, Reducing the Risk (Green-top 37)


  www.bmj.com/cgi/reprint/339/dec03_1/b4583?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=1&author1=sweetland&andorexacttitle=and&andorexacttitleabs=and&andorexactfulltext=and&searchid=1&FIRSTINDEX=0&sortspec=date&fdate=/&resourcetype=HWCIT
Appendix E - Setting up your team

Achieving improvements that reduce harm, waste and variation at a whole-organisation level needs a team approach: one person working alone, or groups of individuals working in an uncoordinated way will not achieve it and this applies equally at all organisational levels.

Whether your improvement priorities relate to 1000 Lives Plus content areas, national intelligent targets or other local priorities, you need to consider three different dimensions in putting your team together:

- Organisation level leadership.
- Clinical or technical expertise.
- Frontline leadership.

There may be one or more individuals on the team working in each dimension, and one individual may fill more than one role, but each component should be represented in order to achieve sustainable improvement.

Organisation level leadership

An Executive, or equivalent level Director, should always be given delegated accountability from the Chief Executive for a specific content area; and all staff working on the changes should know who this is. This individual needs sufficient influence and authority to allocate the time and resources necessary for the work to be undertaken. It is likely that accountability will be further delegated to Divisions, Clinical Programme Groups or Directorates and this can help to build ownership and engagement at a more local level. However, it is essential that the leader has full authority over the areas involved in achieving the improvement aim. As changes spread more widely, crossing organisational boundaries, appropriate levels of delegation will need to be reviewed.

When working with frontline teams, it is essential for organisational level leaders to have an understanding of the improvement methodology and to base conversations around the interpretation of improvement data. Reporting of progress to higher organisational levels should also use a consistent data format so that the Executive level leader can report to the Board on progress.

Clinical/Technical Expertise

A clinical or technical expert is someone who has a full professional understanding of the processes in the content area. It is critical to have at least one such champion on the team who is intimately familiar with the roles, functions, and operations of the content area. This person should have a good working relationship with colleagues and with the frontline leaders, and be interested in driving change in the system. It is important to look for clinicians or technical professionals who are opinion leaders in the organisation (individuals sought out for advice who are not afraid to try changes).
Patients can provide expert advice to the improvement team, based on their experience of the system and the needs and wishes of patients. A patient with an interest in the improvement of the system can be a useful member of the team.

Additional technical expertise may be provided by an expert on improvement methodology, who can help the team to determine what to measure, assist in the design of simple, effective measurement tools, and provide guidance on the design of tests.

**Frontline leadership**

Frontline leaders will be the critical driving component of the team, assuring that changes are tested and overseeing data collection. It is important that this person understands not only the details of the system, but also the various effects of making changes in the system. They should have skills in improvement methods. This individual must also work effectively with the technical experts and system leader. They will be seen as a bridge between the organisation leadership and the day-to-day work.

Frontline leaders are likely to devote a significant amount of their time to the improvement work, ensuring accurate and timely data collection for process and outcome measures related to the frontline team.

**Characteristics of a good team member**

In selecting team members, you should always consider those who want to work on the project rather than trying to convince those that do not. Some useful questions to consider are the following:

- Is the person respected for their judgment by a range of staff?
- Do they enjoy a reputation as a team player?
- What is the person’s area of skill or technical proficiency?
- Are they an excellent listener?
- Is this person a good verbal communicator within and in front of groups?
- Is this person a problem-solver?
- Is this person disappointed with the current system and processes and passionately want to improve things?
- Is this person creative, innovative, and enthusiastic?
- Are they excited about change and new technology?
Appendix F - The Model for Improvement

Successful improvement initiatives don’t just happen - they need careful planning and execution. There are many things to consider and techniques to employ, which are captured in the driver diagram on page 34. The rest of this section explains the primary drivers and where to get more help in using them.

In any improvement initiative you need to succeed in three areas. You need to generate the Will to pursue the changes, despite difficulties and competing demands on time and resources. You need the good Ideas that will transform your service. Finally you need to Execute those ideas effectively to get the change required.

Will

The interventions you need to build Will are explained in the ‘Leading the Way to Safety and Quality Improvement’ and ‘How to Improve’ guides. They concentrate on raising the commitment levels for change and then providing the project structure to underpin improvement approaches. Spreading changes to achieve transformative change across the whole health system requires strong leadership. We need to create an environment where there is an unstoppable will for improvement and a commitment to challenge and support teams to remove any obstacles to progress.

Ideas

The interventions in this guide describe ideas which evidence shows to be effective for achieving changes that result in improvements. It gives examples from organisations that have achieved them and also advice based on their experience. Methods and techniques for generating new ideas or innovative ways to implement the evidence can be found in the ‘How to Improve’ guide and other improvement literature.

Execution

However, to bring these ideas into routine practice in your organisation, it is essential that you test the interventions and ensure that you have achieved a reliable change in your processes before attempting to spread the change more widely.

1000 Lives Plus uses the Model for Improvement (MFI) which is a proven methodology as the basis for all its improvement programmes. It requires you to address three key questions and then use Plan-Do-Study-Act (PDSA) cycles to test a change idea. By doing repeated small-scale tests, you will be able to adapt change ideas until they result in the reliable process improvement you require. Only then are you ready to implement and spread the change more widely.
Model for Improvement

Driver Diagram

**Aim**

**Primary drivers**

**Secondary drivers**

**Interventions**

Create an organisational culture and environment for improvement

Engage senior Leadership
Make links to organisation goals
Form teams
Build skills
Raise awareness
Appoint clinical champions

Use the relevant content area ‘How to Guide’ to assess the latest evidence of best practice

Consult Faculty members to agree standards to be achieved
Use critical sub sets of key content areas to improve the outcome

The Model for Improvement

**What are you trying to accomplish?**

Set SMART aims
Communicate aims
Use project charter to provide structure

**How will you know that a change is an improvement?**

Understand what to measure
Use 7 step measurement process

**What change can you make that will result in improvement?**

Map the process
Use creative thinking

PDSA cycles:
Test - implement - spread - sustain

**Establish reliable process**

Use reliability model

To deliver patient safety and quality initiatives for Health Boards and Trusts

Ideas
Evidence Base (The what to)

Execution
Improvement Methodology (The how to)

Will
Model for Improvement-PDSA Cycle

For more guidance on using the Model for Improvement, see the ‘How to Improve’ guide.

Seven Steps to Measurement

1. Decide aim
2. Choose measures
3. Define measures
4. Collect data
5. Analyse & present
6. Review measures
7. Repeat steps 4-6

Preventing Hospital Acquired Thrombosis
One area that bears extra attention is measurement because we have found that this is often the Achilles heel of improvement projects. When measuring your progress, follow the Seven Steps to Measurement shown on page 35 and covered in more detail in the ‘How to Improve’ Guide.

The key is to go round the Collect-Analyse-Review cycle frequently:

- turn it into something useful like a run chart
- meet to decide what your data is telling you and then take action

Successful improvement projects all have clear aims, robust measurement and well-tested ideas. Use the ‘How to Improve’ guide to ensure your projects have all three.

What are we trying to accomplish?

You will need to set an aim that is Specific, Measurable, Achievable, Realistic and Time-bound (SMART). Everyone involved in the change needs to understand what this is and be able to communicate it to others.

How will we know that change is an improvement?

It is essential to identify what data you need to answer this question and how to interpret what the data is telling you. The improvement methodology ‘How to Guide’ provides detailed information on the tools, tips and information you need to achieve this, and includes the following advice:

- Tracking a few key measures over time is the single most powerful tool a team can use.

  - Remember, measurement is not the goal; improvement is the goal. In order to move forward to the next step, a team needs just enough data to know whether changes are leading to improvement.
  - Sampling is a simple, efficient way to help a team understand how a system is performing.
  - Useful data is often easy to obtain without relying on information systems.
  - In addition to collecting quantitative data, be sure to collect qualitative data, which is often easier to access and highly informative.
  - Don’t overreact to a special cause and don’t think that random movement of your data up and down is a signal of improvement.
What change can we make that will result in improvement?

The interventions in this guide describe a range of change ideas that are known to be effective. However, you need to think about your current local systems and processes and use the guide as a starting point to think creatively about ideas to test. The improvement methodology guide gives more advice to support you in generating ideas.

Spreading changes to achieve transformative change across the whole health system requires strong leadership. We need to create an environment where there is an unstoppable will for improvement and a commitment to challenge and support teams to remove any obstacles to progress. The guide on ‘Leading the Way to Safety and Quality Improvement’ gives detailed information on interventions that will support this. However, the Model for Improvement, PDSA cycles and process measurement lie at the heart of the transformative change we seek.
Improving care, delivering quality

If we can improve care for one person, then we can do it for ten.

If we can do it for ten, then we can do it for a 100.

If we can do it for a 100, we can do it for a 1000.

And if we can do it for a 1000, we can do it for everyone in Wales.

www.1000livesplus.wales.nhs.uk