GUIDELINE	
Venous Thromboembolism (VTE) – Primary Prophylaxis	
Scope (Staff):	Medical, Nursing, Allied Health
Scope (Area):	PMH / PCH

This document should be read in conjunction with this DISCLAIMER

Aim

This guideline provides evidence for the assessment of VTE risk and prophylaxis for children and adolescents from 6 months to <16 years of age within Princess Margaret Hospital / PCH.

Background / Risk [1,2]

While the need for prophylaxis of VTE in adult medical and surgical patients is well established and risk factors for VTE in children and adolescents are known, the indications for prophylaxis in children are less well defined. This is largely because there are 10-fold fewer episodes of VTE in children and the relative contribution of many risk factors is small, making the risk-benefit of routine pharmacologic prophylaxis marginal and expensive.

Education and knowledge of medical and nursing staff should be directed at non-pharmacologic avoidance of VTE as well as early recognition of VTE with limited use of anti-thrombotic agents.

Risk factors for venous thromboembolism in children and adolescents:
Central venous line [2]
Immobility or prolonged bed rest
Congenital heart disease and associated surgeries
Cancer and chemotherapy
Inherited thrombophilia
Nephrotic syndrome
Major burns / trauma
Cardiac catheterisation
Obesity
Surgery: Prolonged surgery / orthopaedic surgery / neurosurgery
Smoking
Dehydration
Oral contraceptive pill
Previous VTE or family history of VTE
Medications e.g. asparaginase

Prevention during surgery, anaesthesia and intensive care

- Few patients require prophylaxis with low molecular weight heparin (LMWH). [1,2]
- Consider consulting a clinical haematologist to aid decision making.
- Most indications are in patients with complex cardiac abnormalities / procedures and anti-thrombotic therapy should be directed by the treating specialist.
- Refer to the American College of Chest Physicians guidelines (2012)[1] for comprehensive guidance on anti-thrombotic therapy for children with complex issues. These patients should be managed individually by their primary consultant in liaison with the anaesthetist, surgeon and haematologist.
- There are insufficient data for useful guidelines to be written for VTE prophylaxis, including peri-operative prophylaxis, in patients with other rare paediatric conditions such as sickle cell disease, patients with acute lymphoblastic leukaemia on asparaginase which may have an inherent risk of VTE.

General measures *[1,2]*

- Both dehydration and immobility are independent risk factors for thrombosis. Therefore, all patients should be kept well hydrated with oral or IV fluids and should be mobilised as early as possible.

Mechanical prophylaxis

- There is limited evidence to support routine use of graduated compression stockings and pneumatic compression devices in children and adolescents.
- Can be considered in older children / adolescents at higher risk for VTE who are of an appropriate size for fitting of the devices.
- Mechanical devices should only be measured and applied by staff trained / experienced in their use.
    - **Compression stockings** (TED): See Appendix 1 for measurement and application instruction. Note: knee length is as effective as above knee.
    - **Pneumatic compression devices** (e.g. *Flowtron® boots):* Available in two sizes only, up to calf size 43cm circumference, use therefore according to fit. Refer to manufacturer instructions for use.
- Contraindications include:
    - Major leg deformity / acute fracture
    - Peripheral vascular disease / severe peripheral neuropathy
    - Pulmonary oedema.
    - Poor skin condition / dermatitis
    - Recent skin grafts, leg wounds or
    - Known or suspected acute DVT or phlebitis
    - Ischemic disease

Pharmacological prophylaxis

Enoxaparin (Clexane)

- Refer to Enoxaparin Monograph for indications, contraindications, dosing and administration information.

Thrombophilia screening [4,5]

- There is currently no indication for thrombophilia screening in children with VTE or with a family history of thrombophilia except in the rare clinical scenario of neonatal skin necrosis to confirm or exclude homozygous deficiencies and prescribe appropriate treatment.
- Knowing whether or not a child has an inherited thrombophilic defect does not aid decision making regarding primary prophylaxis of VTE. Even following an episode of thrombosis, treatment and prophylaxis recommendations are not altered by thrombophilia screening results.
- Routine thrombophilia screening is not recommended prior to prescription of the oral contraceptive (OCP) in adolescents since the increase in risk of VTE does not outweigh the benefit of OCP use.

Early recognition and treatment of VTE

- While not the remit of this guideline, it must be acknowledged that simply because of the relative rarity of paediatric VTE, many episodes will not be prevented and education and knowledge are required for the recognition of clinical signs and symptoms of VTE in neonates, children and adolescents.
- Early and appropriate investigations for diagnosis, therapy and secondary prevention of VTE are essential to reduce the morbidity from post-phlebitic syndrome.
- Anti-thrombotic therapy in neonates and children is a complex issue and the reader is referred to Monagle et al Chest 2012 [1] for treatment guidelines and advised to manage patients in consultation with a clinical haematologist. These guidelines also address prophylaxis and treatment of arterial thrombosis.

Related internal policies, procedures and guidelines
Enoxaparin – Paediatric (Monograph)

References
1. Monagle P, Chan A et al. Antithrombotic therapy in neonates and children: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines (9th ed). Chest. 2012; 141 (2) (Suppl):e737S-e801S. Accessed online 28.06.2017

References
2. Biss T. Venous Thromboembolism in Children: Is It Preventable? Seminars in Thrombosis & Hemostasis. 2016. 42(6) : 603-611
3. Jackson PC, Morgan JM. Perioperative thromboprophylaxis in children: development of a guideline of management. 2008; Pediatr Anesth. 2008; 18:478-487
4. Tormene D, Pagnan, A Prandoni P, Simioni P. Screening for thrombophilia in children: a puzzling decision with unclear implications. J Thromb Hemost 2004; 2:1193-1194
5. Baglin T et al. Clinical guidelines for testing for heritable thrombophilia. British Journal of Haematology 2010; 149: 209–220.

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File Path:	W:\Safety & Quality\CAHS\CLOVERS Nursing Infection Control\Clinical Practice Manual\Word docs\PCH.CPM.VenousThromboembolismPrimaryProphylaxis.docx				
Document Owner:	Haematology Head of Department				
Reviewer / Team:	Clinical Consultant Haematologist; Clinical Pharmacist; Anaesthesia; PICU				
Date First Issued:	May 2010	Last Reviewed:	July 2017	Review Date:	01/02/2021
Approved by:	PMH Clinical Practice Advisory Committee			Date:	01/02/2018
Endorsed by:	Director Clinical Services			Date:	01/02/2018
Standards Applicable:	NSQHS Standards:				
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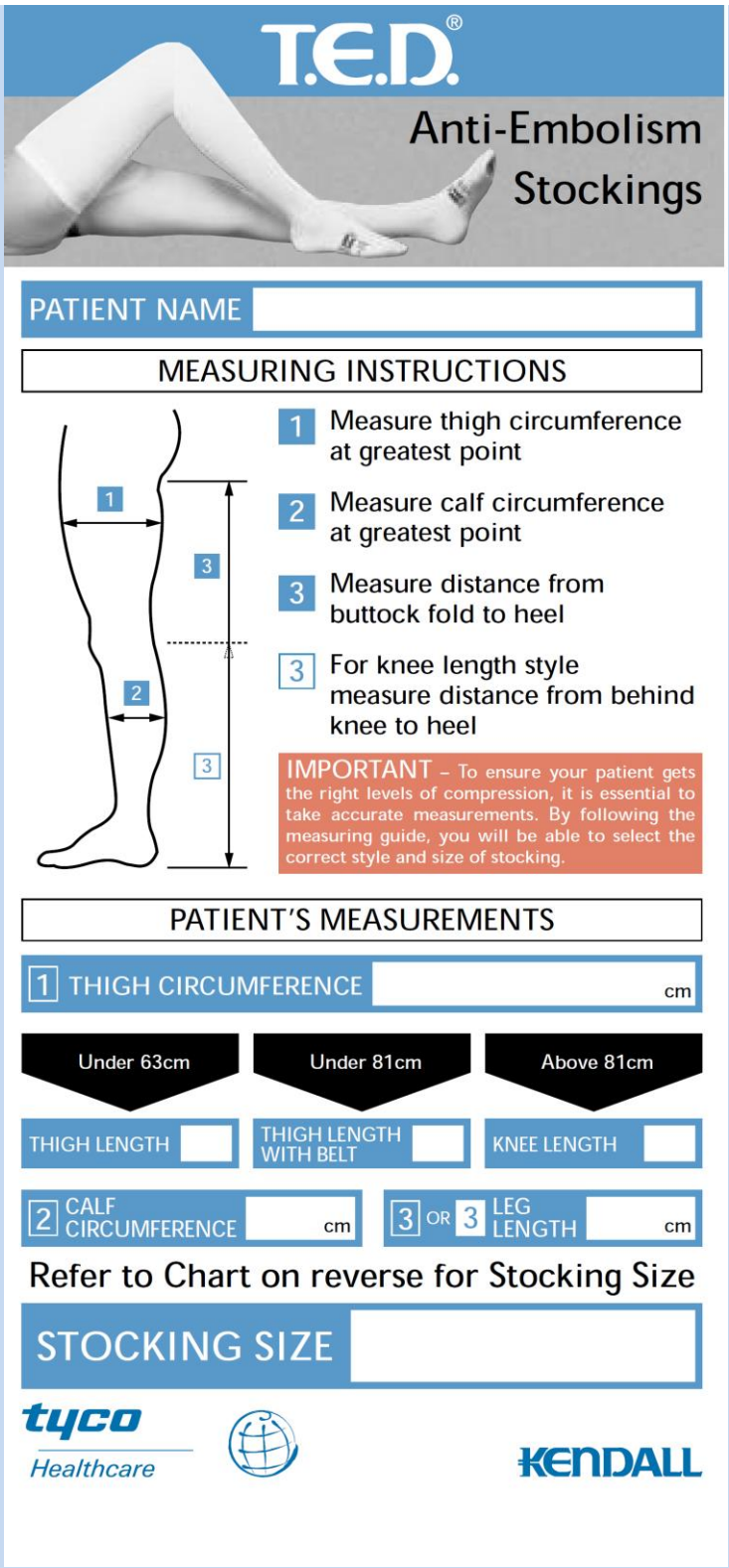
Appendix 1: How to measure and apply compression stockings



Application:

1. Select the correct size (see over page)
2. Apply carefully, aligning toe hole under the toes
3. Check capillary refill in the toes 30 minutes after application. If more than 2 seconds, the stockings should be removed, medical staff informed and stocking size reassessed.
4. Check fitting daily for change in leg circumference (e.g. alteration in oedema)
5. Remove daily for no more than 30 minutes, inspecting skin condition / integrity
6. Do not fold the stockings down

Contraindications:

- dermatitis,
- massive leg oedema,
- major leg deformity,
- severe peripheral neuropathy,
- peripheral vascular disease
- pulmonary oedema

Compression Stocking sizes:

Under 63cm

Calf circumference	Length	Code	Size	Colour Code: Toe	Colour Code: Top
less than 31cm SMALL	less than 74cm SHORT	3071	A		
	74 to 84cm REGULAR	3130	B		
	84cm and more LONG	3222	C		
31cm to 38cm MEDIUM	less than 74cm SHORT	3310	D		
	74 to 84cm REGULAR	3416	E		
	84cm and more LONG	3549	F		
38cm to 45cm LARGE	less than 74cm SHORT	3634	G		
	74 to 84cm REGULAR	3728	H		
	84cm and more LONG	3856	J		

Under 81cm

Calf circumference	Length	Code	Size	Colour Code: Toe	Colour Code: Top
less than 25cm EXTRA SMALL	less than 71cm REGULAR	3306	–		
	71cm and more LONG	3320	–		
25cm to 31cm SMALL	less than 72cm REGULAR	3039	A+		
	72cm and more LONG	3364	B+		
31cm to 38cm MEDIUM	less than 72cm REGULAR	3144	C+		
	72cm and more LONG	3449	D+		
38cm to 45cm LARGE	less than 74cm REGULAR	3221	E+		
	74cm and more LONG	3523	F+		
38cm to 45cm EXTRA LARGE	less than 72cm REGULAR	3922	G+		
	72cm and more LONG	3995	H+		

Above 81cm

Calf circumference	Length	Code	Size	Colour Code: Toe	Colour Code: Top
less than 31cm SMALL	less than 41cm REGULAR	7071	A–		
	41cm and more EXTRA LONG	7339	B–		
31cm to 38cm MEDIUM	less than 43cm REGULAR	7115	C–		
	43cm and more EXTRA LONG	7480	D–		
38cm to 45cm LARGE	less than 46cm REGULAR	7203	E–		
	46cm and more EXTRA LONG	7594	F–		
45cm to 51cm EXTRA LARGE	less than 46cm REGULAR	7604	G–		
	46cm and more EXTRA LONG	7802	H–		