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CHANGE PAGE

Use graduated compression stockings postoperatively to prevent deep vein thrombosis

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Improvements in clinicians' use of graduated compression stockings are needed, supported by consistent policies in hospitals and general practice

The clinical problem

The overall risk of deep vein thrombosis is higher than 20% after major surgery and higher than 40% in patients having major orthopaedic surgery.¹ The level of risk for individual patients depends on their clinical condition and the nature of the operation. Although a deep vein thrombosis may be asymptomatic, it will often give rise to long term morbidity, and there is potential for pulmonary embolism and sudden death. Graduated compression stockings are effective in decreasing the risk of deep vein thrombosis, either alone or in combination with pharmacological prophylaxis in high risk patients. Both forms of prophylaxis are used suboptimally in clinical settings.² Graduated compression stockings should be used routinely for surgical inpatients.

The evidence for change

The most recent review of the evidence was commissioned by the National Institute for Health and Clinical Excellence (NICE), which provides national guidance for clinicians in England and Wales.¹ This study reviewed nine randomised controlled trials with 1344 participants identified in two previous systematic reviews^{3,4} that compared graduated compression stockings with no prophylaxis and concluded that stockings reduce the risk of deep vein thrombosis by 51%. There were too few trials and too few cases reporting pulmonary embolism to assess effects of stocking use on this outcome. The NICE guideline recommends that all patients admitted to hospital for surgery, except those with peripheral arterial disease, should wear graduated compression stockings from the time of admission until they return to their usual level of mobility.

The two previous reviews reached broadly similar conclusions about the value of graduated compression stockings.^{3,4} However, the NICE review recommends thigh length stockings as superior to knee length, whereas one of the other two reviews found insufficient evidence to assess whether thigh length stockings are more effective.³ Given the reported practical difficulties of using thigh length stockings adequately in day to day clinical practice, knee length stockings may be the better option. More evidence about the comparative effectiveness of knee and thigh length stockings is required.

In surgical patients, both mechanical and pharmacological methods are commonly used (either alone or in combination), but mechanical methods have an advantage in that they are not associated with a risk of bleeding.

Barriers to change

Interventions to improve the use of graduated compression stockings face the same barriers to successful implementation as do interventions directed at improving thromboprophylaxis practice. A recent systematic review identified several important barriers: a variability in clinicians' knowledge of risk assessment and appropriate prophylaxis; a lack of belief in the benefits of prophylaxis; and a lack of universal acceptance that the evidence found in guidelines is suitable or appropriate in all clinical situations.⁵ The problem is often compounded by the lack of hospital systems to support best practice, such as a lack of agreement about when to use stockings, which patients need them, who is responsible for ordering them, where their use should be documented, when and how they should be fitted, and by whom they should be applied and checked.⁶ Variable policies and practice

Methods

Analysis of findings from the three most recent systematic reviews of the evidence on the use of graduated compression stockings for prophylaxis for deep vein thrombosis in surgical patients.^{1,3,4}

Change Page aims to alert clinicians to the immediate need for a change in practice to make it consistent with current evidence. The change must be implementable and must offer therapeutic or diagnostic advantage for a reasonably common clinical problem. Compelling and robust evidence must underpin the proposal for change.

between and within surgical units and hospitals leave staff confused and patients vulnerable.

Patient education about the benefits of stockings is highly variable and results in inconsistent wear.⁷ Patients often complain that stockings are painful, hot, itchy, and uncomfortable, particularly thigh length stockings, and compliance studies have found that they are often not reapplied after bathing or walking.^{6,8}

How should we change our practice?

To improve use of prophylaxis against venous thromboembolism requires clinical leadership, improved knowledge by clinicians of risk assessment and prescribing, and a supportive system that removes some of the individual barriers that currently result in suboptimal practices.⁵ Hospital policies on thromboprophylaxis are an essential first step as they enable senior clinicians to consider the evidence, reach agreement on best practice in their facility, and support all staff in their practice. Policies should also clarify which staff are responsible for assessing patient risk, as well as initiating, maintaining, and documenting the proper use of thromboprophylaxis measures, including use of stockings.^{5,9}

The evidence suggests that, although improving clinicians' knowledge of venous thromboembolism risk assessment and prophylaxis through education strategies is important, this is not particularly effective without the additional step of actively reminding clinicians to assess for risk and simplifying the prescription process, such as through a computer based system.⁵ A paper based reminder system with active monitoring of adherence may be equally effective.⁹

All patients having surgery need to be educated about the risk of deep vein thrombosis, preferably by their doctor and preadmission nurse, and need their risk to be assessed by their admitting doctor and have their prophylaxis needs (or contraindications) documented in a highly visible and agreed location, such as the patient's medication chart. Once the need for stockings has been documented, trained nursing staff can measure and fit patients with appropriately sized stockings at the time of admission. Patients who are at highest risk of deep vein thrombosis should receive both graduated compression stockings and

pharmacological forms of prophylaxis.¹ Nursing staff need to educate patients in proper fitting and checking of their skin on a daily basis and provide them on discharge with two pairs of stockings for home use.⁷

General practitioners need to be aware of the risk of postoperative deep vein thrombosis and explain to patients, or give them leaflets on, the need to wear stockings or use other forms of thromboprophylaxis after surgery. General practitioners should also be provided with clear advice on the duration of use of prophylaxis after discharge and encourage use until patients are fully mobile.

Hospital processes (such as preadmission procedures, admission and risk assessment arrangements, staff education and orientation, patient records, product availability, and purchasing practices) need to be regularly audited to ensure that policies exist and are being implemented.⁹ Use of graduated compression stockings and other forms of thromboprophylaxis in surgical patients should be reported as a hospital quality measure and incorporated into accreditation standards.

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Key points

Graduated compression stockings are effective in reducing the risk of deep vein thrombosis in surgical patients, either alone or in combination with pharmacological prophylaxis in patients at higher risk

The advantage of stockings in surgical settings is that they do not increase the risk of bleeding, but they should not be used in patients with peripheral arterial disease

All hospitals should have thromboprophylaxis policies that clarify who is responsible for assessing and managing the risk of deep vein thrombosis in admitted patients

- 1 National Institute for Health and Clinical Excellence. *Venous Thromboembolism. Reducing the risk of venous thromboembolism (deep vein thrombosis and pulmonary embolism) in inpatients undergoing surgery*. 2007. Clinical guideline No 46. www.nice.org.uk/guidance/index.jsp?action=byID&o=11006
- 2 National Institute of Clinical Studies. *Evidence-practice gaps report volume 1*. Melbourne: NICS, 2003. Available at www.nhmrc.gov.au/nics
- 3 Roderick P, Ferris G, Wilson K, Halls H, Jackson D, Collins R, et al. Towards evidence-based guidelines for the prevention of venous thromboembolism: systematic reviews of mechanical methods, oral anticoagulation, dextran and regional anaesthesia as thromboprophylaxis. *Health Technology Assessment* 2005;9. (No 49.)
- 4 Amaragiri SV, Lees TA. Elastic compression stockings for prevention of deep vein thrombosis. *Cochrane Database Syst Rev* 2000;(1):CD001484.
- 5 Toher R, Middleton P, Pham C, Fitridge R, Rowe S, Babidge W, et al. A systematic review of strategies to improve prophylaxis for venous thromboembolism in hospitals. *Ann Surg* 2005;241:397-415.
- 6 Hayes JM, Lehman CA, Castonguay P. Graduated compression stockings: updating practice, improving compliance. *MedSurg Nurs* 2002;11:163-7.
- 7 May V, Clarke T, Coulling S, Cowie L, Cox R, Day D, et al. What information patients require on graduated compression stockings. *Br J Nurs* 2006;15:263-70.
- 8 Brady D, Raingruber B, Peterson J, Varnau W, Denman J, Resuello R, et al. The use of knee-length versus thigh-length compression stockings and sequential compression devices. *Crit Care Nurs Q* 2007;30:255-62.
- 9 National Institute of Clinical Studies. *Stop the clot guide*. [Integrating VTE prevention guideline recommendations into routine hospital care.] Canberra: National Health and Medical Research Council, 2007. Available at www.nhmrc.gov.au/nics