Intermittent pneumatic compression for deep vein thrombosis in patients with stroke

A randomised controlled trial finds that intermittent pneumatic compression reduces the risk of deep vein thrombosis in immobile inpatients who have been admitted to hospital after a stroke.

**Overview:** Patients who have been admitted to hospital with a medical illness and have significantly reduced mobility are at increased risk of developing deep vein thrombosis (DVT). The risk is particularly high in immobile patients admitted to hospital with a stroke: incidence of DVT is 50% in these patients compared with 13% in general medical patients.

People with stroke may be at high risk of bleeding (Whiteley et al. 2013), so anticoagulants, such as low molecular weight heparin, are not always suitable for these patients. Mechanical prophylaxis, such as intermittent pneumatic compression (IPC), is effective at preventing DVT in patients who have undergone surgery (Roderick et al. 2005), but the benefits of this approach in patients with stroke are not clear.

See the NICE Evidence Services topic page on [venous thromboembolism](#) for a general overview of this condition.

**Current advice:** NICE guidance on reducing the risk of venous thromboembolism in patients admitted to hospital recommends that adults admitted for stroke should be offered a foot impulse or IPC device until start of pharmacological prophylaxis with low molecular weight heparin (unfractionated heparin in patients with renal failure). However, pharmacological prophylaxis can be given to patients with stroke only if their risk of bleeding is assessed to be low and they meet one or more of the following criteria: major restriction of mobility; previous history of venous thromboembolism; dehydration; and comorbidities (such as malignant disease).

The NICE Pathway on [venous thromboembolism](#) brings together all related NICE guidance and associated products on the condition in a set of interactive topic-based diagrams.

**New evidence:** In this third study from the CLOTS Trials Collaboration (2013), patients who were immobile and had been admitted to hospital within 3 days of acute stroke were randomly assigned to receive or not receive IPC. Compression was administered continuously day and night to both legs for a minimum of 30 days from randomisation or until the patient regained mobility, was discharged or died. To detect DVT, compression duplex ultrasound was performed at 7–10 days by a technician blinded to treatment allocation. If practical, compression duplex ultrasound was performed again at 25–30 days. Patients were followed up at 6 months to determine survival and late symptomatic venous thromboembolism.

Patients (n=2876) at 94 centres in the UK were randomised to IPC or no compression (n=1438 in each group, median age 76 years). IPC was administered for a mean of 12.5 days, with only around a third (31%) of patients receiving compression for 30 days.
At 30 days' follow-up, patients allocated to IPC were less likely to have symptomatic or asymptomatic DVT in the proximal veins than were patients not in the compression group (adjusted odds ratio [OR]=0.65, 95% confidence interval [CI] 0.51 to 0.84, p=0.001). Patients in the IPC group were also less likely to have any DVT at 6 months' follow-up (adjusted OR=0.72, 95% CI 0.60 to 0.87, p=0.001). Fewer patients in the IPC group than in the no compression group had died at 30 days (11% vs 13%, p=0.057) or at 6 months (22% vs 25%, p=0.059). Skin breaks on the legs occurred more frequently in the IPC group than in the no compression group (3% vs 1%, p=0.002).

The authors concluded that IPC reduces the risk of DVT and is a safe prophylactic technique in patients with stroke. They acknowledged that all patients and investigators were aware of treatment allocation and adherence was low, which could bias their findings.

**Commentary:** “Patients with acute stroke are at risk of complications of immobility, such as DVT, and it is the prevention and treatment of such complications that potentially accounts for the effectiveness of stroke units. However, no study has thus far clearly demonstrated the independent benefits of a single specific intervention.

“The previous CLOTS studies have benefited clinical practice by allowing removal of the routine use of graduated compression stockings for DVT, which were shown to be ineffective at preventing thrombosis (CLOTS Trials Collaboration 2009 and 2010). This measure has delivered cost savings, not only from the price of stockings but also in terms of freeing up the time of healthcare staff (for example, from taking stockings on and off patients). Pharmacological treatments are not effective in practice because the patients who would be at risk of DVT, and, therefore, recommended to be on anticoagulant drugs, cannot take anticoagulants because they are also at high risk of having bleeding complications.

“The benefits of IPC demonstrated in the third CLOTS trial bring to the fore an alternative approach to DVT prevention. However, implementation of the findings will be a challenge because although the equipment is inexpensive, it is not readily available in the NHS. In addition, the intervention is not favoured by patients or staff, and the concomitant lack of adherence was clear in this study because the suggested treatment period of 30 days was not achieved in the majority of patients.” – Caroline Watkins, Professor of Stroke & Older People’s Care and Director of Research, School of Health, University of Central Lancashire

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