

Guidance on the use of intermittent pneumatic compression (IPC) for the prevention of venous thromboembolism (VTE) after stroke

Background

Venous thromboembolism (deep vein thrombosis (DVT) and pulmonary embolism) is common after stroke, with up to 50% of patients having a thrombus in either the calf or the thigh of the affected leg. This guidance is to inform nurses of the current evidence to support their clinical practice in the prevention of VTE after stroke.

Risk of VTE after Stroke

According to SIGN (2010a) VTE is a multi-causal disease, the result of the coincidence of several risk factors which can be grouped as:

- inherent to the individual and may be inherited, e.g. thrombophilia
- inherent to the individual and can be acquired, e.g. obesity, cancer and certain drug use (e.g. oral contraceptive pill)
- the result of an intercurrent illness or procedure, or other cause of temporary reduced mobility, e.g. serious medical disorder such as stroke, following major trauma or surgery, pregnancy, or long-haul travel.

Hospital care in an organised stroke unit is likely to reduce the risk of VTE due to:

- early mobilisation rehabilitation policies
- early hydration with normal saline
- specialised nursing care (SIGN, 2010b).

VTE Prophylaxis after stroke

Interventions to prevent VTE after stroke:

- Low dose aspirin has been shown to be safe and effective in preventing VTE. **Aspirin (300 mg/day) should be given to all patients with acute ischaemic stroke in the first two weeks following stroke onset to help prevent VTE** (provided there are no known contraindications to aspirin therapy) (SIGN, 2010b).
- Patients at a particularly high risk of VTE following an ischaemic stroke (e.g. those with a history of previous DVT, known thrombophilia or active cancer) can be given prophylactic heparin. Low molecular weight heparin (LMWH) is recommended in preference to unfractionated heparin (UFH). Routine anticoagulation for VTE prophylaxis after stroke is not recommended (SIGN, 2010b).
- Anti-embolism / graduated compression (TEDS) stockings are **not effective** after stroke (CLOTS 1 and 2 trials).
- The CLOTS 3 trial demonstrated that **intermittent pneumatic compression (IPC) was effective** at reducing DVT after stroke.

CLOTS 3 Trial

The CLOTS 3 trial was a multicentre randomised controlled trial testing the effect of applying IPC. In summary, the trial showed that IPC was feasible, safe and was associated with a 30% relative reduction in DVT ($p < 0.001$) and, more importantly, a 14% improvement in overall survival to six months ($p = 0.042$).



Although low molecular weight heparin reduces the risk of DVT, it is associated with a greater risk of serious bleeding and NO improvement in survival or functional outcomes.

SSNF / NSNF recommendations for clinical practice for prevention of VTE after stroke

1. Which patients should be treated with IPC?

Patients with acute ischaemic or haemorrhagic stroke who are:

1. for active treatment (i.e. not for palliation)
2. immobile (unable to walk independently to the toilet)
3. able to wear IPC device
4. no contraindications to IPC for example:
 - a. severe congestive heart failure
 - b. severe skin problems on legs
 - c. severe peripheral vascular disease

2. When and for how long?

IPC should be applied for 30 days after stroke. It should be applied as soon as possible after admission and within 72 hours post admission.

IPC should be taken off (whichever comes first):

- when the patient becomes independently mobile
- at discharge from hospital
- if the patient develops any adverse effects
- at 30 days after stroke

It is not recommended to send patients home or to nursing homes with IPC.

What sort of IPC?

There are many different types of IPC (calf or thigh-length, single or sequential, asymmetric or circumferential, fixed or variable frequency, rapid or slow inflation). However, the evidence for VTE reduction is based solely on the system used in the CLOTS 3 trial. The CLOTS 3 trial tested the Kendall SCD™ Express compression system. This provides thigh-length, sequential, circumferential, slow inflation compression at a frequency determined by the venous refill time.

Which sleeves?

Only thigh-length sleeves were tested in CLOTS 3. Two types of sleeve were used in CLOTS 3, the “Original” sleeves and the “Comfort” sleeves (more “J Cloth” material), the latter introduced to enhance patient adherence. Although the differences were not huge, there was definite trend towards better adherence and effectiveness with the Comfort sleeve.



How are they applied?

The sleeves can be applied to patient's bare legs, or over pyjama trousers or stockings. The sleeves should be kept on for as much of the time as possible, day and night, both in bed, sitting out, mobilising and during physiotherapy. If patients are unable to adhere to this, intermittent use is probably better than none. If the patient is not willing to wear the sleeves on both legs, a single sleeve can be applied to the affected leg in which DVT is more likely to develop. If they are accidentally left off for a day or two, there appears to be no risk in re-applying them. Patients who are immobile may also be incontinent; however the sleeves are lower down on the thigh so should not require to be changed.



Monitoring its use

1. The Scottish Stroke Improvement Programme are supporting local implementation, procurement and training requirements.
2. Documentation of the IPC application should be in accordance with local policy. It is recommended they are prescribed on the drug kardex.
3. From January 2014, monitoring of IPC in Stroke Units is included in the Scottish Stroke Improvement Programme.
4. Skin integrity – due to a potential increase risk of skin breaks extra vigilance is recommended in monitoring skin integrity while the patient is wearing IPC by removing the sleeves, checking the lower limbs and pressure areas each shift (2-3 times a day).
5. Falls risk – the IPC sleeves have trailing tubing that could be a falls risk for some patients (e.g. those with inattention, hemianopia or confusion), and therefore this should be recorded in any falls risk assessment.
6. Mobilisation – it is recommended that the nursing team liaise closely with the physiotherapist and occupational therapist to ensure that the IPC device does not limit a patient's ability to mobilise or engage in rehabilitation.

If a patient develops a DVT

It is unclear whether the sleeves should be removed. If the patient finds them uncomfortable it is reasonable to remove them.

How many pumps and sleeves will my unit need?

This will depend on the numbers of admissions to your Stroke Unit, the proportion who are immobile and the duration of use. However, in the CLOTS 3 trial about 50% of stroke patients were immobile on admission and they used IPC for about two weeks on average. Two sleeves should be allocated per patient to allow for changing. For example, a unit admitting a total of 350 stroke patients per year might need:

- 10 Controllers
- 5 boxes of replacement tubing to cover losses; however tubing can be re-used.

Covidien produce sleeves in four sizes, based on patient's thigh circumference (at the level of the top of the sleeve). We would recommend ordering (boxes) in the following ratio in the first instance:

- Extra small (boxes of 5 pairs) - 1
- Small (boxes of 5 pairs) - 3
- Medium (boxes of 5 pairs) -3
- Large (boxes of 3 pairs) -1



How much do they cost?

Sleeves cost between £15 to £30 per sleeve, and the controllers are supplied by the manufacturers free of charge. Therefore they are considered a very cost effective form of VTE prophylaxis.

References / Further Reading

CLOTS (Clots in Legs Or sTockings after Stroke) Trials Collaboration (2013) Effectiveness of intermittent pneumatic compression in reduction of risk of deep vein thrombosis in patients who have had a stroke (CLOTS 3): a multicentre randomised controlled trial. *Lancet* 382: 516–24.

Scottish Intercollegiate Guidelines Network (2010a) 122 Prevention and management of venous thromboembolism. NHS Quality Improvement Scotland

Scottish Intercollegiate Guidelines Network (2010b) 118 Management of patients with stroke. NHS Quality Improvement Scotland

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Scottish Stroke Nurses Forum

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