# The use of the geko™ device for the prevention of venous thromboembolism in patients with acute stroke at The Luton & Dunstable University Hospital (L&D)

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## Introduction

Venous thromboembolism (VTE) remains a common complication in acute stroke which is further exacerbated if a patient is immobile for a prolonged period. In such circumstances NICE and the UK National Clinical Guidelines for Stroke both recommend intermittent pneumatic compression (IPC) as the primary method of VTE mechanical prophylaxis, alongside standard treatments, after acute stroke (NICE NG89 2018[1].

The Luton and Dunstable Hospital (L&D) identified that IPC is not suitable for all immobile acute stroke patients because of immediate contraindication due to vascular disease, fragile skin, skin reactions from the cuff materials and patient intolerance. In addition, it was noted that IPC leads and hoses can present a trip hazard.

NICE guidance MTG19 recommends the geko™ device for VTE prophylaxis in all hospital patients where standard prophylaxis treatments are impractical or contraindicated[2]. The geko™ device (Firstkind Ltd) is an NMES (neuromuscular electrostimulation) device which prevents stasis in the deep veins of the calf[3] by activation of foot and calf muscle pumps via stimulation of the peroneal nerve.

Real world data at the Royal Stoke[4] Hospital, University Hospital of the North Midlands NHS Trust UK has previously quantified when IPC could not be prescribed for immobile stroke patients and found the need for the geko™ device as an alternative anti-stasis device to be ~30%. These patients would otherwise have had no other form of mechanical prophylaxis intervention available to them with the reliance on standard treatment of aspirin and hydration to reduce VTE risk; perhaps with an associated VTE exposure of 8.7% (CLOTS 3[5]). Instead the geko™ was prescribed alongside standard measures (either as a the only or secondary VTE intervention), and a 90 VTE outcome review reported a 0.3% incidence in 316 patients who were prescribed the geko™ device.

## Aims

The aim of this audit was to evaluate the number of patients where IPC could not be prescribed as part of standard of care and assess whether geko™ could play a role as an alternative mechanical prophylactic intervention.

## Methodology

The audit covered a time interval assessing 320 acute stroke patients in total.

A sub-analysis of this cohort showed that 185 patients (Group A) had IPC and chemical prophylaxis as available interventions; whilst of 135 patients (Group B) had IPC, anticoagulation but also the geko™ device as an alternative intervention when either IPC or anticoagulation was contraindicated or not tolerated (all interventions in addition to standard of care).

This sub-analysis would allow a review to highlight any indicative changes in intervention patterns when the geko™ device was on service.

## Results

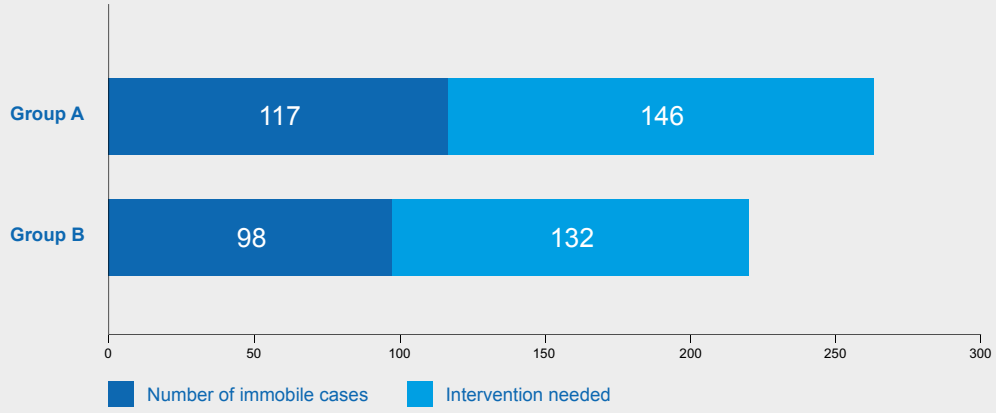
The demographic analysis of the n=320 patients showed that 186 were males (58.1%) and 134 were female (41.9%). In respect to stroke aetiology 266 patients (83.1%) suffered an ischemic stroke and 54 patients (16.9%) had a haemorrhagic stroke.

In terms of VTE prevention 215 of 320 patients from the audit were deemed immobile and required some form of prophylactic intervention. It should be noted that anticoagulation was either used adjunctively with either IPC or geko™ or alone when deemed appropriate. Furthermore, patients had successive interventions i.e. IPC or geko™ followed by anticoagulation. In summary, patients often had more than one successive intervention until they were either mobile or discharged.

- In Group A – this subgroup had 117 patients in need of VTE prophylaxis who required a total of 146 prescribed interventions.
- In Group B – this subgroup had 98 patients in need of VTE prophylaxis who required a total of 132 prescribed interventions.

Patients who were independently mobile, or due for discharge or had entered end of life pathway management were not prescribed any VTE prophylaxis.

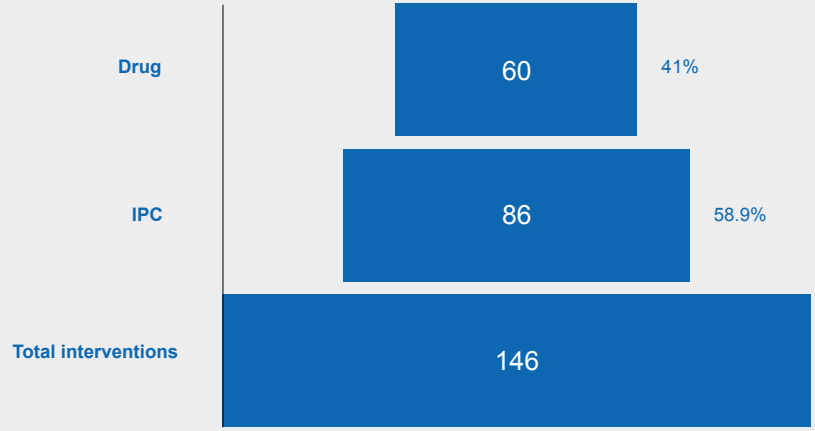
**Graph 1. Summary of immobile patients by subgroup and total interventions prescribed**




## Results

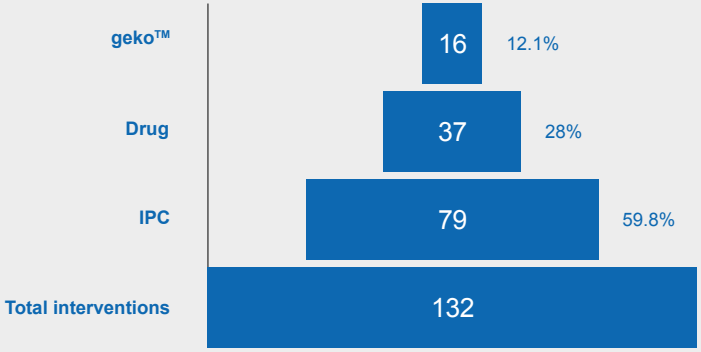
As described 117/185 patients in this subgroup required 146 VTE prophylaxis interventions in addition to standard of care. During this period only IPC and anticoagulation was available to physicians. Graph 2 illustrates that IPC represented 86/146 (58.9%) of prescriptions raised and anticoagulation was prescribed on 60/146 (41%) of occasions.

**Graph 2. VTE prophylaxis intervention breakdown Group A (n=185)**



As described 98/135 patients in this subgroup required 132 VTE prophylactic interventions in addition to standard of care. During this period IPC and anticoagulation but also the geko™ device was available to physicians to prescribe. Graph 3 illustrates that IPC represented 79/132 (59.8%) of prescriptions raised, anticoagulation was prescribed on 37/132 (28%) of occasions and the geko™ device represented 16/132 (12.1%) of prescribed need.

### Graph 3. VTE prophylaxis intervention breakdown Group B summary (n=135)




## Analysis of the prescribed mechanical VTE intervention Group A Vs Group B

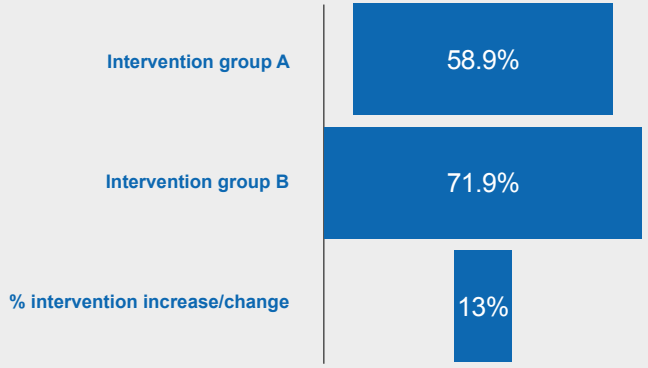
The above analysis shows that mechanical VTE prophylaxis was the intervention of choice for both groups.

Analysis of Group A shows that 86 prescriptions were raised for mechanical intervention (IPC) to serve the needs of 117 immobile patients. Mechanical intervention therefore represented 58.9% of the prophylactic need.

Conversely for Group B when the geko™ device was on service, 132 prescriptions were raised for a mechanical intervention (IPC or geko™) to serve the needs of 98 immobile patients. Mechanical intervention therefore represented 71.9% of the prophylactic need an increase of 13% compared to Group A.

The geko™ device served 12.1% of VTE prophylaxis need for Group B patients and achieved a 16.8% share (16/95) of mechanical prescription requests.

### Graph 4. Increased use of Mechanical VTE prophylaxis Group A Vs Group B (% of total prescriptions raised)




### Table 1. Summary of interventions used in audit

| Intervention | Total Audit (n=320) | Group A (n=185) | Group B (n=135) | Intervention change Group A vs Group B |
|---|---|---|---|---|
| Available interventions | ALL | IPC Anticoagulation | IPC Anticoagulation The geko™ device | |
| Patients requiring prophylaxis | 215 | 117 | 98 | |
| Prescribed interventions | 278 | 146 | 132 | |
| Anticoagulants | 97/278 or 34.8% | 60/146 or 41% | 37/132 or 28% | -13% |
| IPC | 165/278 or 59.3% | 86/146 or 58.9% | 79/132 or 59.8% | -0.01% |
| geko™ | 16/278 or 5.7% | 0 | 16/132 or 12.1% | +12.1% |
| Total mechanical need | 181/278 or 65% | 86/146 or 58.9% | 95/132 or 71.9% | +13% |
| geko™ as a % of mechanical need | 16/181 or 8.8% | 0 | 16/95 or 16.8% | 16.8% |

## Summary

### The geko™ device provides a meaningful alternative anti-stasis device when IPC or anticoagulation cannot be prescribed or tolerated.

- In Group A, IPC accounted for 58.9% of mechanical interventions required.
- In Group B, when the geko™ device was also available, as a mechanical intervention, total mechanical use increased to 71.9%.
- In Group B, the geko™ device served 17% of all mechanical prophylaxis interventions.
- In Group B, when the geko™ device was on service, anticoagulation use decreased from 41% to 28%. A meaningful reduction of 13%.
- Our observational review also considered VTE incidence at 90 days for all patients (n=320). We noted 1 DVT and 2 bilateral PE's in patients who were prescribed IPC and anticoagulation for VTE prophylaxis.
- The geko™ device was highly tolerated by patients and deemed to be safe to use.
- The geko™ device was easily incorporated into the VTE prophylaxis protocol and is now fully embedded into our enhanced VTE stroke pathway at the L&D.
- L&D hospital are now fully aligned with the objective of NICE guidance MTG19 with the geko™ device serving the described population.
- These findings are aligned to those reported by Roffe and Natarajan[4].

### References


1. NICE guidelines (CG92). Published date January 2010, update June 2015.
2. NICE medical technologies guidance [MTG19] Published date June 20 2014.
3. A.Nicolaides, M Griffin, Measurement of blood flow in the deep veins of the lower limb using the geko™ neuromuscular electro-stimulation device. Journal of International Angiology August 2016-04.
4. Natarajan I, et al. Poster: The use of the geko™ device (a neuromuscular electrostimulation device) and the resulting activation of the foot and calf muscle pumps for the prevention of venous thromboembolism in patients with acute stroke. The reported 0.3% VTE outcome is the sum of 0% VTEs (0/218) in patients prescribed geko™ alone and 1% (1/98) in patients prescribed IPC and geko™ in combination, equating to 0.3% (1/316).
5. M. Dennis; P. Sandercock; J. Reid; C. Graham; J. Forbes; G. Murray. 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. 2013; 382(9891):516-24.