Restlessness or agitation 49.5% 12.2% 12.5% 8.1% 18.7% 22

Table 2. Demographic details

<table>
<thead>
<tr>
<th>Patient demographics</th>
<th>Total no of patients in the audit n=1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>495</td>
</tr>
<tr>
<td>Females</td>
<td>505</td>
</tr>
<tr>
<td>Haemorrhagic strokes</td>
<td>126</td>
</tr>
<tr>
<td>Ischaemic strokes</td>
<td>874</td>
</tr>
</tbody>
</table>

Table 1. Contraindications to IPC

<table>
<thead>
<tr>
<th>High risk of falls</th>
<th>Restlessness or agitation</th>
<th>Peripheral vascular disease</th>
<th>Leg ulcers</th>
</tr>
</thead>
</table>

Table 3. Primary and secondary methods of VTE prevention

<table>
<thead>
<tr>
<th>Intervention</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPC alone</td>
<td>463</td>
</tr>
<tr>
<td>IPC Primary + geko™ secondary</td>
<td>81</td>
</tr>
<tr>
<td>The geko™ device alone</td>
<td>122</td>
</tr>
<tr>
<td>Drug Prophylaxis</td>
<td>125</td>
</tr>
<tr>
<td>No prophylaxis required</td>
<td>187</td>
</tr>
<tr>
<td>Refused mechanical prophylaxis</td>
<td>22</td>
</tr>
<tr>
<td>Total Patients</td>
<td>1000</td>
</tr>
</tbody>
</table>

Methodology

Population

The audit included every patient admitted to the Acute Stroke Unit at Royal Stoke University Hospital RSUH in Stoke-on-Trent, Staffordshire, UK. RSUH is a 32 bed combined hyperacute and acute stroke unit admitting about 1200 patients with suspected acute stroke per annum. As a primary stroke centre it provides thrombolysis and mechanical thrombectomy, and receives secondary referrals from other stroke centres not providing these services.

The VTE prevention pathway

All stroke patients who are immobile (defined as not able to walk independently) are given VTE prophylaxis, unless they are dying, refusing the intervention, or fully anticoagulated. Every patient is reviewed daily on a nurse-led VTE ward round to monitor compliance with VTE prophylaxis and complications. Patients are also assessed at regular intervals throughout the day by a member of the stroke unit nursing team to check for compliance and complications.

In addition to generic measures (adequate hydration, early mobilization, aspirin 300 mg/day for the first 3 weeks for patients with ischemic strokes) the primary method of VTE prophylaxis in immobile stroke patients is IPC (IPC alone), unless contraindicated. Prophylactic low-dose anticoagulation is not given routinely. If patients are fully anticoagulated for other reasons no VTE prophylaxis other than the generic measures above is provided. Surface neuromuscular stimulation of the peroneal nerve using the geko™ device is considered safe, it is approved by NICE for VTE prophylaxis in medical and surgical patients where standard prophylaxis treatments are impractical or contraindicated (NICE MTG19, 2014). There is currently no evidence to support this form of VTE prophylaxis in stroke patients.

As VTE prophylaxis using IPC is not possible in all stroke patients, we amended our VTE prevention pathway to include the geko™ device as an alternative for patients with acute stroke who had contradictions to IPC or did not tolerate IPC. The aim of this audit was to assess the acceptability of this new procedure for patients and staff and its impact on VTE.

Results

1000 patients (mean age 75 years, 495 (49.5%) males and 505 females (50.5%)) had 90 day outcomes and were included in the audit (Table 2).

VTE prophylaxis

187/1000 (18.7%) did not require VTE prophylaxis, as they were independently mobile. The remaining 813 (81.3%) of patients who were prescribed VTE prophylaxis. Of these 544 (54.4%) were initially prescribed IPC devices (IPC alone), 122 (12.2%) were initially given geko™ (geko™ alone), and 125 (12.5%) were initially given anticoagulants (drug prophylaxis). 81 (8.1%) patients who were initially prescribed IPC became intolerant to this intervention and were then changed to the geko™ device as a secondary intervention (IPC primary + geko™ secondary) and 22 patients refused IPC or the geko device. The final distribution of VTE prophylaxis methods after changing to a second method, if needed, is shown in Table 3 and Figure 1.

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Of the 688 patients prescribed mechanical VTE prophylaxis, 203/688 (29.5%) were treated with the geko™ device either as primary or secondary mechanical prophylaxis. The median length of patient use for the geko™ device was 9 days.

**Patient tolerance**

In total 116 patients (21.7%) prescribed IPC did not tolerate IPC and 21 patients prescribed the geko™ (9.17%) did not tolerate the device (Figure 2).

**VTE incidence**

In total 15/1000 (1.5%) patients developed symptomatic VTE (9 DVTs and 6 PE’s) within 90 days. Of these, 11 patients (2.4%) developed VTE were prescribed IPC alone, 1 patient (1.2%) was prescribed IPC and the geko™ device as a secondary intervention and 1 patient (0.8%) was prescribed anticoagulation. There was 1 VTE event in a patient who reused prophylaxis (4.8%) and 1 event in a patient who was deemed mobile and was not prescribed prophylaxis (0.5%). There was no DVT or PE in patients treated with the geko™ device as the primary VTE prophylaxis (Figure 3).

**Conclusion**

This audit shows a low incidence (1.5%) of symptomatic VTE in a high risk population of immobile stroke patients.

We introduced NMES via the geko™ device as an alternative to IPC, where IPC was contraindicated or not tolerated. The audit also shows that the use of the device was feasible within an acute stroke unit environment, and well tolerated by patients. A significant proportion of acute stroke patients (29.5%) had contraindications to or did not tolerate IPC, a similar proportion as described in the original CLOTS-3 paper which provided the evidence underlying the guideline recommendation for IPC as first line VTE prophylaxis.

The number of patients treated with geko™ in this clinical audit was (n=203). Our data suggests that the device is safe and as effective as IPC in our patient cohort. Fewer patients were intolerant of the geko™ device than of IPC, but, as the majority of patients treated with geko™ were changed to the device because IPC was not tolerated, a direct comparison is not possible. The geko™ device provided an alternative VTE prophylaxis strategy in immobile stroke patients. These patients were at high risk of VTE due to foot and calf pump paralysis and would otherwise have had no form of VTE prophylaxis other than general measures.

The findings of this audit suggest that geko™ is safe and well tolerated in patients with acute stroke. A randomized controlled study is needed to provide evidence for effectiveness in comparison with established methods of VTE prophylaxis. In the absence of such data the results of this audit support the use of geko™ as a meaningful addition to our prophylactic options for stroke patients at high risk of VTE who have contraindications to IPC.

**References**


NICE Guideline CG92: Venous thromboembolism in over 16s: reducing the risk of hospital-acquired deep vein thrombosis or pulmonary embolism. NICE guideline [CG92] Published date: March 2018

NICE medical technologies guidance [MTG19] Published date June 2014. Available from: https://www.nice.org.uk/guidance/mtg19/chapter/6-Conclusions