The use of compression therapy post stroke and DVT

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SUMMARY
A systematic review conducted in 2018 provides an important basis for preventing DVT in stroke patients, especially in hemorrhagic stroke patients. IPC significantly reduces the risk of DVT and significantly improves survival in a wide variety of patients who are immobile after stroke. However, IPC does not significantly improve quality-adjusted survival. Clinicians should take functional status and quality of life into consideration when making decisions for stroke patients. [2]

A Cochrane Systematic Review from 2010 concluded that evidence from randomised trials does not support the routine use of GCS to reduce the risk of DVT after acute stroke. There is insufficient evidence to support the routine use of IPC to reduce the risk of DVT in acute stroke and further larger randomised studies of IPC are needed to reliably assess the balance of risks and benefits of this intervention. [17]

The CLOTS Trial - The Clots in Legs Or sTockings after Stroke (CLOTS) 3 trial tested whether or not squeezing the legs with intermittent pneumatic compression (IPC) sleeves reduced the risk of DVT. The trial included 2876 volunteer patients, half of whom were randomly allocated to receive IPC and the other half to receive standard care. Patients allocated the IPC sleeve wore it for an average of about 12 days, day and night, but some wore it for up to 30 days. The patients who received IPC developed clots in their leg veins less often than those who did not receive IPC. Patients assigned IPC were less likely to die within 6 months of their stroke. The average cost of IPC is about £65 per patient. In summary, the CLOTS 3 trial has shown that IPC is an effective and inexpensive way to reduce the risk of DVT in stroke patients and it also improves their chances of survival. [4]
1. Effectiveness of Initiating Deep Vein Thrombosis Prophylaxis in Patients With Stroke: An Integrative Review.

Author(s): Dizon, Mark Angel M.; De Leon, Josephine M.

Source: Journal of Neuroscience Nursing; Oct 2018; vol. 50 (no. 5); p. 308-312

Publication Date: Oct 2018

Publication Type(s): Academic Journal

Abstract: Supplemental digital content is available in the text. Venous thromboembolism (VTE) is a frequent and potentially fatal complication of immobility caused by cerebrovascular disease. This review examines the efficiency of deep vein thrombosis (DVT) prophylaxis methods. Patients with stroke initiated on DVT prophylaxis were compared with those who did not have any prophylaxis. Integrative review research design was used and included articles from 2010 to 2016. Search terms such as "DVT prophylaxis" and "stroke" were used to identify scientific publications. Of 173 studies identified, 12 articles were included and rated using the Canadian Medical Association and Center for Evidence-Based Medicine Level of Evidence ranking system. Of DVT prophylaxis methods identified, intermittent pneumatic compression device was superior to antiembolic stockings. Current data showed that the stockings were insufficient in preventing VTE. Heparin and low-molecular-weight heparin were efficient chemoprophylaxis in reducing the incidence of VTE. The combination of chemical and mechanical DVT prevention is recommended.

Database: CINAHL


Author(s): Zhang D; Li, Fenfen; Li, Xiaotian; Du, Ganqin

Source: Worldviews on Evidence-Based Nursing; Jun 2018; vol. 15 (no. 3); p. 189-196

Publication Date: Jun 2018

Publication Type(s): Academic Journal

Abstract: Background: Deep vein thrombosis (DVT) and subsequent pulmonary embolism (PE) are common complications of stroke. However, the effect of intermittent pneumatic compression (IPC) for patients after stroke is uncertain. Objectives: To assess the effectiveness and safety of IPC in reducing the risk of DVT, PE, and mortality in stroke patients. Methods: We searched leading medical databases including Medline, EMBASE, Cochrane Library, Wanfang, CNKI, and CBM, from inception to June 2, 2017. Studies comparing IPC with no IPC in stroke patients were included. Agreement was measured using simple agreement and kappa statistics. The rates of PE, DVT, and mortality were compared. The results were pooled using a fixed effects model to evaluate the differences between the IPC and control groups. If there was significant heterogeneity in the pooled result, a random effect model was used. Results: We identified seven randomized controlled trials that included 3,551 stroke patients. The average calculated κ for the various parameters was κ = 0.96 (0.70–1). Overall, IPC significantly reduced the incidence of DVT in stroke patients (risk ratio [RR] = 0.50; 95% confidence interval [CI 0.27, 0.94]). At the same time, IPC increased IPC-related adverse events (RR = 5.71; 95% CI [3.40, 9.58]). Though IPC was associated with a significant increase in survival by 4.5 days during 6 months of follow-up (148–152 days; 95% CI [–0.2, 9.1]), there was a mean gain of only 0.9 days (26.7–27.6 days; 95% CI [2.1, 3.9]) in quality-adjusted survival during the 6-month follow-up. Overall, sensitivity analyses did not alter these findings. Linking Evidence to Action: This review provides an important basis for preventing DVT in stroke patients, especially in hemorrhagic stroke patients. IPC significantly reduces the risk of DVT and significantly improves
survival in a wide variety of patients who are immobile after stroke. However, IPC does not significantly improve quality-adjusted survival. Clinicians should take functional status and quality of life into consideration when making decisions for stroke patients.

Database: CINAHL

3. Non-pharmacological interventions for the prevention of venous thromboembolism: a literature review

Author(s): Hanison, Esther; Corbett, Kevin
Source: Nursing Standard; Oct 2016; vol. 31 (no. 8); p. 48-57
Publication Date: Oct 2016
Publication Type(s): Article Evidence Based Healthcare Literature Review

Abstract:Aim: To assess the relative clinical efficacy of different forms of non-pharmacological prophylaxis, intermittent pneumatic compression and graduated compression stockings in reducing the incidence of venous thromboembolism (VTE) in patients hospitalised following acute stroke. Method: This was a thematic synthesis of literature retrieved from a structured bibliographic search of: Medline, the Cumulative Index to Nursing and Allied Health Literature (CINAHL), Summon, British Nursing Index, NHS Evidence, Internurse.com, PubMed, Ovid and the websites of other health information resources, such as the Nursing and Midwifery Council, National Institute for Health and Care Excellence and the World Health Organization. Citations were also searched for using: Web of Science, Google Scholar, the Cochrane Central Register of Controlled Trials, Current Controlled Trials, Stroke Trials Registry and Clinical Trials. Findings: Intermittent pneumatic compression (IPC) showed a small but statistically significant (P = 0.001) reduction in rates of deep vein thrombosis (DVT), in both symptomatic and asymptomatic DVT, involving proximal or calf veins, with fewer adverse effects such as skin breakdown and ulcers attributed to IPC, as compared to graduated compression stockings. No single intervention was the most effective for VTE prevention. Conclusion: More reliable evidence is required. Clear and extensive guidelines are necessary to ensure high-quality care for patients with acute stroke to improve their quality of life, and reduce morbidity and mortality rates. References

Database: BNI

4. The Clots in Legs or sTockings after Stroke (CLOTS) 3 trial: A randomised controlled trial to determine whether or not intermittent pneumatic compression reduces the risk of post-stroke deep vein thrombosis and to estimate its cost-effectiveness

Author(s): Dennis M.; Sandercock P.; Graham C.; Forbes J.
Source: Health Technology Assessment; Sep 2015; vol. 19 (no. 76)
Publication Date: Sep 2015
Publication Type(s): Article

Available at Health Technology Assessment - from Unpaywall

Abstract:Background: Venous thromboembolism (VTE) is a common cause of death and morbidity in stroke patients. There are few data concerning the effectiveness of intermittent pneumatic compression (IPC) in treating patients with stroke. Objective(s): To establish whether or not the application of IPC to the legs of immobile stroke patients reduced their risk of deep vein thrombosis (DVT). Design(s): Clots in Legs Or sTockings after Stroke (CLOTS) 3 was a multicentre, parallel-group, randomised controlled trial which allocated patients via a central randomisation system to IPC or no IPC. A technician blinded to treatment allocation performed compression duplex ultrasound (CDU)
of both legs at 7-10 days and 25-30 days after enrolment. We followed up patients for 6 months to determine survival and later symptomatic VTE. Patients were analysed according to their treatment allocation. Setting(s): We enrolled 2876 patients in 94 UK hospitals between 8 December 2008 and 6 September 2012. Participant(s): Inclusion criteria: patients admitted to hospital within 3 days of acute stroke and who were immobile on the day of admission (day 0) to day 3. Exclusion criteria: age < 16 years; subarachnoid haemorrhage; and contra-indications to IPC including dermatitis, leg ulcers, severe oedema, severe peripheral vascular disease and congestive cardiac failure. Intervention(s): Participants were allocated to routine care or routine care plus IPC for 30 days, or until earlier discharge or walking independently. Main Outcome Measure(s): The primary outcome was DVT in popliteal or femoral veins, detected on a screening CDU, or any symptomatic DVT in the proximal veins, confirmed by imaging, within 30 days of randomisation. The secondary outcomes included death, any DVTs, symptomatic DVTs, pulmonary emboli, skin breaks on the legs, falls with injury or fractures and duration of IPC use occurring within 30 days of randomisation and survival, symptomatic VTE, disability (as measured by the Oxford Handicap Scale), quality of life (as measured by the European Quality of Life-5 Dimensions 3 Level questionnaire) and length of initial hospital stay measured 6 months after randomisation. Result(s): We allocated 1438 patients to IPC and 1438 to no IPC. The primary outcome occurred in 122 (8.5%) of 1438 patients allocated to IPC and 174 (12.1%) of 1438 patients allocated to no IPC, giving an absolute reduction in risk of 3.6% [95% confidence interval (CI) 1.4% to 5.8%] and a relative risk reduction of 0.69 (95% CI 0.55 to 0.86). After excluding 323 patients who died prior to any primary outcome and 41 who had no screening CDU, the primary outcome occurred in 122 of 1267 IPC participants compared with 174 of 1245 no-IPC participants, giving an adjusted odds ratio of 0.65 (95% CI 0.51 to 0.84; p = 0.001). Secondary outcomes in IPC compared with no-IPC participants were death in the treatment period in 156 (10.8%) versus 189 (13.1%) (p = 0.058); skin breaks in 44 (3.1%) versus 20 (1.4%) (p = 0.002); and falls with injury in 33 (2.3%) versus 24 (1.7%) (p = 0.221). Among patients treated with IPC, there was a statistically significant improvement in survival to 6 months (hazard ratio 0.86, 95% CI 0.73 to 0.99; p = 0.042), but no improvement in disability. The direct cost of preventing a DVT was £1282 per event (95% CI £785 to £3077). Conclusion(s): IPC is an effective and inexpensive method of reducing the risk of DVT and improving survival in immobile stroke patients. Future research: Further research should test whether or not IPC improves survival in other groups of high-risk hospitalised medical patients. In addition, research into methods to improve adherence to IPC might increase the benefits of IPC in stroke patients. Trial registration: Current Controlled Trials ISRCTN93529999. Funding(s): The start-up phase of the trial (December 2008-March 2010) was funded by the Chief Scientist Office of the Scottish Government (reference number CZH/4/417). The main phase of the trial was funded by the National Institute for Health Research Health Technology Assessment programme (reference number 08/14/03). Covidien Ltd (Mansfield, MA, USA) lent its Kendall SCDTM Express sequential compression system controllers to the 105 centres involved in the trial and donated supplies of its sleeves. It also provided logistical help in keeping our centres supplied with sleeves and training materials relevant to the use of their devices. Recruitment and follow-up were supported by the National Institute for Health Research-funded UK Stroke Research Network and by the Scottish Stroke Research Network, which was supported by NHS Research Scotland. Copyright © Queen’s Printer and Controller of HMSO 2015.

Database: EMCARE

5. 42 The implementation of intermittent pneumatic compression to reduce deep vein thrombosis rates in stroke patients. [Conference Abstract]

Author(s): Elliott ; Gananandan, K.; Fenwick-Elliott, S.; Bathula, R.; Devine, J.; Cohen, D.

Source: Age & Ageing; Oct 2014; vol. 43 (no. suppl_2)

Publication Date: Oct 2014
Abstract: Background: Following stroke, deep vein thrombosis (DVT) incidence is 33-50% with 25% of early deaths caused by pulmonary embolus (Kamphuisen, Agnelli, Sebastianelli, Journal of Thrombosis and Haemostasis, 2005,3:1187). At present there is no NICE guidance on venous thromboembolism prophylaxis, but the CLOTS3 trial, showed intermittent pneumatic compression (IPC) to reduce DVT incidence (CLOT Trials Collaboration, The Lancet, 2013,382:516). We studied the number of devices that would be needed to provide IPC in a busy stroke unit and apply this for use nationally. Sampling methods: Patients admitted over two 31-day periods were assessed for eligibility and duration of IPC. CLOTS3 inclusion criteria were used. These are acute stroke within 72 hours and reduced mobility (needing help of 1 to mobilise). Exclusion criteria were: mobilisation within 72 hours, severe peripheral oedema or peripheral vascular disease. Patients who were to be repatriated to another hospital were excluded. Results: The average number of patients eligible for IPC per month was 33 (36.1%). Mean and median duration of use were 15.8 and 16.5 days respectively. Maximum number of patients at any one time using IPC was 22. Maximum number of new admissions requiring IPC on a single day was 3, and the mean was 1.5. Conclusions: Our recommendations for a 50 bed unit with an average of 91.5 admissions a month are; to acquire a total of 25 base pump units (if maximum patients on IPC and maximum eligible new patients admitted coincided on the same day), and to purchase 51 pairs of compression leg sleeves per month (total eligible plus replacements for soiled sleeves for IPC use for over 2 weeks). Nationally this data can be used for other units budgeting for this new treatment: for every 10 admissions a month, 2.7 controllers and 5.6 pairs of sleeves would be required.

Database: CINAHL

6. 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

Author(s): Dennis M.

Source: The Lancet; 2013; vol. 382 (no. 9891); p. 516-524

Publication Date: 2013

Publication Type(s): Article

Available at The Lancet - from ScienceDirect
Available at The Lancet - from ProQuest (Health Research Premium) - NHS Version
Available at The Lancet - from Exeter Health Library print Local Print Collection [location]: Exeter Health Library - PRINT COPY ONLY.

Abstract: Background Venous thromboembolism is a common, potentially avoidable cause of death and morbidity in patients in hospital, including those with stroke. In surgical patients, intermittent pneumatic compression (IPC) reduces the risk of deep vein thrombosis (DVT), but no reliable evidence exists about its effectiveness in patients who have had a stroke. We assessed the effectiveness of IPC to reduce the risk of DVT in patients who have had a stroke. Methods The CLOTS 3 trial is a multicentre parallel group randomised trial assessing IPC in immobile patients (ie, who cannot walk to the toilet without the help of another person) with acute stroke. We enrolled patients from day 0 to day 3 of admission and allocated them via a central randomisation system (ratio 1:1) to receive either IPC or no IPC. A technician who was masked to treatment allocation did a compression duplex ultrasound (CDU) of both legs at 7-10 days and, wherever practical, at 25-30 days after enrolment. Caregivers and patients were not masked to treatment assignment. Patients were followed up for 6 months to determine survival and later symptomatic venous
thromboembolism. The primary outcome was a DVT in the proximal veins detected on a screening CDU or any symptomatic DVT in the proximal veins, confirmed on imaging, within 30 days of randomisation. Patients were analysed according to their treatment allocation. Trial registration: ISRCTN93529999. Findings Between Dec 8, 2008, and Sept 6, 2012, 2876 patients were enrolled in 94 centres in the UK. The included patients were broadly representative of immobile stroke patients admitted to hospital and had a median age of 76 years (IQR 67-84). The primary outcome occurred in 122 (8.5%) of 1438 patients allocated IPC and 174 (12.1%) of 1438 patients allocated no IPC; an absolute reduction in risk of 3.6% (95% CI 1.4-5.8). Excluding the 323 patients who died before any primary outcome and 41 without any screening CDU, the adjusted OR for the comparison of 122 of 1267 patients vs 174 of 1245 patients was 0.65 (95% CI 0.51-0.84; p=0.001). Deaths in the treatment period occurred in 156 (11%) patients allocated IPC and 189 (13%) patients allocated no IPC died within the 30 days of treatment period (p=0.057); skin breaks on the legs were reported in 44 (3%) patients allocated IPC and in 20 (1%) patients allocated no IPC (p=0.002); falls with injury were reported in 33 (2%) patients in the IPC group and in 24 (2%) patients in the no-IPC group (p=0.221). Interpretation IPC is an effective method of reducing the risk of DVT and possibly improving survival in a wide variety of patients who are immobile after stroke. Funding National Institute of Health Research (NIHR) Health Technology Assessment (HTA) programme, UK; Chief Scientist Office of Scottish Government; Covidien (MA, USA). © 2013 The Authors. Open Access article distributed under the terms of CC BY-NC-ND.

Database: EMSCARE

7. Incidence of venous thromboembolism in the wake of the Clots in Legs Or sTockings after Stroke (CLOTS) study.

Author(s): Jain, Palbha; Ward, Elizabeth; Nevatte, Tracy; Roffe, Christine

Source: Stroke; Oct 2013; vol. 44 (no. 10); p. 2910-2912

Publication Date: Oct 2013

Publication Type(s): Journal Article

PubMedID: 23929744

Available at Stroke - from HighWire - Free Full Text

Abstract: BACKGROUND AND PURPOSE In the United Kingdom, compressive stockings were standard care in all stroke units until the publication of the Clots in Legs Or sTockings after Stroke (CLOTS) trial results in May 2009, which concluded that stockings were ineffective. The aim of this audit was to assess whether this change in practice was associated with any change in venous thromboembolism incidence in routine clinical practice. METHODS All stroke register entries at the University Hospital of North Staffordshire from 2 years before the publication of the CLOTS trial results to 2 years after were identified and included in this audit. The hospital radiology reporting system was then cross-checked for evidence of venous thromboembolism on computed tomography pulmonary angiogram, ventilation/perfusion lung scan, and leg Doppler reports. RESULTS There were 773 patients in the before cohort and 861 in the after cohort (mean age, 74/74 years; men, 47%/45%; and ischemic stroke, 87%/85%, respectively). Symptomatic venous thromboembolism incidence was the same in both cohorts, 21 (2.7%) in the before cohort and 26 (3.0%) in the after cohort (P=0.8). There was a trend toward more deep vein thrombosis (9 [1.2%] versus 19 [2.2%; P=0.1] and fewer pulmonary embolisms (12 [1.6%] versus 6 [0.7%; P=0.2] in the after cohort. CONCLUSIONS Discontinuation of compressive stockings did not increase venous thromboembolism incidence. There was a trend toward more deep vein thrombosis and fewer PEs after CLOTS, which might be because of increased clinical vigilance in the diagnosis of deep vein thrombosis, but a chance variation cannot be excluded.

Database: Medline
8. Intermittent pneumatic compression reduced deep venous thrombosis after stroke. [comment]

Author(s): Kearon

Source: ACP Journal Club; Aug 2013; vol. 159 (no. 4); p. 1-1

Publication Date: Aug 2013

Publication Type(s): Academic Journal

Abstract: The article presents a study that examines the effectiveness of intermittent pneumatic compression in lowering the risk of deep vein thrombosis in patients who have a history of stroke in Great Britain. It discusses the methodologies used in the study including multicentre randomised controlled trial. It concludes that hospitalized patients with stroke who are immobile, intermittent pneumatic compression have shown reduced low deep venous thrombosis.

Database: CINAHL

9. Challenging the evidence for graduated compression stockings [Letter]

Author(s): Whittaker, Laurence; Baglin, Trevor; Vuylsteke, Alain

Source: BMJ: British Medical Journal (Online); Jun 2013; vol. 346; p. n

Publication Date: Jun 2013

Publication Type(s): Correspondence

Abstract: Venous thromboembolism: reducing the risk of venous thromboembolism (deep vein thrombosis and pulmonary embolism) in patients admitted to hospital. Effectiveness of thigh-length graduated compression stockings to reduce the risk of deep vein thrombosis after stroke (CLOTS trial 1): a multicentre, randomised controlled trial.

Database: BNI


Author(s): CLOTS Trials Collaboration; Dennis, Martin; Sandercock, Peter; Reid, John; Graham, Catriona; Murray, Gordon; Venables, Graham; Rudd, Anthony; Bowler, Gill

Source: Stroke; Apr 2013; vol. 44 (no. 4); p. 1075-1079

Publication Date: Apr 2013

Publication Type(s): Research Support, Non-u.s. Gov't Randomized Controlled Trial Multicenter Study Journal Article

PubMedID: 23482600

Abstract: BACKGROUND AND PURPOSE: Most randomized controlled trials of venous thromboembolism prophylaxis have focused on reduction of deep vein thrombosis, predominantly asymptomatic deep vein thrombosis, detected on imaging. We aimed to estimate the effects of
graduated compression stockings on venous thromboembolism events, survival, and functional status at 6 months after stroke.

METHODS The CLOTS Trials adopted an international multicentre, parallel group design, with central randomization and a 1:1 treatment allocation. In CLOTS Trial 1, 2518 immobile stroke patients were allocated thigh-length graduated compression stockings or not, and in CLOTS trial 2, 3014 to thigh-length or below-knee graduated compression stockings. We measured vital status, Oxford Handicap Scale, and quality of life (EQ5D-3 L) at 6 months.

RESULTS We compared survival in patients enrolled in Trials 1 and 2 with a Cox proportional hazards model, including variables included in our minimization algorithm. In both trials, allocation to thigh-length graduated compression stockings was associated with a very slight, but nonsignificant, increased hazard of death in the first 6 months (Trial 1: hazard ratio, 1.087; 95% confidence interval, 0.913-1.295; and Trial 2: hazard ratio, 1.037; 95% confidence interval, 0.892-1.205). There were no statistically significant differences in venous thromboembolism events, Oxford Handicap Scale, or EQ5D-3 L between the treatment groups in CLOTS Trials 1 or 2.

CONCLUSIONS Although underpowered to detect clinically important effects on long-term outcomes, our results effectively exclude a >10% relative reduction in the hazard of death within 6 months associated with the use of thigh-length stockings. No other long-term benefits were apparent.

Database: Medline


Author(s): Field, Thalia S; Hill, Michael D

Source: Clinical and applied thrombosis/hemostasis : official journal of the International Academy of Clinical and Applied Thrombosis/Hemostasis; 2012; vol. 18 (no. 1); p. 5-19

Publication Date: 2012

Publication Type(s): Research Support, Non-u.s. Gov't Journal Article Review

PubMedID: 21733942

Available at Clinical and applied thrombosis/hemostasis : official journal of the International Academy of Clinical and Applied Thrombosis/Hemostasis - from ProQuest (Health Research Premium) - NHS Version

Abstract: Venous thromboembolism (VTE), encompassing deep venous thrombosis and pulmonary embolism, is a potentially fatal but preventable complication of stroke. Reported rates of VTE after stroke have decreased over the last four decades, possibly due to the implementation of stroke units, early mobilization and hydration, and increased early use of antiplatelets. Additional means of thromboprophylaxis in stroke include mechanical methods (i.e., compression stockings) to prevent venous stasis and medical therapy including antiplatelets, heparins, and heparinoids. Risk of VTE must be balanced by potential risk of hemorrhagic complications from pharmacotherapy. Unfractionated heparin, low-molecular-weight heparin (LMWH), and danaparoid are acceptable options for chemoprophylaxis though none have shown superior efficacy for VTE prevention without an associated increase in major hemorrhage. The efficacy and timing of pharmacological thromboprophylaxis in hemorrhagic stroke are not well defined. Graduated compression stockings are associated with an increased rate of adverse events and are not recommended and intermittent pneumatic compression stockings require further investigation.

Database: Medline


Author(s): Kearon, Clive; O’Donnell, Martin
Pulmonary embolism is the most common preventable cause of death in hospital patients and prevention of venous thromboembolism (VTE) is cost-saving in high-risk patients. Low-dose anticoagulation is very effective at preventing VTE but increases bleeding. Graduated compression stockings and intermittent pneumatic compression devices are also used to prevent VTE and do not increase bleeding, which makes their use appealing in patients who cannot tolerate bleeding, such as patients with acute stroke. Studies that evaluated mechanical methods of preventing VTE were small and mainly used asymptomatic deep vein thrombosis (DVT), detected using screening tests, as the study outcome. The recently published CLOTS Trial 1 (Clots in Legs Or sTockings after Stroke) compared thigh-level compression stockings with no stockings in about 2500 patients with stroke and immobility, and found that thigh-level stockings were not effective. Indirectly, the findings of this study question the ability of stockings to prevent VTE in other patient groups, including those after surgery. CLOTS 1 compared thigh-level and below-knee stockings in about 3000 patients with acute stroke. Given that thigh-level stockings were ineffective in CLOTS 1, it is surprising that they were more effective than below-knee stockings in CLOTS Trial 2. A possible explanation is that below-knee stockings increase DVT, although this seems unlikely. CLOTS 1 and CLOTS 2 question whether graduated compression stockings prevent VTE and suggest the need for further trials evaluating their efficacy in medical and surgical patients.


**Author(s):** Qaseem, Amir; Chou, Roger; Humphrey, Linda L; Starkey, Melissa; Shekelle, Paul; Clinical Guidelines Committee of the American College of Physicians

**Source:** Annals of internal medicine; Nov 2011; vol. 155 (no. 9); p. 625-632

**Publication Date:** Nov 2011

**Publication Type(s):** Research Support, Non-u.s. Gov't Practice Guideline Journal Article

**PubMedID:** 22041951

Available at [Annals of internal medicine](http://www.annals.org) - from Unpaywall

**Abstract:** DESCRIPTION The American College of Physicians (ACP) developed this guideline to present the evidence and provide clinical recommendations on prophylaxis of venous thromboembolism for hospitalized nonsurgical patients (medical patients and patients with acute stroke). METHOD This guideline is based on published literature on the topic from 1950 through April 2011 that was identified by using MEDLINE, the Cochrane Library, and reference lists of pertinent randomized trials and systematic reviews to identify additional reports. Searches were limited to randomized trials and English-language publications. The primary outcome for this guideline was total mortality up to 120 days after randomization. Secondary outcomes included symptomatic deep venous thrombosis; all pulmonary embolisms; fatal pulmonary embolism; all bleeding events; major bleeding events; and, for mechanical prophylaxis, effects on skin. This guideline grades the evidence and recommendations by using the ACP's clinical practice guidelines grading system. RECOMMENDATION 1 ACP recommends assessment of the risk for thromboembolism and bleeding in medical (including stroke) patients prior to initiation of prophylaxis of venous thromboembolism (Grade: strong recommendation, moderate-quality evidence). RECOMMENDATION 2 ACP recommends pharmacologic prophylaxis with heparin or a related drug for venous thromboembolism in medical conditions.
(including stroke) patients unless the assessed risk for bleeding outweighs the likely benefits (Grade: strong recommendation, moderate-quality evidence). RECOMMENDATION 3ACP recommends against the use of mechanical prophylaxis with graduated compression stockings for prevention of venous thromboembolism (Grade: strong recommendation, moderate-quality evidence). POLICY IMPLICATION ACP does not support the application of performance measures in medical (including stroke) patients that promotes universal venous thromboembolism prophylaxis regardless of risk.

Database: Medline


Author(s): Dennis, Martin; Sandercock, Peter; Reid, John; Graham, Catriona; Murray, Gordon; Venables, Graham; Rudd, Anthony; Bowler, Gill; CLOTS Trials Collaboration

Source: Journal of neurology, neurosurgery, and psychiatry; Oct 2011; vol. 82 (no. 10); p. 1067-1073

Publication Date: Oct 2011

Publication Type(s): Research Support, Non-u.s. Gov't Comparative Study Randomized Controlled Trial Journal Article

PubMedID: 21357988

Available at Journal of neurology, neurosurgery, and psychiatry - from BMJ Journals - NHS

Available at Journal of neurology, neurosurgery, and psychiatry - from ProQuest (Health Research Premium) - NHS Version

Abstract: BACKGROUND Deep vein thrombosis (DVT) is an important complication of stroke. Guidelines recommend that DVT prophylaxis should be guided by an assessment of the individual patient's risk. The authors aimed to develop and test models to predict DVT risk.

METHODS The Clots in Legs Or sTockings after Stroke (CLOTS) Trial 1 randomised 2518 immobile patients with acute stroke to thigh-length graduated compression stockings (GCS) or no GCS and CLOTS Trial 2 randomised 3114 to thigh-length or below-knee GCS. The authors collected potential predictive variables at baseline and detected DVTs with compression duplex ultrasound scans at about 7-10 days and 25-30 days. The authors developed models with logistic regression to predict DVT in 1242 Trial 2 patients who had two scans and tested the models in the 1422 Trial 1 patients with two scans by estimating the area under the receiver operating characteristic curve (AUC). RESULTS 168 (11.8%) patients in Trial 1 and 122 (9.8%) in Trial 2 had proximal DVTs. A model based on the Trial 2 cohort contained four of the 12 baseline variables: dependent before stroke (OR=3.62, 95% CI 2.15 to 6.08), unable to lift arms off bed (OR 1.89, 95% CI 1.23 to 2.90), history of DVT/pulmonary embolism (OR 3.69, 95% CI 1.98 to 6.88) and diabetes (OR 0.55, 95% CI 0.30 to 0.99). The AUC in the development cohort was 0.65 but only 0.57, 95% CI (0.53 to 0.61) in the Trial 1 cohort, indicating poor discrimination. CONCLUSIONS Unfortunately, models based on clinical factors alone discriminate poorly between immobile patients with stroke at high and low risk, and would not facilitate individual tailoring of DVT prophylaxis strategies.

Database: Medline

15. The Timing, Extent, Progression and Regression of Deep Vein Thrombosis in Immobile Stroke Patients: Observational Data From the CLOTS Multicenter Randomized Trials

Author(s): Dennis M; Mordi N; Graham C; et al.


Publication Type: Randomized Controlled Trial
Abstract: Background: Deep vein thrombosis (DVT) is an important complication of stroke, but the evidence to support commonly used prophylactic strategies is conflicting. Objectives: To describe the incidence, extent, associated clinical features and evolution of DVT after stroke.

Patients/methods: The CLOTS trials 1 and 2 together randomized 5632 immobile stroke patients in 135 hospitals in nine countries. We screened patients for asymptomatic DVT with compression duplex ultrasound (CDU) at about 7-10 days and again at about 25-30 days after enrollment.

Results: Six hundred and forty-one (11.4%) of 5632 patients had DVT detected on the first CDU scan at a median of 8 days (interquartile range [IQR] 7-10 days) after enrollment, and an additional 176 (3.1%) had a DVT on the second CDU scan at a median of 28 days (IQR 26-30 days). Of the 817 with DVTs, 289 (35%) were symptomatic and 39 (5%) had pulmonary embolism (PE) confirmed by imaging. Six hundred and seventy-six (83%) were unilateral, 141 (17%) were bilateral, 322 (39%) were limited to calf veins, 172 (21%) were popliteal, and 323 (40%) were femoral. Among the 542 patients with DVT and a weak leg, the DVT affected the weaker leg in 396 (73%), the stronger leg in 59 (11%), and was bilateral in 87 (16%). Among the 318 patients with a DVT detected on the first CDU scan who had a second scan, the DVT regressed in 148 (47%), stayed the same in 140 (44%), and progressed in only 30 (9%). Conclusions: Although most DVTs develop within the first week, some develop later, and some early DVTs progress. Any prophylaxis needs to be started early but ideally continued for at least 4 weeks. © 2011 International Society on Thrombosis and Haemostasis.

Database: PubMed

16. Thigh-length versus below-knee stockings for deep venous thrombosis prophylaxis after stroke: a randomized trial.

Author(s): CLOTS (Clots in Legs Or sTockings after Stroke) Trial Collaboration

Source: Annals of internal medicine; Nov 2010; vol. 153 (no. 9); p. 553-562

Publication Date: Nov 2010

Publication Type(s): Research Support, Non-u.s. Gov't Randomized Controlled Trial Multicenter Study Journal Article

PubMedID: 20855784

Available at Annals of internal medicine - from Unpaywall

Abstract: BACKGROUND Graduated compression stockings are widely used for deep venous thrombosis (DVT) prophylaxis. Although below-knee stockings are used more often than thigh-length stockings, no reliable evidence indicates that they are as effective as thigh-length stockings. OBJECTIVE To compare the effectiveness of thigh-length stockings with that of below-knee stockings for preventing proximal DVT in immobile, hospitalized patients with stroke. DESIGN Parallel-group trial with centralized randomization (minimization within centers) to ensure allocation concealment. The ultrasonographers who looked for DVT were blinded, but the patients and caregivers were not. (Controlled-trials.com registration number: ISRCTN28163533) SETTING 112 hospitals in 9 countries. PATIENTS 3114 immobile patients hospitalized with acute stroke between January 2002 and May 2009. INTERVENTION 1552 patients received thigh-length stockings and 1562 patients received below-knee stockings to wear while they were in the hospital. MEASUREMENTS Ultrasonographers performed compression duplex ultrasonography in 1406 patients (96% of survivors) in each treatment group between 7 and 10 days after enrollment. They performed a second scan in 643 patients in the thigh-length stockings group and 639 in the below-knee stockings group at about 25 to 30 days. The primary outcome was symptomatic or asymptomatic DVT in the popliteal or femoral veins, detected on either scan. RESULTS Patients were retained in their assigned group for all analyses. The primary outcome occurred in 98 patients (6.3%) who received thigh-length stockings and 138 (8.8%) who received below-knee stockings (absolute difference, 2.5 percentage points [95% CI, 0.7 to 4.4 percentage points]; P = 0.008), an odds
reduction of 31% (CI, 9% to 47%). Seventy-five percent of patients in both groups wore the stockings for 30 days or until they were discharged, died, or regained mobility. Skin breaks occurred in 61 patients who received thigh-length stockings (3.9%) and 45 (2.9%) who received below-knee stockings.

LIMITATION
Blinding was incomplete, 2 scans were not obtained for all enrolled patients, and the trial was stopped before the target accrual was reached.

CONCLUSION
Proximal DVT occurs more often in patients with stroke who wear below-knee stockings than in those who wear thigh-length stockings.

PRIMARY FUNDING SOURCE
Medical Research Council of the United Kingdom, Chief Scientist Office of the Scottish Government, and Chest Heart and Stroke Scotland.

Database: Medline

17. Physical methods for preventing deep vein thrombosis in stroke.

Author(s): Naccarato, Marcello; Chiodo Grandi, Fabio; Dennis, Martin; Sandercock, Peter Ag

Source: The Cochrane database of systematic reviews; Aug 2010 (no. 8); p. CD001922

Publication Date: Aug 2010

Publication Type(s): Meta-analysis Journal Article Review Systematic Review

PubMedID: 20687069

Available at The Cochrane database of systematic reviews - from Cochrane Collaboration (Wiley)

Abstract: BACKGROUND Deep vein thrombosis (DVT) and resulting pulmonary embolism (PE) are important complications of stroke. Physical methods to reduce the risk of DVT and PE, such as graduated compression stockings (GCS) or intermittent pneumatic compression (IPC) applied to the legs, do not appear to be associated with any bleeding risk and reduce the risk of DVT in some categories of surgical patients. We sought to assess their effects in stroke patients.

OBJECTIVE
To assess the effectiveness and safety of physical methods of reducing the risk of DVT, fatal or non-fatal PE and death in patients with recent stroke.

SEARCH STRATEGY
We searched the Cochrane Stroke Group Trials Register (last searched November 2009), the Cochrane Central Register of Controlled Trials (CENTRAL) (The Cochrane Library Issue 4, 2009), MEDLINE (1966 to November 2009), EMBASE (1980 to November 2009), CINAHL (1982 to November 2009) and The British Nursing Index (1985 to November 2009). We screened reference lists of all relevant papers, searched ongoing trials registers (November 2009) and contacted experts in the field.

SELECTION CRITERIA
Unconfounded randomised controlled trials comparing physical methods for reducing the risk of DVT with control and in which prophylaxis was started within seven days of the onset of stroke.

DATA COLLECTION AND ANALYSIS
Two review authors searched for trials and extracted data.

MAIN RESULTS
We identified two trials of GCS that included 2615 patients and two small studies of IPC that included 177 patients. Overall, physical methods were not associated with a significant reduction in DVTs during the treatment period (odds ratio (OR) 0.85, 95% confidence interval (CI) 0.70 to 1.04) or deaths (OR 1.12, 95% CI 0.87 to 1.45). Use of GCS was not associated with any significant reduction in risk of DVT (OR 0.88, 95% CI 0.72 to 1.08) or death (OR 1.13, 95% CI 0.87 to 1.47) at the end of follow up. IPC was associated with a non-significant trend towards a lower risk of DVTs (OR 0.45, 95% CI 0.19 to 1.10) with no evidence of an effect on deaths (OR 1.04, 95% CI 0.37 to 2.89).

AUTHORS’ CONCLUSIONS:
Evidence from randomised trials does not support the routine use of GCS to reduce the risk of DVT after acute stroke. There is insufficient evidence to support the routine use of IPC to reduce the risk of DVT in acute stroke and further larger randomised studies of IPC are needed to reliably assess the balance of risks and benefits of this intervention.

Database: Medline

18. DVT in acute stroke--the use of graduated compression stockings.
AUTHOR(s): Xu, Bo

Source: Australian family physician; Jul 2010; vol. 39 (no. 7); p. 485-487

Publication Date: Jul 2010

Publication Type(s): Case Reports Journal Article Review

PubMedID: 20628662

Abstract: BACKGROUND Graduated compression stockings (GCS) are routinely prescribed for deep vein thrombosis (DVT) prophylaxis in acute stroke patients. In the light of recent data from the CLOTS trial 1, this practice needs to be reviewed. OBJECTIVE This article presents an evidence based review of the literature regarding the use of GCS for DVT prevention in acute stroke patients. DISCUSSION Data on the use of GCS for DVT prevention in acute stroke is limited. The CLOTS trial 1 provides strong evidence that the routine use of GCS in acute stroke patients does not significantly reduce the risk of DVT and that GCS increase the risk of skin problems in this population. Graduated compression stockings may also increase the risk of critical limb ischaemia and are contraindicated in patients with known peripheral vascular disease, or an ankle brachial pressure index <0.8. Graduated compression stockings may help reduce dependant oedema in stroke patients with reduced mobility, although there have been no studies looking at this question in stroke patients. Graduated compression stockings should not be routinely prescribed for acute stroke patients. The decision to use GCS in acute stroke patients should be individualised.

Database: Medline

Databases & Search Terms

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Cochrane, NICE and PubMed were also searched.

LA=Eng / YR=2010=2020

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