PREVUE; PlantaR flexion Exercise for Venous Ulcer Evaluation, a multi-centre, controlled, prospective, randomized feasibility trial

Version 4, dd 12 December 2018

Chief Investigator's Statement of Ownership and Content.

I, Dr Leon Jonker, confirm that this protocol is my work and is owned by me. The protocol conforms with standards outlined in the Declaration of Helsinki 1964.

Name (PRINT):___Leon Jonker_____

Signature:_____

Date: ____12 Decl 2018_____

RESEARCH PROTOCOL SUMMARY

TITLE:	**PREVUE; PlantaR flexion Exercise for Venous leg UlcEr, a multi-centre, controlled, prospective, randomized feasibility trial**
Short title:	PREVUE
IRAS number	222694
Device description	StepIt plantar flexion rocker pedal device. CE-marked and licensed medical device. To be used in this study for indicated purpose, namely plantar flexion exercise.
Study design	Single centre, controlled, prospective randomized feasibility trial
Primary objective	To assess the feasibility of conducting a full RCT in the future - Participants' compliance to StepIt exercise regime - Recruitment and attrition rates, willingness of patients to be randomised, response rates to questionnaires, and degrees of missing data - Testing of eligibility criteria and ability/willingness of clinical staff to partake in recruitment of participants - Adequacy of duration of follow-up (e.g. in relation to VLU healing)
Secondary objectives	To determine the acceptability and efficacy of the step-it pedal as an adjuvant therapy for VLU at 6 and 12 weeks post-baseline - Healing rate (ulcer size, PUSH score) - Ankle motion range - Patient mobility score - VLU-related quality of life score - VLU-related pain - Patient feedback on use of the device
Patient population	A total of 28 participants, over the age of eighteen, with venous leg ulcers and treated either in hospital or at home by the community nursing team. Participants must have the capacity to provide informed written consent and complete patient reported outcome measures. Participants are recruited from the local community nursing caseload and identified in hospital clinics. - 12 Patient will receive treatment as usual (TaU) - 12 Patients will receive TaU plus StepIt exercise programme intervention

	Randomisation will be stratified for ulcer size, with cut-off PUSH score of up to 8, and 9 and above.
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Organisations where research will take place	Cumbria Partnership NHS Foundation Trust Carleton Clinic, R&D department Cumwhinton Drive Carlisle CA1 3SX Carlisle Healthcare primary care services Spencer House, St Paul's Square Carlisle, CA1 1DG North Cumbria University Hospitals NHS Trust Cumberland Infirmary, Newtown Road Carlisle, CA2 7HY
Planned timeline	Start date May 2017, end date: Dec 2018
Protocol version, date	Version 4, 12 December 2018

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1. LAY SUMMARY

Venous leg ulcers (VLUs) are the most common type of leg ulcers, affecting 1-3% of the population over 60 years and this incidence is expected to increase with an aging population. There is some evidence to suggest that specific exercise of the calf muscle through for example plantar flexion movement with resistance – moving the front of the foot up and down, similar to what a drummer does when using the foot pedal of a drum - may improve the calf muscle pump function. The positive effects have been shown at the haemodynamic level; they have shown that at least in the short-term there is better blood flow and endurance if the calf muscle is exercised in this manner.

It is acknowledged that venous return from the lower limbs depends on an efficient calf muscle pump and adequate range of ankle motion. Whilst failure of these systems may contribute to venous leg ulceration, evidence suggests that exercise programmes designed to increase the strength of the calf muscle pump through resistance training is feasible and effective in improving calf muscle pump function and ankle range of motion. As yet there remains considerable uncertainty as to the effects of an exercise programme on ulcer healing. There is very limited research data available on the medium- to long-term effects of calf muscle exercising by VLU patients on the healing rate of the ulcer.

This study is a prospective, controlled, randomised, feasibility trial to determine if the use of a CE-approved plantar flexion pedal, developed by StepIt Ltd, will be of benefit to people with VLU in terms of healing rate of VLUs. This pilot aims to assess the feasibility of conducting a full randomised clinical trial in the future. Of the total of 48 patients to be recruited, 24 patients will be randomised to treatment as usual, standard compression therapy only, and the other 24 will be allocated to treatment as usual plus a StepIt exercise programme for 12 weeks. The main outcome measure will be the degree of healing of the VLU. Other outcomes measures will include acceptability of the device training, trial completion rates, and ankle range of motion. Patients with VLUs are less mobile than their aged matched population for a variety of reasons. Initiating foot and ankle exercises may be a first step in increasing physical activity for this population and improving calf muscle pump function.

2. INTRODUCTION

Venous leg ulcers (VLUs) are the most common type of leg ulcers, affecting 1-3% of the population over 60 years (SIGN 2010, Graham *et al* 2003) and this incidence is expected to increase with an aging population. A positive relationship has been observed between occurrence and specific modern lifestyle risk factors such as sedentary lifestyles and obesity (Brand *et al* 1998). The natural history of the disease is a continuous cycle of healing and breakdown over decades and VLUs are associated with considerable; expense, morbidity and impaired quality of life (Persoon *et al* 2004).

Table 1 shows annual NHS cost for treating VLUs compared to other chronic wound treatments.

Table 1. Chronic wound treatment costs to the NHS (Posnett & Franks 2008)

	Annual incidence	Cost per patient	Annual NHS cost (2005–2006)
Venous leg ulcers	108,600	£1,500–1,800	£168–198m
Foot ulcers	57,000	£5,200	£300m
Pressure ulcers	410,000	£4,300–6,400	£1.8–2.6bn
TOTAL	575,600	£4,000–5,400	£2.3–3.1bn

Despite extensive research the exact manner in which VLUs develop, is not yet fully understood however it is agreed that prolonged venous hypertension caused by chronic venous insufficiency is a common aetiological factor (Eberhardt & Rafetto 2005, White & Ryjewski 2005). The mainstay of treatment of VLUs is the reversal of venous hypertension through compression bandaging (O'Brien *et al* 2012), however up to 15-30% do not respond to this current gold standard treatment and remain unhealed even after 6 months of treatment (Moffett *et al* 2006, O'Meara, Cullum & Nelson 2009).

Venous return is also facilitated by the action of the foot and calf muscle pump but previous studies have shown that patients with VLUs have histopathological changes of degeneration in the calf muscle (Taheri *et al* 1984) and impaired calf muscle function (Porter, 1995, Yang, Vandogen & Stacey 1999). Literature suggests that there is a relationship between VLU severity, calf muscle pump dysfunction and range of ankle movement (Back *et al.*1995, Dixy, Brooke and McCollum, 2003, Davies *et al.*, 2007). Patients with VLU have a limited range of ankle movement because of decreases in both plantar flexion and dorsiflexion. This decreased ankle mobility is associated with delayed VLU healing (Davies *et al.*, 2007).

There is evidence that exercise of specifically the calf muscle can improve physiological functioning of said muscle. Exercises such as heel raises, flexion, extension and rotation of the ankles have been shown to increase venous return (Padberg, Johnston & Sisto, 2004, Roaldsen *et al* 2006, Jull *et al* 2009) and clinical guidelines recommend ankle exercises and walking (RCN 1998, SIGN 2010). There is paucity of studies demonstrating any correlation with exercise and improvement in ulcer healing but the suggestion that exercise as an adjunct therapy may improve the time to VLU healing warrants exploration.

Patients with venous leg ulcers report multiple co-morbidities and are more likely to be sedentary than age matched controls (Persoon *et al* 2004*,* Roaldsen *et al* 2006). Whilst exercise could be of particular benefit for this group of patients' research suggests that around 50% of sedentary adults who start an exercise programme stop within the first 6 months of involvement (Heinen *et al* 2007). This study will apply a step–it rocker pedal for the first time in patients with VLU's in addition to the standard treatment of compression therapy. This is a small pedal device that can be used from a seated position and was first devised to help alleviate the risk of deep vein thrombosis for travellers on long haul flights. Patients may be receptive to this form of exercise especially if they are elderly, frail, have limited mobility, have a fear of falling or are housebound.

The aim of this initial randomised, controlled, prospective feasibility study is to determine the acceptability and efficacy of the step-it pedal as an adjuvant therapy for VLU with a primary outcome measure of VLU healing. This is a pilot aiming to assess the feasibility of conducting a full randomised clinical trial in the future.

3. INVESTIGATIONAL DEVICE

The step-it pedal is developed at Uppsala University Hospital through collaboration between Professor Christer Busch and vascular surgeon Professor David Bergqvist. The step-it rocker pedal is designed to mimic the walking movement and make the foot bend and stretch. This design is aimed to stimulate the calf muscles and increases circulation in the legs, thereby decreasing the risk for blood clotting and circulation problems. The step-it pedal is 95mm by 230mm by 40mm, weights 212 gram and is made out of ABS-plastic with a silicon footpad (figure 1).

Resistance of the pedal is circa 6 kg and cannot be adjusted. There is no recommended tempo indicated for the pedal, simply because some patients will be more able to do the movements. The videos on the Step-It website show a frequency of roughly 1 second downwards, 1 second upwards motion (https://www.youtube.com/watch?v=nsAZm5TxEIY&feature=youtu.be and http://www.stepit.com/). However, in the VLU target population , patients will be encouraged to work at – or towards - a 2 second downwards, 2 second upwards motion frequency.

Figure 1. Step-it pedal

4. STUDY HYPOTHESIS

4.1 Primary objective

- To assess the feasibility of conducting a full RCT in the future

4.2 Secondary objective

- To assess the acceptability and efficacy of the Step-It pedal as an adjuvant therapy for VLU healing

5. STUDY PROTOCOL

5.1 Study design and timeline

This concerns a multi-centre, controlled prospective randomized study. The study will be carried out in Cumbria by NHS Cumbria Partnership Foundation Trust, North Cumbria Universit Hospitals NHS trust and North Cumbria CCG. The study will take place in local community setting with support and oversight from community nurses and research staff. Research delivery staff will be delegated to provide support with data collection and processing.

Table 2. Anticipated timeline

Month	Setup	Recruitment	Analysis	Finalise
Mar-17	Submission for HRA approval			
Apr-17	NIHR portfolio adoption			
May-17	HRA and Trust approval	Start recruitment		
Dec-18		Finish recruitment		
Jan-19			Analyze data	
Mar-19				Finalise analysis & report

5.2 Participant identification & screening

Patients who are referred to the local community nursing team with a VLU will be screened for eligibility for this study by the local community nursing team. The research team will then be informed on potential participants and the patient information sheet will be added to the appointment letter. All eligible patients will be invited to take part until the required numbers have been achieved. Patients will be recruited sequentially and randomised into two groups: one control group receiving care as usual and one intervention group receiving care with the StepIt device. The eligible patient population is defined in the Inclusion and Exclusion criteria section. Consent

If the community research nurse is not available, arrangements will be made for someone of the research team to join the (non-research) nurse to the first appointment. During this visit the study will be discussed in further detail and the participant has the opportunity to ask questions that they may have. If potential participants meet the eligibility criteria, the patients can be consented by the continence care team or this may be delegated to the research delivery team as long as the patient's verbal consent has been sought for the latter arrangement. A screening form will be completed for potentially eligible patients to confirm that they indeed meet the trial criteria.

Participants will receive no incentives and consent will be regarded as a process and not a one off event. Participants are free to withdraw from the study at any time without the need to give any reasons for withdrawal. Their standard care will not be affected by either declining to participate in the study or withdrawing during participation.

5.3 Recruitment

Participants will be randomised to either the control group (standard care) or the intervention group (standard care plus use of a StepIt pedal) for 12 weeks or until ulcer healing has taken place. Patients in both groups will be given the usual leg ulcer information leaflet, but those in the intervention group will be issued with a StepIt Pedal to use daily for foot and ankle exercises. These exercises consist of resisted plantar flexion while seated, performed 2 times daily in the pattern of: 1 minute exercise / 1 minute rest, 10 times (participants may alternate legs as an alternative to merely resting both legs for 1 minute). The participants will be asked to keep an exercise diary to record their activity. At their discharge visits participants are asked to provide their opinion on trial participation. All participants will have demographic data obtained and the following base line measures (table 2):

- VLU size measured with Convatec grid tool
- PUSH score (size and characteristics)
- Mobility score
- Ankle range of motion using a goniometer
- Visual analogue pain score
- Quality of life assessment using the Charing Cross Venous Ulcer Questionnaire

Table 3. Baseline measures

Weeks	0	2	4	6#	8	10	12#
Ulcer size and PUSH score	X			X			X
Mobility score	X			x			X
Ankle range of motion	X			x			X
Visual analogue pain score	X			X			X
Charing Cross Venous Ulcer Questionnaire	X			x			X

 # Allowed to be up to 2 weeks early or late

The Pressure Ulcer Scale for Healing (PUSH) tool, see Appendix 1 is a standardised method of assessing and monitoring the severity and healing of both pressure ulcers and venous leg ulcers (Stotts et al, 2001; Ratliff & Rodeheaver 2005). Concerns have been raised regarding the criterion validity and intra-rater reliability of the tool (Pillen et al 2009) however in the absence of other valid tools it provides a comprehensive parallel assessment of the ulcer along with measuring size alone.

A mobility measure will be taken using a life space questionnaire, see Appendix 1 (Stalvey *et al* 1999). This is a tool that has demonstrated reliability and construct and criterion validity in establishing the spatial extent of an older person's mobility within their home setting. There are other versions (Peel *et al* 2005) that additionally measure the use of aids and equipment however this is not of particular interest within the study, hence the simpler version will be used.

A recent review of specific health related quality of life instruments for venous leg ulcers favours the Charing Cross Venous Leg Ulcer Questionnaire (appendix 2) (Smith *et al* 2010) above others such as the Hyland for its disease specific psychometric characteristics (Gonzalez & Verdu 2011).

During the recruitment process the research team acts as a contact point and coordinator for patients requiring information and support. If concerns are raised on participants (mental) wellbeing based on the home visits or outcome of the assessments, referral of patients/families on to other professional agencies will be done as appropriate and according to the Trust guideline.

5.4 Follow-up

Patients are in the study until the VLU is healed or for the maximum period of 12 weeks. The patient will be followed up as they would in normal clinical practice. The community nurse will redress the VLU as per routine care, and will conduct the measurement of the VLU (grid measurement and PUSH score). The researcher will visit the patient at baseline, week 6 and week 12 of study participation to randomise the patient, hand out the StepIt pedal, measure ankle range of motion and conduct the questionnaires.

5.5 Outcome measures

5.5.1 Primary outcome measures

To assess the feasibility of conducting a full CRT in the future, the primary outcome measures are mainly:

<u>Trial-related outcome measures</u>

- Participants' compliance to StepIt exercise regime
- Recruitment and attrition rates, willingness of patients to be randomised, response rates to questionnaires, and degrees of missing data
- Testing of eligibility criteria and ability/willingness of clinical staff to partake in recruitment of participants
- Ability of sites and clinicians to recruit and randomise patients, irrespective of care setting
- To assess any training requirements
- Adequacy of duration of follow-up (e.g. in relation to VLU healing)
- Fitness for purpose of data collection methods including across and between care settings
- Adverse events

5.5.2 Secondary outcome measures

The primary outcome for this pilot trial will be the feasibility of conducting a full CRT in the future. However, this study also aims to provide preliminary results regarding the acceptability and efficacy of a simple StepIt pedal as an adjuvant therapy for on VLU healing.

<u>Clinical outcome measures</u>

- VLU size, measured with Convatec grid tool (outcome measure used for calculating potential power of this present study)

- Size and characteristics of VLU, determined with PUSH score
- Mobility score
- Ankle range of motion
- Pain score
- Quality of life score, determined with Charing Cross Venous Ulcer Questionnaire
- Exercise diary
- Participant opinion on trial participation
- Patient withdrawal rates due to change in management (e.g. need for surgery)
- VLU infection rates

6. SUBJECTS

6.1 Anticipated number of research subjects

Since there is no pilot data to base an *a priori* sample size calculation on, it is difficult to make a calculated prediction on the exact number of patients required for a sufficiently powered trial. The outcome of this present study will inform the power calculation for a larger definitive interventional trial. However, below a summary is given for the power potentially achievable for our suggested feasibility sample size. Since some patients may require surgical intervention or may withdraw, a hypothetical 30% dropout rate is calculated into the sample size (actual attrition rate is a study objective). A 1:1 allocation to the control and intervention group respectively will be applied.

The primary outcome, average percentage decrease in ulcer size is used for sample size calculation. Power calculations for sample size, 80% power and 5% significance, based on a Chi-squared test. A priori power calculations using GPower 3.1 software, result in the following sample size summarized in Table 4.

It must be stressed that this current PREVUE study will first and foremost establish if StepIt exercise is acceptable to staff and patients alike, and therefore it is not certain at this stage whether sufficient participants will be enrolled, if participants will be compliant and if they will be compliant for the 12 weeks treatment period.

Table 4, Sample size calculation

	Percentage patients achieving at least 50% reduction in ulcer size	**Percentage patients *not* achieving 50% reduction in ulcer size**
Arm A (*hypothetical*)	*60%*	*40%*
Arm B (*hypothetical*)	*30%*	*70%*
	Power beta of 80%, Alpha p-value of 0.05, Effect size 0.6 Sample size required without any drop-out: 22 samples. Sample size with 30% attrition rate included: 28 **Total of 28 patients:** - **12 Patients to receive treatment as usual** - **12 Patient to receive treatment as usual plus StepIt exercise**	

The CONSORT guidelines require a statement on the number of patients assessed for eligibility (Schulz, Altman & Moher 2010). The number of patients screened but who did not meet the inclusion criteria or who declined to participate will be recorded, as will any patients who are lot to follow-up (Appendix 3).

The calculation does take into account a 30% patient attrition rate (withdrawal and loss to follow-up), since this involves a study with at least two visits. Patients will be recruited from the adult (age 18+) population routinely seen by the evaluating clinical staff members.

6.1.1 Randomisation

Following written consent patients will be allocated at random to the control or intervention group, using a non-restricted randomised sequence generated for the whole sample using a free ware randomisation programme, see https://www.randomizer.org/ . The randomisation will be stratified for VLU size, with one group being those with a PUSH score of 8 or lower and the other with a PUSH score of 9 or higher. Sequential envelopes with each next randomisation allocation will be used to achieve concealment. It is recognised that random selection does not guarantee representativeness but variables which may affect the outcome variable are more likely to be balanced out and reliability enhanced (Thomas 1990).

As the study involves a self-administered intervention of necessity it is not possible to achieve blinding for the participants. Due to the pilot nature of this study, the researcher will not be blinded either to the subjects intervention, although this can be considered as part of a larger trial since it would further reduce any risk of bias. However, the primary outcome measure, size of the VLU is a quantitative outcome measure which is less prone to bias than for example a patient reported outcome measure or a clinician reported outcome measure.

6.2 Eligibility criteria

6.2.1 Inclusion criteria

- Over the age of 18
- VLU[1]
- Tolerating compression bandaging
- Able to give consent

[1] The case definition for VLU is any break in the skin on the lower leg that has been present for 2 weeks or more with a clinical venous aetiology and an ankle brachial pressure of $\geq$ 0.8 (NICE 2013).

6.2.2 Exclusion criteria

- Under the age of 18 years
- Unable to fully understand the consent process and provide informed consent due to either language barriers or mental capacity
- Limited life expectancy, i.e. undergoing palliative care

- Active infection in VLU

6.3 Early withdrawal of subjects

Patients have the right to withdraw from the trial at any time and without giving any reason. If a patient withdraws from the trial, any and all information gathered prior to the withdrawal will be excluded in the analysis, no further data collection will occur. If a patient does not attend a planned follow-up appointment then two more attempts will be made to contact the patient regarding the study. If still no contact can be made then the patient is deemed lost to follow-up and any collected study data will be retained.

7. SAFETY

7.1 Potential risks & benefits to study participants

There is no anticipated personal safety risk associated with taking part in this study. If the research team learns of important new information that might affect patient's desire to remain in the study, he or she will be told. Appropriate precautions are in place to ensure medical and personal information is kept safe through adhering to appropriate governance regulations. Participants in the StepIt intervention group will be asked to do the StepIt exercise; this will take more time and effort compared to standard management (treatment as usual). Any adverse events will be recorded, as outlined in sections below.

For the participants in the control group there is no direct benefit in taking part in this study. They will be cared for in exactly the same manner as they normally would. For participants in the Step It intervention group, there may be benefits in terms of improved VLU healing compared to normal standard care. However, this has not yet been proven and established, and this study is aimed to assess this. Participants cannot claim payments, reimbursement of expenses or any other benefits or incentives for taking part in this research.

7.2 Safety definitions

Adverse Event (AE)	Any untoward medical occurrence in a patient or other clinical investigation participant taking part in a trial of a medical device, which does not necessarily have to have a causal relationship with the device under investigation. An AE can therefore be any unfavourable and unintended sign (including an abnormal laboratory finding), symptom or disease temporally associated with the use of the device, whether or not considered related to the device.
Serious Adverse Event	A serious adverse event is any untoward medical occurrence that: - results in death - is life-threatening

- requires inpatient hospitalisation or prolongation of existing hospitalisation
- results in persistent or significant disability/incapacity
- consists of a congenital anomaly or birth defect.

Other 'important medical events' may also be considered serious if they jeopardise the participant or require an intervention to prevent one of the above consequences.

NOTE: The term "life-threatening" in the definition of "serious" refers to an event in which the participant was at risk of death at the time of the event; it does not refer to an event which hypothetically might have caused death if it were more severe.

7.3 Procedures for recording adverse events

All SAEs need to be reported to the sponsor/host Trust R&D **within one working day** of the investigator team becoming aware of them.

The only device to be in contact with the patient is the sterile swab provided by the hospital and employed by hospital staff only.

The relationship of each adverse event to the trial must be determined by a medically qualified individual according to the following definitions:

- **Related**: The adverse event follows a reasonable temporal sequence from swabbing. It cannot reasonably be attributed to any other cause.
- **Not Related**: The adverse event is probably produced by the participant's clinical state or by other modes of therapy administered to the participant.

8. STATISTICAL CONSIDERATION AND DATA ANALYSIS PLAN

8.1 Analysis of baseline characteristics

To determine the demographics and characteristics of the patients in the two arms the following data will be collated:

- Age
- Gender
- BMI
- Smoking status
- Significant comorbidities, including peripheral arterial disease, diabetes, rheumatoid arthritis, heart failure.
- VLU location

Any differences in distribution will be established with Chi-squared test or ANOVA as indicated.

8.2 Primary outcome statistics

The primary objective for this pilot study is the feasibility of conducting a larger scale randomised controlled trial. The secondary outcome statistics will inform the success of this pilot study and will therefore inform whether a larger scale trial is indicated. This will be based on signs of clinical effectiveness, positive patient feedback on the intervention, positive changes in VLU related quality of life, recruitment to time and target, low attrition rates, minimal data queries and lack of or low number of adverse events. If the effect size of the StepIt pedal is large enough, then this pilot trial may provide a definitive answer concerning its clinical effectiveness.

The following descriptive statistics will be reported on:

- Number of patients screened
- Number of patients eligible/ineligible, and percentage of patients consented into the trial
- Number of patients completed the trial/discontinued (plus reasons if discontinued)

8.3 Secondary outcome statistics

To evaluate the effect of the StepIt exercises on VLU healing data from the control group will be compared with data from the StepIt group. The StepIt exercise data will be stratified into different groups according to coherence to treatment.

Healing is defined by the following parameters:

- Ulcer size
- PUSH score
- Mobility score
- Ankle range of motion
- Visual analogue pain score
- Charing Cross Venous Ulcer Questionnaire

To assess the Ulcer size, PUSH score and visual analogue pain scores which are measured every 6 weeks, the average difference between time points will be calculated per group. To compare the groups, Mann-Whitney U-test will be applied.

To assess mobility score and ankle range of motion, the average differences between first and last visit will be calculated. The control and intervention group will be compared by applying Mann-Whitney U-test or unpaired t-test depending on the distribution of the data.

To measure patient-reported outcome measures on quality of life at first visit and final visit, the Mann-Whitney U-test will be performed. Data of the control and intervention group will be compared by applying the Mann-Whitney U-test.

Subject to sufficient data being available, Cox proportional hazards regression analysis will be conducted to investigate the role of StepIt and other covariates in VLU healing rates. Other

covariates include: VLU size and age at baseline, ankle motion range, patient age, patient mobility, absence/presence of co-morbidities.

9. DATA HANDLING AND MONITORING

Data arising from this study is confidential. Identifiable information can only be accessed by delegated members of the study team. Anyone in the research team who does not have a substantive contract with Cumbria Partnership NHS Trusts will need to apply for a letter of access via the NIHR research passport scheme.

Patient identifiable data will only be used within each respective Trust; pseudo-anonymised data are shared with the wider members of the study team. All identifiable data is stored on password protected NHS computer systems. Anonymised data will be shared and stored using security-enabled systems such as password-protection and encryption of e-mails and files. The requirements of the Data Protection Act and NHS Code of Confidentiality will be followed at all times. All researchers will be fully trained in NHS Confidentiality and GCP. Participants' GP practices will be informed that they are taking part in the study.

All paper data will be held in secure locked environments in the office of the Research & Development department in the Carleton Clinic, Carlisle, Cumbria Partnership. Data released (e.g. by publication) will contain no information that could lead to the identification of an individual participant. Upon completion of the study the site files will be archived for a period of 10 years in line with local archiving policy and procedures. Direct access to anonymised data only will be granted to authorised representatives from the sponsor, host institution and the regulatory authorities to permit trial-related monitoring, audits and inspections.

As this concerns a pilot study, the trial will be monitored by the in-house research team who will convene on a monthly basis. A trial steering committee will not be convened for this trial.

10. GOVERANCE OF STUDY

10.1 Approvals

This study will be conducted in compliance with the protocol approved by the Health Research Authority, National Research Ethics Service, and local Trust R&D Approval, and according to Good Clinical Practice standards including the Declaration of Helsinki (1964, Amended Oct 2013). No deviation from the protocol will be implemented without the prior review and approval of the aforementioned review bodies, except where it may be necessary to eliminate an immediate hazard to a research subject. In such case, the deviation will be reported according to policies and procedures

10.2 Sponsor & Indemnity

Cumbria Partnership NHS Trust is the sponsor of this study and therefore NHS indemnity applies for design, conduct and management of the study. StepIt Ltd has provided a grant for this study by means of provision of the StepIt pedals free of charge

Patients will not be given financial incentives for taking part in the study. Travel expenses are not offered in this study since patients are seen at their home by community nurses or hospital as part of their normal care pathway. Patients randomised to the intervention group will be provided the StepIt device free-of-charge for the duration of the trial.

11. PUBLICATION AND DATA-SHARING POLICY

The study will be registered on the Clinical Trials Gov website, in line with CONSORT guidelines on good practice in clinical research.

The results of this study will potentially be disseminated through:

- Peer-reviewed manuscript in scientific journal
- Conference paper
- Internal report

A summary of the main findings can be supplied to participants on request and this will be stated in the patient information leaflet

12. REFERENCES

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APPENDIX 1. TOOLS AND ASSESSMENTS

This appendix contains:

- The PUSH tool that will be used to assess each leg ulcer at base line and 2 weekly thereafter. (from Stotts et al, 2001)
- The mobility life space questionnaire that will be completed for each participant to confirm limited mobility at base line and at 12 weeks (from Stalvey et al 1999)
- The Charing Cross Venous Ulcer Questionnaire used to score VLU-related quality of life for each participant at baseline and at 12 weeks (from Hareendran et al, 2005)
- Visual analogue pain scale

NATIONAL PRESSURE ULCER ADVISORY PANEL

Pressure Ulcer Scale for Healing (PUSH)
PUSH Tool 3.0

Patient Name_____ Patient ID# _____

Ulcer Location _____ Date _____

Directions:

Observe and measure the pressure ulcer. Categorize the ulcer with respect to surface area, exudate, and type of wound tissue. Record a sub-score for each of these ulcer characteristics. Add the sub-scores to obtain the total score. A comparison of total scores measured over time provides an indication of the improvement or deterioration in pressure ulcer healing.

LENGTH X WIDTH (in cm^2)	**0** 0	**1** < 0.3	**2** 0.3 – 0.6	**3** 0.7 – 1.0	**4** 1.1 – 2.0	**5** 2.1 – 3.0	**Sub-score**
		6 3.1 – 4.0	**7** 4.1 – 8.0	**8** 8.1 – 12.0	**9** 12.1 – 24.0	**10** > 24.0	
EXUDATE AMOUNT	**0** None	**1** Light	**2** Moderate	**3** Heavy			**Sub-score**
TISSUE TYPE	**0** Closed	**1** Epithelial Tissue	**2** Granulation Tissue	**3** Slough	**4** Necrotic Tissue		**Sub-score**
							TOTAL SCORE

Life Space Questionnaire

Interviewer: "I am interested in all the places that you have been within the last 2 weeks" [It is acknowledged that original paper states 'within the last 3 days']

1. During the past 2 weeks have you been to other rooms of your home besides the room where you sleep?

   1 = ……..Yes 2= ……..No ☐

2. During the past 2 weeks have you been to an area immediately outside your home, such as your porch, patio, garage?

   1 = ……..Yes 2= ……..No ☐

3. During the past 2 weeks have you been to an area outside your home such as a yard, courtyard, garden, driveway?

   1 = ……..Yes 2= ……..No ☐

4. During the past 2 weeks have you been to places in your immediate neighbourhood but beyond your own property?

   1 = ……..Yes 2= ……..No ☐

5. During the past 2 weeks have you been to places outside your immediate neighbourhood but within your town or community?

   1 = ……..Yes 2= ……..No ☐

6. During the past 2 weeks have you been to places outside your immediate town or community?

   1 = ……..Yes 2= ……..No ☐

7. During the past 2 weeks have you been to places outside of Cumbria?

   1 = ……..Yes 2= ……..No ☐

Quality of life assessment: Charing Cross Venous Ulcer Questionnaire

I have pain from my ulcer:

None of the time	A little of the time	Some of the time	A good bit of the time	All of the time
1	2	3	4	5

1. Having an ulcer on my leg stops me from doing the following:

	None of the time	A little of the time	Some of the time	A good bit of the time	All of the time
a. Meeting friends and relatives	1	2	3	4	5
b. Going on holiday	1	2	3	4	5
c. Enjoying my hobbies	1	2	3	4	5
d. Using public transport	1	2	3	4	5

2. How TRUE or FALSE is each of the following statements for you when considering your leg ulcer?

	Definitely true	Mostly true	Don't know	Mostly false	Definitely false
a. My ulcer has slowed me down in general	5	4	3	2	1
b. My ulcer has put a strain on my personal relationships	5	4	3	2	1
c. The discharge from my ulcer is a problem	5	4	3	2	1
d. I spend a lot of time thinking about my ulcer	5	4	3	2	1
e. I am worried that my ulcer will never heal	5	4	3	2	1
f. I am fed up with the amount of time it takes to treat my ulcer	5	4	3	2	1

3. I am unhappy about the appearance of my legs because of the ulcer and/or dressings

No, definitely not	Occasionally	Often	All of the time
1	2	3	4

4. My leg ulcer prevents me from the following household duties:

	None of the time	A little of the time	Some of the time	A good bit of the time	All of the time
a. Cooking	1	2	3	4	5
b. Cleaning	1	2	3	4	5
c. Shopping	1	2	3	4	5
d. Gardening	1	2	3	4	5

5. I feel depressed because of my leg ulcer

Never	Occasionally	Often	Always
1	2	3	4

6. Please state how much of a problem to you the following factors are regarding the dressings for your leg

	A huge problem	A big problem	A moderate problem	A little problem	No problem
a. The bulkiness them	5	4	3	2	1
b. The appearance of them	5	4	3	2	1
c. They influence the clothes I wear	5	4	3	2	1

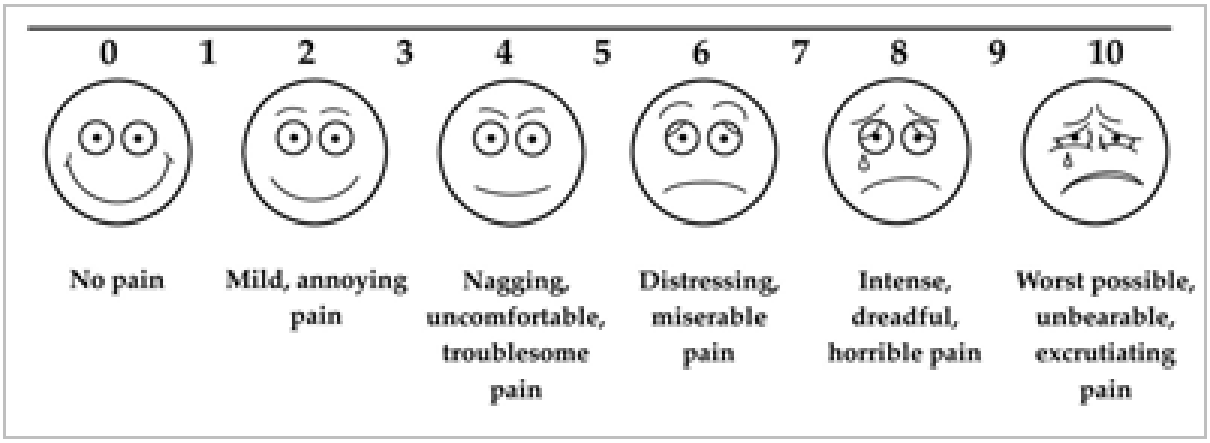
7. I have difficulty walking because of my leg ulcer

Never	Occasionally	Often	Always
1	2	3	4

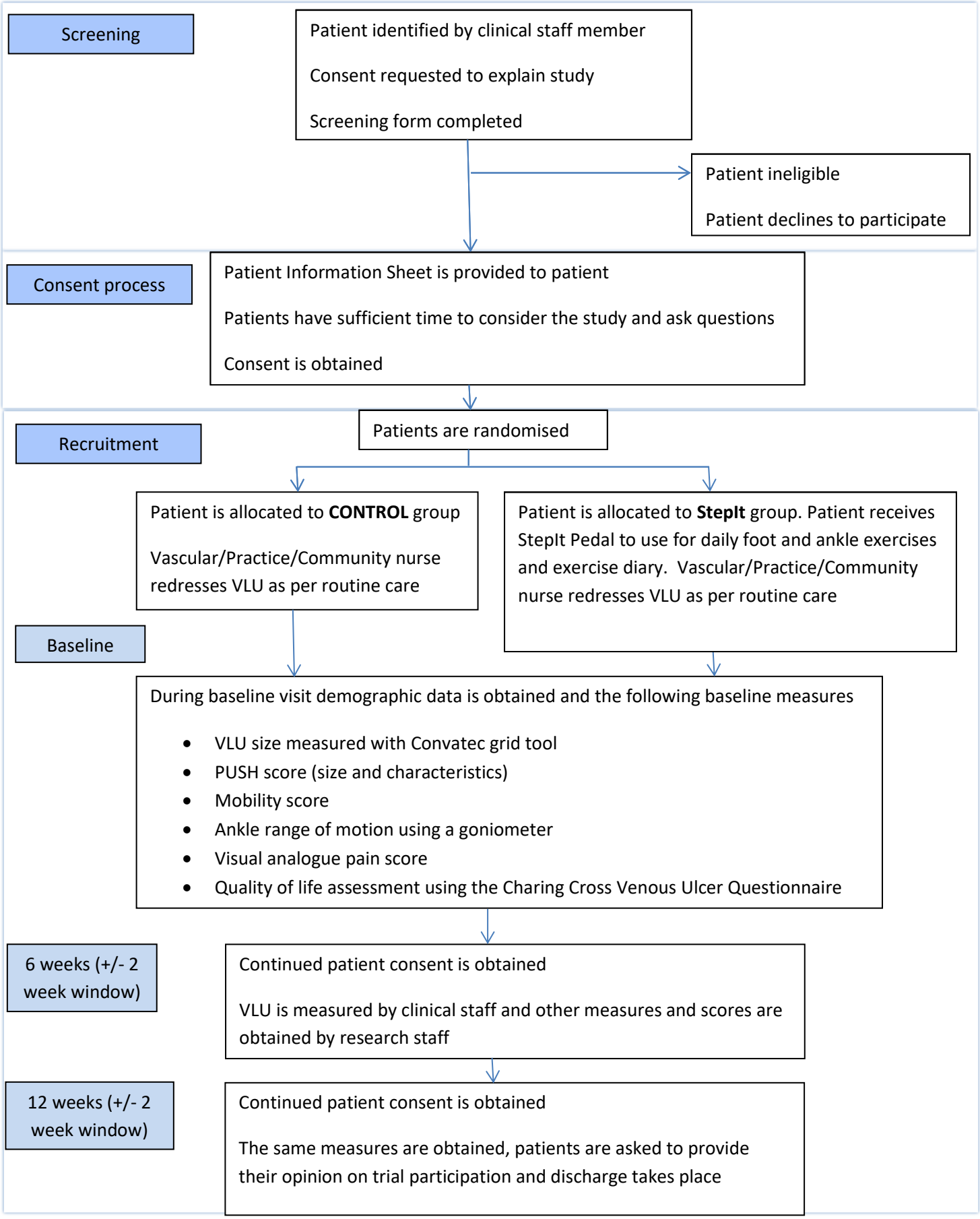
Total score:

(A score of 100 is the worst possible situation)

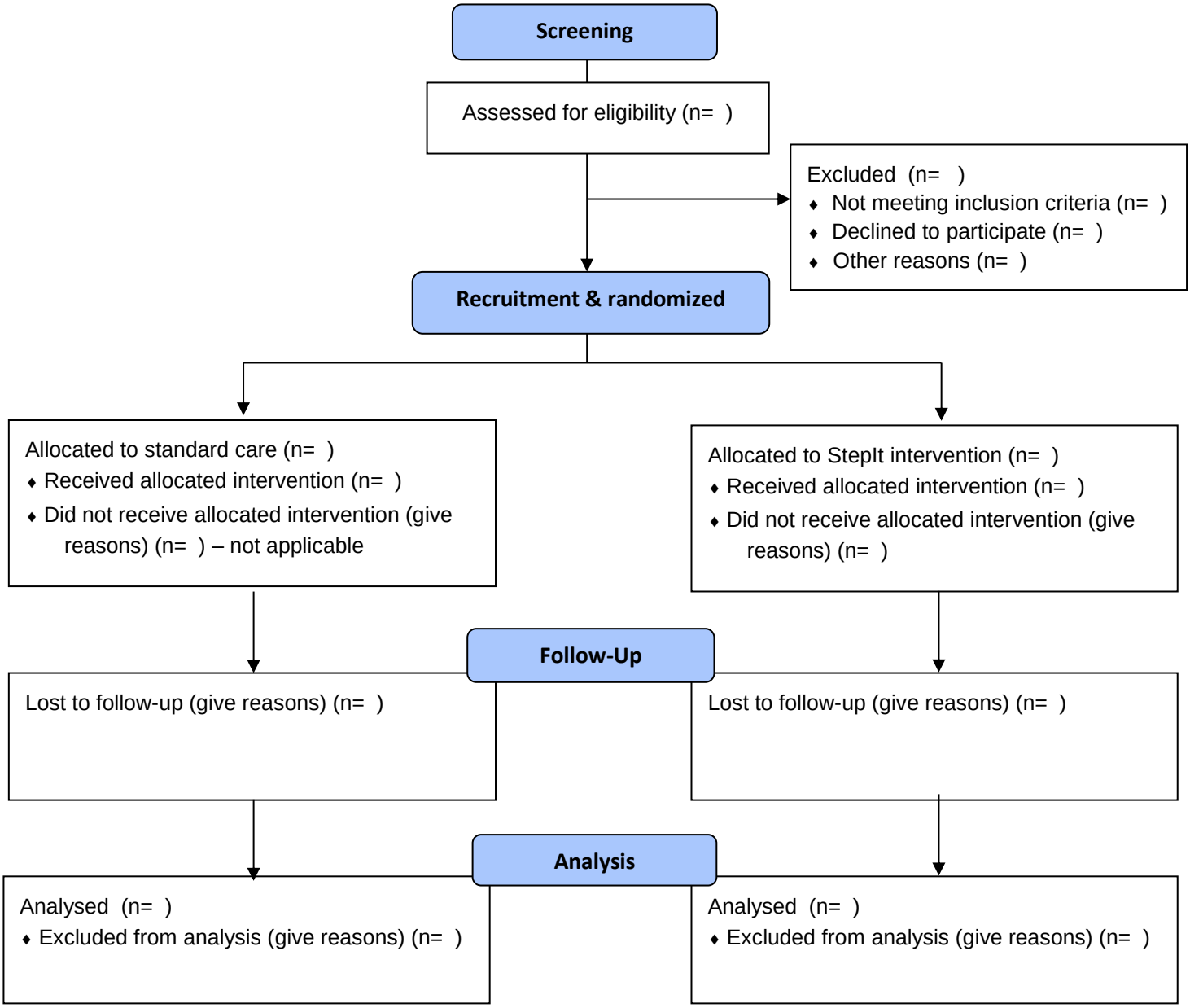
Visual analogue Pain score:



APPENDIX 2. STUDY PARTICIPANT FLOWCHART



APPENDIX 3. CONSORT FLOWCHART



**Based on CONSORT Flowchart*