

1A VASCULAR SURGERY 1

O15 CARDIOPULMONARY EXERCISE TESTING PREDICTS MEDIUM TERM SURVIVAL FOLLOWING ELECTIVE ENDOVASCULAR ANEURYSM REPAIR

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Introduction: Cardiopulmonary exercise testing (CPET) is a recognized assessment tool prior to abdominal aortic aneurysm (AAA) repair. CPET values predict survival following open AAA repair, however its role in patients who undergo EVAR is unclear.

Method: Age, gender, AAA size, device type, anaerobic threshold (AT), maximal oxygen consumption (peak VO₂) and ventilatory equivalent for carbon dioxide (VE/ VCO₂) were recorded on patients undergoing elective EVAR between 01/06/2007 and 28/02/2013. Continuous variables were compared by t-test, categorical variables by Chi-squared. Univariate survival was determined by Kaplan-Meier analysis and multivariable adjusted survival by Cox regression. Sub-threshold values were defined a priori based on previously published research as AT <11mlkg⁻¹min⁻¹, peak VO₂ <15mlkg⁻¹min⁻¹ and VE/ VCO₂ >42mlkg⁻¹min⁻¹.

Result: 188 patients underwent elective EVAR, CPET was performed in 127 of which AT was measured in 115. 3-year survival was associated with age but not device type, AAA size or gender. In multivariable adjusted analysis 3-year survival was significantly reduced for those patients who attained sub-threshold values in AT (HR 5.48, 95%CI 1.58-19.1, p=0.007), peak VO₂ (HR 5.37, 95%CI 1.54-18.7, p=0.008) and VE/ VCO₂ (HR 3.24, 95%CI 1.15-9.12, p=0.026). Multiple sub-threshold values were independently associated with reduced survival >1 sub-threshold value (HR 5.75, 95%CI 1.34-24.8, p=0.019), >2 sub-threshold values HR 2.40, 95%CI 1.06-5.44, p=0.021) and =3 sub-threshold values (HR 3.50, 95%CI 1.26-9.72, p=0.005).

Conclusion: Medium term survival following EVAR is significantly associated with sub-threshold CPET values both individually and cumulatively. CPET is therefore a crucial tool to guide decision-making regarding intervention in patients with AAA.

Take-home message:

CPET is a crucial tool to guide decision-making regarding intervention in patient with AAA.

O16 THE USE OF DEEP VENOUS STENTING FOR ACUTE VENOUS THROMBOSIS OF THE LOWER LIMB

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Introduction: Venous stenting following successful acute DVT thrombolysis is thought to reduce recurrence rates and the rates of post thrombotic syndrome(PTS).The aim of this review is to evaluate venous stent patency and the impact on the development of PTS, recurrence, quality of life(QOL) and optimal post-procedural anticoagulation regimen in acute iliofemoral DVT treatment.

Method: EMBASE and Medline databases were interrogated to identify studies in which patients with acute DVT were stented. The inclusion criteria were; RCTs for acute venous stenting, case series with more than 5 patients, and studies published in English or Arabic.

Result: 760 articles were identified and following title, abstract and full text screening, 27 articles were included. This included 542 patients stented following thrombolysis. Primary, assisted primary and secondary patency rates 12 months after stent placement ranged from 74-95%,90-95% and 84-100% respectively. Recurrence rates from 3 RCTs(n=213) showed a statistically significant difference in short-term follow-up favouring stenting, with lower recurrence rates of DVT mean numbers(P= 0.002). PTS was assessed in most studies with an overall observed rate of 14.6% The incidence of stent re-thrombosis(n=542) was 7.9%. In 26% of studies, patients received additional antiplatelet therapy. QOL questionnaires were only employed in 11.1% of studies demonstrating an improvement in CIVIQ (22.67±3.01 vs 39.34±6.66) between test and control groups.

Conclusion: Venous stenting appears to be an effective adjunct to early thrombus removal, lowering recurrence and PTS rates. Further studies are needed to identify optimal anticoagulant regimen and to look at the effect of interventional therapy on longterm QOL.

Take-home message:

Venous stenting appears to be an effective procedure in the context of acute lower limb DVT management, as well as lowering recurrence and PTS rates.

O17 ASSOCIATION OF AGE WITH LONG TERM MORTALITY IN PATIENTS WITH LOWER LIMB PERIPHERAL ARTERIAL DISEASE

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Introduction: Some studies suggest that extremes of age correlate with poorer outcome in patients with lower limb atherosclerosis yet current prognostic research is limited and somewhat historic. Younger patients have poor outcomes following intervention. We hypothesized that younger patients have significantly poorer overall long-term outcomes.

Method: Three groups of patients with PAD were analysed: Group 1 age < 64; Group 2 65-74; Group 3 > 75. Patient relevant factors were determined and the degree of lower limb atherosclerotic burden characterized. The primary outcome was all-cause mortality. The overall median follow-up period was 69.9 months (63-73).

Result: Group 1: 184 patients, median age 57 years, mortality rate 25%, group 2: 170 patients, median age 70 years, mortality rate 32% and group 3: 342 patients, median age 82 years, mortality rate 63%. Overall mortality was significantly higher in group 3 ($p < 0.001$). Patients in group 3 were more likely to have diabetes mellitus ($p = 0.045$), chronic kidney disease ($p < 0.001$), atrial fibrillation ($p = 0.003$), heart failure ($p = 0.002$) and overall greater burden of lower limb PAD ($p < 0.001$). A diagnosis of ischaemic heart disease and the number of patients prescribed either an antiplatelet agent or statin were not statistically significant between groups.

Conclusion: Differences in overall mortality rates in patients with PAD are evident as age increases (refuting our hypothesis), yet a 25% mortality rate in patients under the age of 65 years is of concern. Focus needs to be targeted towards reducing mortality as a whole and specifically in this younger cohort.

Take-home message:

Age is not the only indicator of progressive vascular disease - focus needs to be targeted toward high-risk cohorts of patients.

O18 COMPARISON OF ENDOVENOUS MECHANOCHEMICAL AND THERMAL ABLATION IN THE TREATMENT OF SUPERFICIAL VENOUS INCOMPETENCE

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Introduction: Endovenous thermal ablation using radiofrequency (RFA) and laser (EVLA) are the recommended first-line treatment of superficial venous incompetence (SVI). However it requires tumescent anaesthesia, which can be uncomfortable. New non-thermal techniques such as mechanochemical ablation (MOCA) aim to remove the need for tumescent and thus reduce pain. This study compares thermal and non-thermal techniques.

Method: Patients with unilateral SVI were treated with RFA, EVLA or MOCA and follow-up prospectively. Outcomes included Visual Analogue Pain scores, clinical severity scores, quality of life, recovery time, efficacy and complications.

Result: 75 patients underwent treatment (25 RFA, 25 EVLA and 25 MOCA). The mean age was 52 and 57% were female. Both groups were well match at baseline. Fewer patients in the MOCA group underwent concomitant phlebectomy, 24 vs 20 vs 6. Patients in the MOCA group experienced less pain during truncal ablation than thermal groups (MOCA 18.8 ± 14.9 mm vs thermal ablation 32 mm ± 22.1 mm; $p = 0.003$, vs RFA 35.9 mm ± 22.9 mm; $p = 0.003$, and vs EVLA 28.1 ± 21.1 mm; $p = 0.07$). At 6 weeks, all groups showed significant improvement in clinical severity and disease-specific quality-of-life. There were no significant complications.

Conclusion: Non-thermal MOCA is associated with less intra-procedural pain compared with thermal RFA and EVLA techniques.

Take-home message:

Truncal ablation with non-thermal MOCA is less painful than thermal RFA and EVLA techniques.

O19 ASSOCIATION BETWEEN ABDOMINAL VISCERAL ARTERY CALCIFICATION AND ALL-CAUSE MORTALITY- A COMPUTERIZED TOMOGRAPHY IMAGING-BASED LONGITUDINAL FOLLOW UP STUDY

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Introduction: Increasing arterial stiffness and calcification are hallmarks of ageing. These have an association with the underlying atherosclerotic plaque burden. Coronary artery calcium is an independent predictor of future cardiovascular events and mortality. The association of abdominal visceral artery calcium with mortality remains predominantly unexplored.

Method: A novel calcium score [cumulative visceral arteries calcium score (VACS)] for the abdominal visceral arteries (superior, inferior mesenteric and renal arteries) was calculated using a modified Agatston score on a consecutive series of patients undergoing computerized tomography (CT) imaging (2006-2010). The primary outcome was all-cause mortality. Cox-regression analysis was used to assess association between VACS and all-cause mortality. Kaplan Meier survival analysis was used to assess difference in event free survival duration between groups of patients with high and low VACS.

Result: Eighty-nine subjects [median age: 79 yrs (interquartile range (IQR): 71-83)] had a median follow-up duration of 72 (47-92) months since CT imaging. 35 patients died (39%) during this period. Median VACS was 267 (IQR: 4-1337). Hypertension and VACS were observed to have strong association with all-cause mortality ($p < 0.05$). Receiver operator curve analysis demonstrated a VACS cut-off value of greater than 401 [sensitivity (95% confidence interval (CI): 0.57 (0.39-0.73), specificity: 0.62 (0.48-0.75)] strongly associated with all-cause mortality. Mean survival was greater in patients with VACS less than 401 [102.40 vs. 75.07 months, log-rank: $p = 0.01$].

Conclusion: VACS is strongly associated with all-cause mortality. Further research is warranted for use of VACS as a risk stratification tool in patients with cardiovascular atherosclerotic disease.

Take-home message:

Abdominal visceral artery calcium burden has significant association with patient all-cause mortality.

O20 HOW TO MEASURE PATIENT REPORTED OUTCOME MEASURES (PROMS) IN PATIENTS WITH PERIPHERAL ARTERIAL DISEASE (PAD): MIXED METHODS

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Introduction: To assess the suitability of PROMs used for patients with PAD.

Method: The study was conducted in 3 stages: 1-Systematic review to identify PROMs validated in patients with PAD using psychometric criteria from published recommendations in accordance with the FDA guidance. 2- Systematic review of qualitative studies and a qualitative study to investigate impact of PAD on patients. The results were synthesised using framework analysis. 3-Triangulation study whereby the themes from the qualitative reviews, qualitative interviews and PROMs items/domains were examined to assess the extent to which the items from the identified PROMs correspond with the concepts important to patients.

Result: 1- 6 generic (EQ-5D, SF-36, SF-6, SF-8, NHP, POMS) & 7 disease specific PROMs (AUSVIQUOL, ICQ, PADQOL, PAQ, SIPic, WIQ, VascuQOL) were identified. SF-36, EQ-5D & VascuQOL were the most commonly used. VascuQoL was the most psychometrically robust PROM, although no evidence on floor/ceiling effect or acceptability was reported for it. 2- 6 Studies were included in the qualitative evidence synthesis and included the views of 146 patients. 29 concepts were identified. 3- SF-36 & PADQOL PROMS were the generic and disease specific measures with the best fit respectively. However both omitted important concepts such as impact on independence, sleep, physical symptoms like healing wounds, cold limbs and financial impact.

Conclusion : The findings give a comprehensive insight into aspects of care that are relevant to patients, providing a first step to develop new PROMs relevant for PAD that cover all the concepts of interest to patients.

Take-home message:

The findings show a lack of validated PROMS that cover all aspect of care for subgroups of patients suffering with PAD such Critical limb ischaemia.

O21 BIOMARKER RESEARCH IN THROMBOEMBOLIC STROKE

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Introduction: There is a clinical need to improve risk stratification of carotid atherosclerosis, to better target surgical or interventional therapy and prevent stroke. This study aimed to determine diagnostic biomarkers of high-risk carotid atherosclerosis, and ensure their validity in the presence of alternative phenotypes of atherosclerotic disease.

Method: 150 patients were recruited according to the following criteria: 1. Symptomatic >50% carotid stenosis 2. Non-carotid stroke/TIA 3. Asymptomatic >50% carotid stenosis 4. Asymptomatic controls with <50% carotid stenosis 5. Abdominal aortic aneurysm 6. Intermittent claudication Disease groups were matched for age, gender, cardiovascular risk factors, haematological and biochemical parameters. Blood and urine was collected from all patients and analysed through global metabolic profiling (1H-NMR Spectroscopy, HILIC-Mass Spectrometry and Lipid Profiling-Mass Spectrometry). Acquired spectra were compared across groups using computational multivariate data analysis to determine markers of high-risk carotid atherosclerosis.

Result: Statistical models derived from urinary spectra proved stronger than serum datasets, in particular with HILIC-Mass Spectrometry (positive ionisation mode). Application of computational OPLS-DA resulted in statistically significant discrimination of symptomatic carotid atherosclerosis from asymptomatic disease (Q2Y=0.563), aneurysmal disease (Q2Y=0.607), and intermittent claudication (Q2Y=0.500). Differentiating metabolites span a vast array of compounds including lipid derivatives, amino acid derivatives and nucleotide derivatives.

Conclusion: This is the first study to identify urinary metabolic biomarkers of high-risk carotid atherosclerosis, differentiating symptomatic carotid atherosclerosis from asymptomatic disease, and aneurysmal and peripheral arterial disease. Targeted temporal studies are now required for clinical validation and to determine the variation of acute biomarkers with time.

Take-home message:

This is the first metabolomic study to demonstrate urinary biomarkers of high-risk carotid atherosclerosis.

O22 DIFFERENCES IN ACUTE AND CHRONIC ILLNESS BURDEN PREDICT PATIENT RELEVANT OUTCOMES IN OLDER VASCULAR SURGERY PATIENTS

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Introduction: The aging population greatly affects the delivery of care and patient outcomes in vascular surgery. Patients have a number of age related morbidities, which allied to the often acute / subacute presentation, increase the risk of poor outcomes. This study aimed to interrogate the complex interface between acute and chronic illness in older vascular surgery patients in relation to patient-specific outcomes.

Method: Patient >75 years of age admitted non-electively to a vascular unit over a one-year period were analysed. Data was collated with regard to demographics, co-morbidity, geriatric syndromes including frailty score (FS) and acute physiological illness (Worthing physiological score (WPS)). The primary outcome was in-hospital mortality. Secondary outcomes were prolonged length of stay (LOS), discharge destination and mobility.

Result: A total of 177 patients were analysed (median age 81 years, 78 women). In-hospital mortality was 6.2% and overall LOS 10 days (IQR 6-18). Age ($p=0.004$), WPS score ($p<0.001$) and Katz score ($p=0.008$) were independent predictors of in-hospital mortality although FS failed to predict mortality ($p=0.754$). FS but not WPS score was an independent predictor of a prolonged LOS ($p=0.025$) as well as discharge destination ($p<0.001$) and mobility ($p<0.001$). Further independent predictors of prolonged LOS were malnutrition, cognitive impairment and a previous history of falls (all $p<0.03$).

Conclusion: Acute physiological impairment alongside measures of geriatric syndrome influence early mortality. Frailty specifically predicts other patient relevant outcomes. This complex interaction between chronic and acute illness needs exploring further to enable relevant focused interventions aimed at improving outcomes.

Take-home message:

A combination of acute illness and frailty predict patient relevant outcomes in vascular surgery patients

023 IS THERE ANY VALID PATIENT REPORTED OUTCOME MEASURES (PROMS) FOR PATIENTS UNDERGOING CAROTID ARTERY REVASCULARISATION?

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Introduction: To identify and evaluate the psychometric properties of PROMs used in patients undergoing carotid artery revascularisation. This is to inform the use of the appropriate PROMs in clinical practice.

Method: A systematic review of peer-reviewed articles was undertaken to identify studies that assessed the psychometric validity of generic and disease-specific PROMs used for patient undergoing treatment for carotid artery disease. The psychometric criteria were adapted from published recommendations in accordance with the FDA guidance and the criteria were based on the Oxford system and the consensus-based standards for the selection of health status measurement instruments -COSMIN-. Two reviewers assessed the psychometric properties of each PROMs independently.

Result: A total of 1,670 records were retrieved and following review 5 papers were identified that reported validation on 6 PROMs. These included 4 generic (SF-36, EQ-5D, DHI & HPQ) and 2 disease specific measures (New measures by Ivanova et al. & Stolker et al.). No study reported any evidence on criterion validity and test-retest reliability. Only Hsu et al. reported a Cronbach alpha score >0.70 as evidence of internal consistency. Ivanova PROMs was the only tool with content validity. The acceptability and responsiveness were poor among all the identified PROMS. Overall, according to the set criteria the identified PROMs had poor psychometric properties.

Conclusion: PROMs are an important measure of surgical outcomes in addition to death & stroke in patients undergoing carotid revascularisation. The lack of validated PROMs to measure this outcome highlights the need for developing valid PROMs.

Take-home message:

PROMs are an important measure of surgical outcomes as identified by the NHS as well as WHO. There is no validated PROMs for patients undergoing carotid revascularisation.

024 HOW DOES THE 'ANGIOSOME CONCEPT' FARE IN THE REAL WORLD

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Introduction: The angiosome concept potentially provides optimal target for revascularization. However, it may not be achievable or necessary. We aimed to review the applicability of the angiosome concept in real world.

Method: Patients undergoing revascularization for tissue loss (Rutherford 5/6) were identified using a prospective database. Direct revascularization (DR) was compared to Indirect revascularization (IR) and outcomes were analysed.

Result: Between 2008 and 2010, 36 consecutive patients with tissue loss were identified for study. Median patient age was 78.5 years: 39% presented with forefoot, 8.3% heel and 19.4% ankle ulceration. 22.2% had ulceration over multiple angiosomes. Revascularization decisions were based on best vessel at primary imaging with 6 patients undergoing DR and 24 IR. However, retrospective review of primary imaging identified an angiosome target vessel in 22 patients (67%). There were no significant

differences in co-morbid status in patients undergoing DR or IR, with a total of 13 diabetic patients included. 30 patients underwent revascularization: 13 primary angioplasty, 17 infra-inguinal bypass. There was no significant difference in wound healing at 3 months overall (DR 67%: IR 79%, $p=0.638$) but increased wound healing rate amongst diabetics in the IR group (DR 50%: IR 100%, $p=0.01$). There was a significant increase in amputations at 12 months in the DR group (DR 33%: IR 0%, $p=0.04$).

Conclusion: In patients presenting with ulceration, revascularization to the angiosome target vessel is not always possible. Restoration of blood flow to the ulcer is critical but in this small real world study indirect revascularization does not appear to be inferior to direct angiosomal revascularization.

Take-home message:

Indirect revascularization is at least as good as direct angiosomal revascularization in patients with tissue loss

O25 ATHEROSCLEROTIC LOWER LIMB BURDEN (TOTAL AND SEGMENTAL) PREDICTS LONG TERM MORBIDITY AND MORTALITY IN PATIENTS WITH PERIPHERAL ARTERIAL DISEASE: AN ANATOMICAL ASSESSMENT

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Introduction: The ankle brachial pressure index, a predictive marker of cardiovascular (CV) outcome, is a global marker of limb perfusion. It does not, however, reflect the contribution of atherosclerotic burden in differing segments of the lower limb arterial tree, which may allow for more accurate CV event rate prediction.

Method: Total, femoropopliteal (FP) and infrageniculate crural (CR) atherosclerotic disease burden was determined from a consecutive series of lower limb arterial duplex scans (Bollinger score). Patient demographics, co-morbidities and long-term outcomes were determined. The primary outcome was all-cause mortality. Secondary outcome was non-fatal coronary event (defined as an acute hospital admission with proven ischaemic coronary event).

Result: A total of 696 patients were analysed. Median follow up period was 69.9 months (63-73). All-cause mortality was 45%. Coronary events occurred in 67. Predictors for all-cause mortality were total Bollinger score (odds ratio [OR] 3.452 95% confidence interval [CI]: 1.987-5.654; $p<0.001$), as well as FP score (OR 1.623 95% CI 1.232-1.879; $p=0.032$) and CR score (OR 2.123 95% CI 1.675-2.679; $p=0.025$). Predictors of the secondary outcome were CR Bollinger score (OR 2.123 95% CI 1.786-2.654; $p=0.031$). Total (OR 1.654 95% CI 1.321-1.987; $p=0.052$) and FP (OR 1.321 95% CI 1.087-1.786; $p=0.404$) Bollinger score did not predict secondary outcome.

Conclusion: Atherosclerotic burden predicted both all-cause mortality and coronary event rates. This may allow a more accurate prediction of outcome than more traditional methods. Specifically, anatomical associations in the coronary and lower limb circulation may help direct appropriate interventions to reduce such risk.

Take-home message:

The role of Bollinger scores in the lower limb may aid to identify at-risk patients with regards to all-cause mortality and cardiovascular outcomes.

O26 EFFECTIVENESS, SAFETY AND PATIENT SATISFACTION OF POST-OPERATIVE NURSE ONLY TELEPHONE FOLLOW UP FOR VASCULAR SURGERY

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Introduction: Post-operative nurse only telephone follow up is increasingly used, but its effectiveness, safety and acceptability is unclear.

Method: We retrospectively analysed the patient records one year post-operatively of all patients who were seen as follow up in the Vascular Department. We called a random selection of patients to ask their views on follow up. This was coordinated by an independent researcher.

Result: 236 patients had nurse only telephone follow up over one year. 85 had arterial surgery; 48 angioplasty; 15 AAA repairs; 12 endarterectomy/embolectomy. 72 patients had venous surgery. 196 (83%) were discharged afterwards; 51 had further telephone nurse follow up, 14 saw a surgeon; 13 patients required further treatment. Only 4 (1.7%) patients had a complication which may have benefited from being seen in clinic, possibly with less delay to follow up treatment. No patients had complications missed one year post-operatively. Questionnaire: 145 patients were randomly contacted (54%), 98 (41%) were successfully contacted. 82 (83%) patients were either very satisfied/satisfied with nurse follow up; eleven (11%) neutral; 3 (3%) dissatisfied; 0 (0%) very dissatisfied; 1 no comment; 1 patient physically attended. 48 patients (49%) preferred telephone; 23 (23%) preferred face to face; 26 (27%) had no preference.

Conclusion: Vascular nurse only telephone follow up is a safe, effective and satisfactory method. It is safe for both major vascular surgery such as aortic aneurysm repair and day case procedures. Travel and time were saved for the patient. As a result the department is able to see more new patients.

Take-home message:

Vascular nurse only telephone follow up is a safe, effective and satisfactory method. It is safe for both major vascular surgery such as aortic aneurysm repair and day case procedures.

O149 HOW TO MEASURE PATIENT REPORTED OUTCOME MEASURES (PROMS) FOR PATIENTS WITH VENOUS LEG ULCERS (VLU): A MIXED METHOD STUDY

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Introduction: To identify and evaluate the psychometric properties of PROMs used in patients with VLU.

Method: A systematic review of peer-reviewed articles was undertaken to identify studies that assessed the psychometric validity of generic and disease specific PROMs used for patients with VLU. The psychometric criteria that were used to assess these studies were adapted from published recommendations in accordance with the FDA guidance and were based on Oxford system and consensus-based standards for the selection of health status measurement instruments (COSMIN). Two reviewers assessed the psychometric properties of identified PROMs.

Result: A total of 3,879 records were retrieved and following review only 6 papers were identified that reported psychometric properties for 7 PROMs. This included 3 generic (NHP, SF-12 & EQ-5D) and 4 disease-specific measures (VeLUSET, VLU-QOL, Hyland & SPVU-5D). None of the generic PROMs had any criterion validity. NHP had good internal consistency (Cronbach's α -score: 0.81), responsiveness was reported as 0.6 ($p < 0.001$) and 91% acceptability. EQ-5D had poor responsiveness but acceptability of $>80\%$. SF12 had acceptability of 91% and weak responsiveness. All the disease-specific PROMs had poor criterion and construct validity. VLU-QOL had good internal consistency (Cronbach's α -score >70), test re-test reliability, responsiveness and content validity. VeLUSET had good content validity and test-retest reliability. SPVU-5D had robust content validity but poor internal consistency. Hyland PROMs had poor responsiveness and acceptability.

Conclusion: NHP is the most appropriate generic PROMs used for patients with VLU, however more work needs to be done to develop a valid disease specific PROMs.

Take-home message:

The most appropriate generic PROMs to be used for patients with VLU in randomised controlled trials and service analysis is NHP, however a new disease specific PROMs need to be developed.