BOFAS

British Orthopaedic Foot & Ankle Society

Registry Report 2022

INTRODUCTION

The data presented in this report covers procedures entered into the British Orthopaedic Foot & Ankle Society (BOFAS) Registry from its inception in 2014 until December 2021. The 1st Metatarsophalangeal Joint Arthrodesis Pathway (1st MTPJAP) and the Ankle Arthrodesis Pathway (AAP) have been open since the registry started, however the Foot and Ankle General Pathway (FAGP) was only opened towards the end of 2016. The Achilles Rupture Trauma Pathway, Achilles Tendinopathy Pathway and Ankle Primary & Revision Arthroplasty pathways were introduced in the previous year and the Ankle Fracture and Foot and Ankle Trauma pathways this year.

Over this period we have seen a steady increase in data entry but, it is clear that as it currently stands, the Registry only captures a small proportion of national activity, both in the Private & NHS sectors. We are making headway in including data from some, already established, Amplitude based Hospital systems and are also exploring how we may import data from other established Hospital Patient Related Outcome Measure (PROM) collection systems.

The majority of the information in this report is summary data, however we have begun to statistically analyse certain outcomes where we have sufficient pathway numbers. The information contained within this report will be useful for BOFAS members in their appraisals and, as we continue to collect data, it will aid quality improvement and may help direct practice and future research priorities nationally.

The BOFAS Registry is one of the eight Emerging Registries forming part of the Trauma & Orthopaedic Registries Unifying Structure (TORUS). TORUS is a collaborative project of the British Orthopaedic Association (BOA) in conjunction with the specialist societies. The BOFAS Registry is a national audit and is available to all foot and ankle surgeons who are members of the society. Surgical disciplines lend themselves to evidence capture, and a registry is an ideal method of demonstrating the nature and success of one's practice. The BOFAS Registry incorporates a downloadable personal Revalidation Report, which in conjunction with the annual report, can be used to assess your own practice against the average nationally.

AIMS

The broad aims of the BOFAS Registry are in line with those of the BOA Quality Outcomes project:

- Help surgeons to track the outcomes of their patients.
- Allow Surgeons/Trusts to compare themselves to others or the average and to identify areas for improvement.
- Provide surgeons with information for revalidation.
- Provide evidence on trends in outcomes, performance of different implants/procedures/etc.
- Enable individuals and Trusts who may be potential outliers to be alerted to this in order to take action.

BACKGROUND

The BOFAS Registry is the responsibility of the BOFAS Outcomes Committee. The role of the committee is to support the Society and Council in developing suitable processes to collect patient outcome measures.

Duties of the Outcomes Committee include:

- Working with the platform provider to enable collection of information into central BOFAS registry
- Ensuring that the consent from remains compliant with legal requirements.
- Oversight of information governance.
- Publication of data.
- Registry funding.
- Long term strategy.

Further details regarding the BOFAS Registry can be found on the BOFAS Website.

MEMBERSHIP OF OUTCOMES COMMITTEE

- Chair: Lyndon Mason
- Co-chair: Ed Wood
- Member: Nick Harris
- Member: Nilesh Makwana
- Member: James McKenzie
- Member: Tim Clough
- Caldicott Guardian: Stephen Bendall
- President: Heath Taylor
- Treasurer: Hiro Tanaka
- Secretary: Mark Davies
- Co-opted: Andy Goldberg
- Co-opted: Karan Malhotra
- Co-opted: Thomas Lewis
- Co-opted: Toby Jennison

CONTRIBUTING SURGEONS / UNITS

Hospital	Pathway Owner
Basingstoke and North Hampshire Hospital	Elliot, Robin
BMI Bath Clinic, Bath	McKenzie, Jamie
BMI Mount Alvernia Hospital, Guildford	Kohls-Gatzoulis, Julie
Cambridge University Hospitals NHS Foundation Trust	Barrett, Mike
Circle Hospital, Reading	Mahadevan, Devendra
Countess of Chester Hospital, Chester	Thomason, Katharine
Countess of Chester Hospital, Chester	Wood, Edward
Gartnavel General Hospital, Glasgow	Moir, John Stuart
Guy's Hospital, London	Abbasian, Ali
King's College Hospital, London	Ray, Robbie
Liverpool Uniersity Hospitals NHS Foundation Trust	Butcher, Cliff
Liverpool University Hospital NHS Foundation Trust	Cooper, Lucy
Liverpool University Hospital NHS Foundation Trust	Heyes, Gavin
Liverpool University Hospital NHS Foundation Trust	Mason, Lyndon
Liverpool University Hospital NHS Foundation Trust	Molloy, Andy
Liverpool University Hospital NHS Foundation Trust	Rees, Robin
Liverpool University Hospital NHS Foundation Trust	Singh, Anjani
Liverpool University Hospital NHS Foundation Trust	Sirikonda, Siva
Musgrove Park Hospital, Taunton	Robinson, Peter
Nuffield Health Guildford Hospital, Guildford	Halliwell, Paul
Nuffield Health Guildford Hospital, Guildford	Solan, Matthew
Princess Royal University Hospital, Orpington	Lyle, Shirley
Princess Royal University Hospital, Orpington	Ray, Robbie
Queen Alexandra Hospital, Portsmouth	Koc, Togay
Queen Elizabeth University Hospital, Glasgow	Moir, John Stuart
Robert Jones & Agnes Hunt Orthopaedic Hospital, Oswestry	Bing, Andrew
Robert Jones & Agnes Hunt Orthopaedic Hospital, Oswestry	Makwana, Nilesh
Royal Berkshire Hospital, Reading	Mahadevan, Devendra
Royal Hampshire County Hospital	Marsland, Daniel
Royal Orthopaedic Hospital, Birmingham	McKenzie, Jamie
South West London Elective Orthopaedic Centre, Epsom	Sott, Andrea
Southmead Hospital, Bristol	Riddick, Andrew
Southmead Hospital, Bristol	Robinson, Peter
West Suffolk Hospital, Bury St Edmunds	Vaughan, Phil
Yeovil District Hospital, Yeovil	Grundy, Julian
	Acharya, Ashok
Royal Cornwall Hospital, Truro	Butler, Michael
	Chandrashekar, Suresh
James Paget University Hospitals NHS FT	Devany, Adam
	Dhukaram, Vivek
	Goswami, Sanjeev
Great Western Hospital, Swindon	Grice, John
	Heaver, Catriona
	Henderson, Matthew
	Humphrey, Joel
Portsmouth Hospitals	Jowett, Billy
	Kankate, Raghu
Norfolk & Norwich University Hospitals NHS FT	Loveday, David
Robert Jones & Agnes Hunt Orthopaedic Hospital, Oswestry	Marquis, Christopher
	May, Jonathan
	Millar, Tim
	O'Flaherty, Maurice
Royal United Hospital, Bath	Robinson, Derek
	Rudge, Ben
Chelsea and Westminster Hospital NHS FT	Sinnett, Tim
	Syed, Turab
	Teoh, Kar
	Thorisdottir, Vigdis
Colchester General Hospital	Williams, Timothy

*Where Organisation is blank – information not available from individual's BOFAS Profile.

SUMMARY

UPTAKE & COMPLIANCE

The degree of uptake of the registry by the BOFAS membership is increasing with time, however it remains a minority of members actively entering data. Over the last few years we have seen an almost exponential increase in the total number of cases and, by the end of 2021, have exceeded 10,000 pathways within the registry (Fig 1). This is still however, only a small proportion of the national figures.

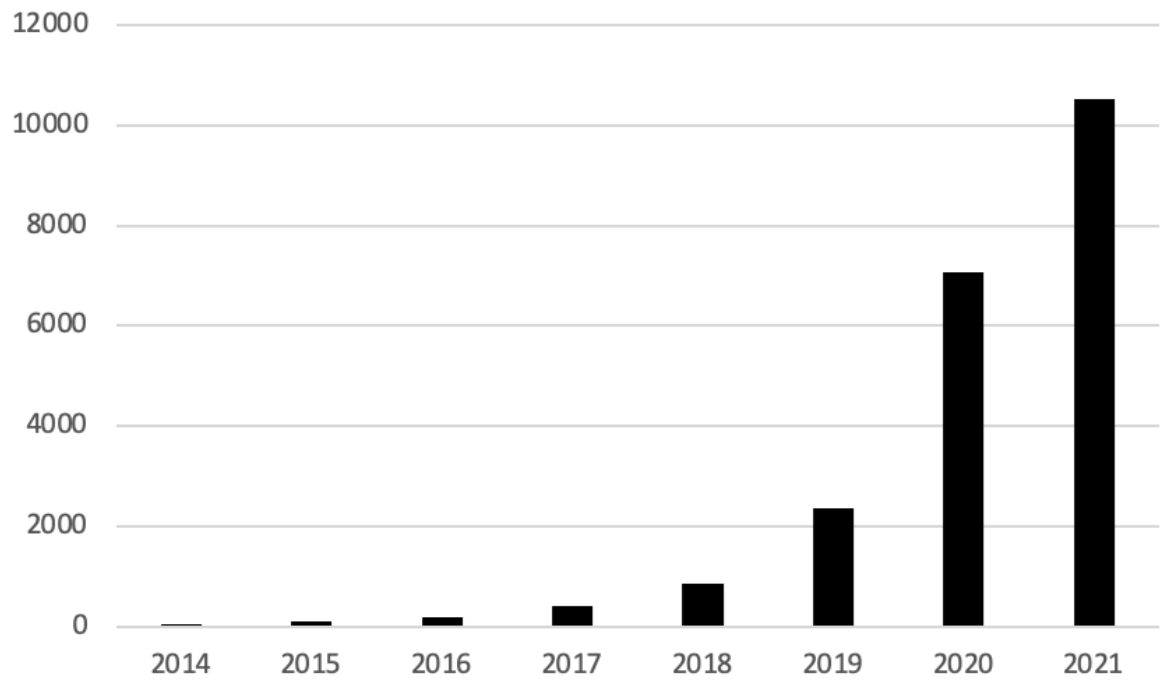


Fig 1: Cumulative Total Pathways by Year

IMPACT OF COVID-19 PANDEMIC

The impact of the Covid pandemic, on clinical activity in 2021, was reflected in the low number of new pathways generated early in the year. However as restrictions were eased in the spring there has been a progressive increase in activity (Fig 2). On average 99 new pathways were added each month over 2021, a marked increase on the previous year's monthly average of 48.

Separate to the Registry, as part of a collaboration between the Scientific and Outcomes committees, work has been done looking at the outcome of patients in the UK who underwent foot and ankle surgery during the COVID-19 crisis. This is detailed in the UK-Falcon reports, available on the BOFAS website (https://www.bofas.org.uk/clinician/research/bofas-national-audits).

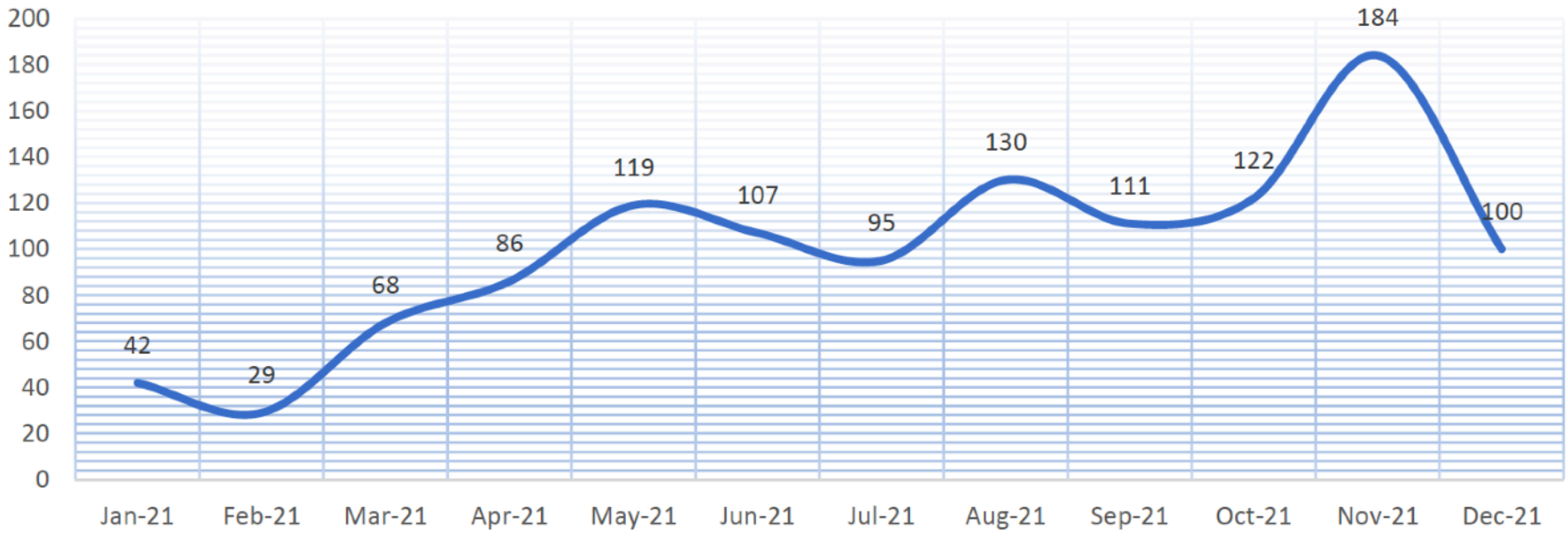


Fig 2: Number of new pathways per month, 2021

BARRIERS TO UPTAKE

A number of factors may prevent surgeons from registering and entering cases: time pressure, unfamiliarity, concern regarding data use. As the registry is not currently mandated, support from Trusts regarding data collection and input is widely variable. We believe this will be a valuable tool for our members for revalidation and appraisal and may become something that the Responsible Officers look too. Videos on how to use the registry are now available on the BOFAS website.

COMPLIANCE

Compliance for consent is high across the three pathways (≥95%). Where consent has been gained, surgeons can look back at individual outcomes. Where consent is absent, the record is anonymised. In this scenario, the PROMS enter the registry summary data, but it is not possible to identify the individual or add follow up data. It is still necessary to take paper consent and file this in the notes even though patients confirm consent online when they first log in, since their details have been entered to enable them to be contacted, and that is only legal if consent has already been taken.

Between 15% and 34% of cases have no email address associated with their entry. This removes the ability of the registry to automate data collection. In this scenario different strategies for post-op PROMS collection need to be put in place. Making use of telephone review streams can be a good solution.

We have also seen a significant proportion of patients registered but with no initial PROMS entered (18% - 39% depending on pathway). It is not clear if this reflects patients registered in clinic, who are yet to come to their procedure, or if it has simply not been recorded.

OVERVIEW OF PROM SCORES

The BOFAS Registry allows foot and ankle surgeons to use the outcome scores to assess patients both pre- and post-operatively. The standard outcomes scores for each pathway are detailed in table 1.

Pathway	MOXFQ	EQ-5D	VAS Pain	OMAS	ATRS	AS	VISA-A
1st MTP Fusion	✓	✓	✓				
Ankle Arthrodesis	✓	✓	✓				
Foot & Ankle Generic	✓	✓	✓				
TAR Primary	✓	✓					
TAR Revision	✓	✓					
Achilles Rupture					✓	✓	
Achilles Tendinopathy		✓					✓
Trauma Ankle Fracture		✓	✓	✓			
Trauma Foot & Ankle	✓	✓	✓				

Table 1: Standard Pathway PROMS

Other scores are available, depending on Surgeon choice, and may be configured in the Surgeon's registry settings. For example, one may choose to record MOXFQ & EQ-5D for all patient groups. Scores are recorded pre-operatively then routinely, via email, SMS text, or in person, at regular intervals post-operatively, depending on the pathway.

EQ-5D-5L and EQ-5D Health VAS

EQ-5D is a standardised measure of health status developed by the EuroQol Group in order to provide a simple, generic measure of health for clinical and economic appraisal. The five level EQ-5D consist of two pages: the EQ-5D descriptive system and the EQ VAS. The EQ-5D comprises five domains: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. Each dimension has 5 levels: no, slight, moderate, severe and extreme problems. The digit generated for each dimension is combined into a 5 digit number that describes the patient's health state. For example a health state 21143 represents a patient who indicates slight problems with mobility, no problems with self-care, and usual activities dimension, severe pain or discomfort and moderate problems on the anxiety/depression dimension. The health states can then be converted into a single Index value.

The EQ VAS records the patient's self-rated health on a vertical 20cm VAS line, where the end points are labelled `*The best health you can imagine*` (100 points) and `*The worst health you can imagine*` (0 points). The VAS can be used as a quantitative measure of health outcome that reflect the patient's own judgement. The EQ-5D-5L has been validated in a diverse patient population in 6 countries. The EQ-5D data can be compared against data for the average person of the same age and/or gender in the general population, helping identify the burden of disease in a particular patient population.

Manchester-Oxford Foot Questionnaire (MOxFQ)

The MOXFQ is a 16–item PROM instrument, which is self-administered. It assesses how foot and ankle problems impair health-related quality of life and is completed pre- and post-operatively. It was originally intended for use for hallux valgus surgery and more recently proven for use with a variety of foot and ankle problems

The questionnaire consists of three domains/scales:

- Walking/standing – 7 items. (MOxFQ-W)
- Pain – 5 items. (MOxFQ- P)
- Social interaction – 4 items (MOxFQ-S)

The responses consist of a 5 point Likert scale (0-4) which ranges from no limitation (0) to maximum limitation (4). Scores for each domain are calculated by summating the responses in each domain. The raw scale scores are then converted to a metric from 0-100, where 100 denotes the most severe. The raw scores can also be used to generate a summary Index score (MOxFQ- Index). The questionnaire has been validated.

Olerud & Molander Ankle Score (OMAS)

The Olerud & Molander Ankle Score is a nine item, disease specific, outcome score designed to evaluate symptoms after an ankle fracture. The scale is a functional rating with a maximum score of 100, indicating an unimpaired ankle.

Subjective outcomes are recorded in the following parameters:

- Pain
- Stiffness
- Swelling
- Stair Climbing
- Running
- Jumping
- Squatting
- Use of Supports
- Work/ADL

The original article describes significant correlation with patients' reported outcomes on a linear analogue scale, range of motion, presence of osteoarthritis and presence of dislocations (Olerud & Molander, 1984). There is evidence for test-retest reliability and construct validity for the English, Swedish & Turkish versions (Garratt 2018, Nilsson 2013, Turhan

2017). The Smallest Detectable Change (SDC) is 20.6: this indicates the level of change that can be considered a real difference (Garratt 2018). The SDC does not however represent a clinically significant change, however the MIC for OMAS has yet to be defined.

The Achilles Tendon Total Rupture Score (ATRS)

The ATRS is a validated, patient reported score for measuring outcome after total Achilles tendon rupture. There are 10 parameters, each of which is scored on a scale from 0 – 10, where 0 represents major limitations/symptoms and 10 represents no limitations or symptoms.

Outcomes are recorded in the following domains:

- Are you limited because of decreased strength in the calf/ Achilles tendon/foot?
- Are you limited because of fatigue in the calf/Achilles tendon/foot?
- Are you limited due to stiffness in the calf/Achilles tendon/foot?
- Are you limited because of pain in the calf/Achilles tendon/foot?
- Are you limited during activities of daily living?
- Are you limited when walking on uneven surfaces?
- Are you limited when walking quickly upstairs or uphill?
- Are you limited during activities that include running?
- Are you limited during activities that include jumping?
- Are you limited in performing hard physical labor?

The original article demonstrates good construct and convergent validity with both the FAOS and VISA-A scores. Intraclass correlation coefficient was 0.98 and the internal consistency was shown to be 0.96 (Cronbach's alpha) showing good test-retest reliability (Nilsson-Helander K *et al* 2007). A modified, 'cross cultural' version of the score was validated in the English population by Carmont *et al*, where it was shown to have excellent reliability (Carmont M *et al* 2012). The minimal detectable change was 6.75 points. The BOFAS Registry uses the original Swedish/English language version. There were no significant differences in results comparing the 'cross cultural' & Swedish versions (Carmont M *et al* 2012). The Minimally Important Change (MIC) was determined for the Dutch version of the score (Dams OC *et al* 2020). Using an anchor-based approach they showed MICs of 13.5 (*cf* EQ-5D-5L mobility), 25.5 (*cf* EQ-5D-5L usual activities) and 28.5 (*cf* GRoC).

Achilles Tendon Rupture Repair Score (AS)

Not to be confused with the ATRS above, the Achilles Tendon Rupture Repair Score (AS) was originally described by Leppilahti *et al* in 1998 for measurement of the outcome of surgically treated Achilles ruptures. The version provided by the registry uses the modification described by Hutchison *et al* who, in lieu of an isokinetic dynamometer, used a single heel raise test to assess muscle strength (Hutchison AM *et al* 2015).

Outcomes are recorded in the following domains:

- Pain
- Stiffness
- Calf muscle weakness (subjective)
- Footwear restrictions
- Active range of motion difference between ankles
- Subjective result
- Isokinetic muscle strength (modification)

The maximum score is 100 indicating no impairment, with 0 representing a poor result. To the best of the authors' knowledge, the score and its modifications have not been validated and MIC not determined. As this outcome measure requires face to face review it is acknowledged that it is optional, should those facilities exist.

Victorian Institute of Sports Assessment – Achilles (VISA-A)

The VISA-A outcome score is specific to Achilles tendinopathy, originally described by Robinson *et al* 2001. The score consists of 8 questions measuring domains of pain, function in daily living and sporting activity. The maximum score is 100, with high scores indicating a good outcome. The original article reported good reliability and stability in a sporting population, however evidence of reliability has not been established in the non-sporting population. One may therefore wish to consider additional PROMS in this group. The MIC has been estimated for patients with Insertional Achilles Tendinopathy (see below).

Minimally Important Change

Whilst changes in outcome scores may be statistically significant, this may or may not, represent a clinically significant difference in patients' symptoms. The Minimally Important Change (MIC) represents a change in the outcome score that is clinically relevant. The MIC for the EQ—5D index score has been shown to be 0.074 (Walters 2005). For the MOXFQ components Walking/Standing, Pain, Social Interaction the MICs are 16, 12 and 24 respectively (Dawson 2012). As yet the MIC for OMAS has not been determined. The MICs for the ATRS range from 13.5 to 28.5 and are documented above (Dams OC *et al* 2020). For the VISA-A an MIC of 6.5 points has been suggested for Insertional Achilles Tendinopathy (McCormack *et al* 2015).

Data Analysis

As the number of cases are small, only summary data is presented in this report. As the numbers grow we aim to provide more robust, statistical analysis. For the 1st MTPJ fusion & Ankle Fusion pathways the criteria are clearly defined and analysis of the variables should be easily achieved. The general Foot and Ankle pathway will be more difficult to analyse because of the sheer variety of procedures undertaken. However, in this report, we have undertaken a limited analysis based on 3 common diagnoses found within the pathway. We are working with Amplitude to try to achieve consistency, particularly with definition of procedures, to help us achieve this in the future.

Statistical Analysis

Where statistical tests were performed the following rules were followed. Continuous variables were tested for normality distribution, and presented as means and 95% confidence intervals. Whereas categorical and qualitative variables are expressed as numbers and percentages. The Student t-test and ANOVA was used for continuous variables if the criteria for normality and equality of variances were fulfilled. Alternatively, the Mann-Whitney U test was performed. Categorical variables were analysed using the Chi-square test for sample sets greater than 5, otherwise the Fisher's exact test was used. Missing data were included in flowcharts and descriptive analyses, allowing denominators to remain consistent in calculations. All data were assessed using SPSS Version 26.0 (SPSS Inc., IBM, Chicago, IL).

Confidence Intervals

Where expressed, a 95% confidence interval has been used.

1ST METATARSOPHALANGEAL JOINT ARTHRODESIS PATHWAY

Within the registry, 958 1st MTPJ Arthrodesis pathways have been instituted since it originally opened, an increase of over 400 over the course of the last year. This large increase is partly due to the import of external datasets. Previously, the completion rate for pre-operative PROMS was reasonable, at approximately 80% across the 3 outcomes. With the import of external data sets, this rate has fallen. Complete pre-operative PROMS (MOXFQ, EQ-5D & VAS Pain) were found for 379 (39.6%) pathways. At 6 and 12 months there were yet fewer with 219 (22.9%) and 145 (15.1%) cases with complete PROMS respectively.

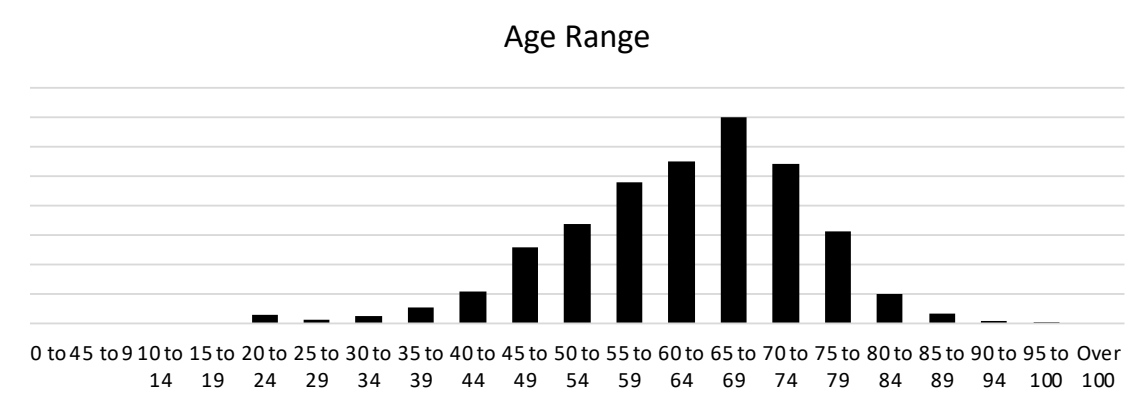


Figure 3: Age distribution, 1st MTPJ Pathway

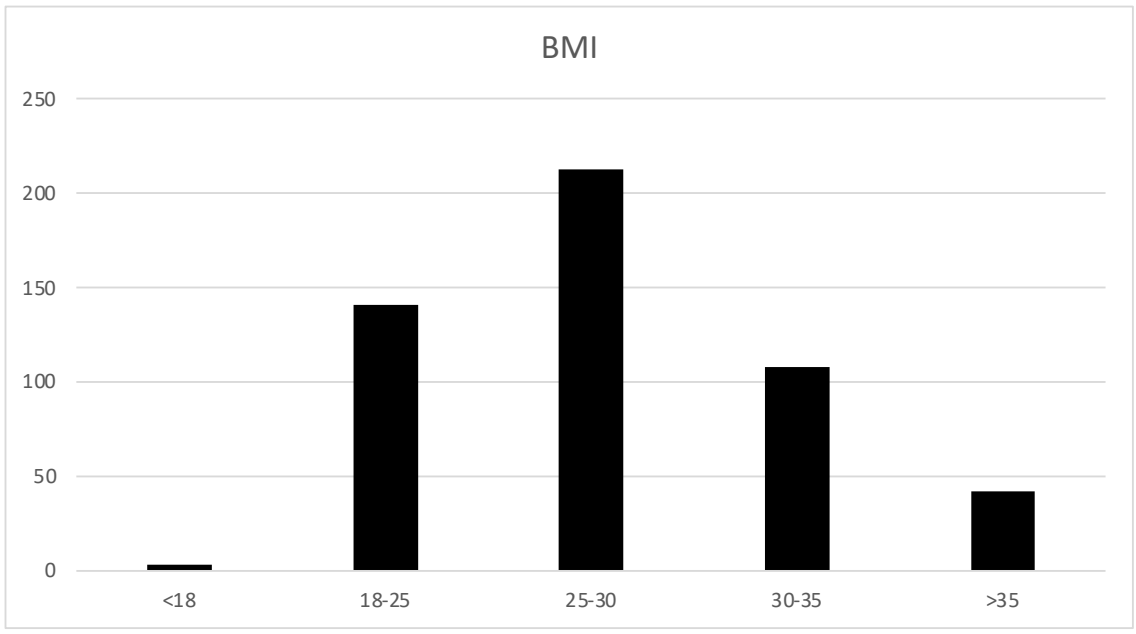


Figure 4: BMI Range, 1st MTPJ Pathway.

The average age was 67 (SD 20.64) and the range for this patient cohort is illustrated in figure 3. Recorded gender was 35% male and 65% female. BMI was recorded in 510 pathways, the distribution is illustrated in figure 4, with the majority of patients being either overweight or obese (BMI ≥25). The operation was undertaken on the right foot in 47.6% of individuals and left side in 41.1% of individuals, in the remainder the side was not recorded. Of the 448 pathways where smoking status was recorded: 7% of individuals were smokers, 21% were ex-smokers and 72% were non-smokers. The numbers for smoking were too small to make any comparison in outcomes.

Where recorded, 92% of patients were classed as primary procedures, with 7% as revision procedures, 1% as second revision, <1% conversion from arthroplasty and <1% as ‘other’ indication. Additional procedures were recorded in 154 cases: 74 of these were lesser toe corrections, 36 were recorded as either Weil’s, Forefoot Arthroplasties or Forefoot reconstructions, and a further 44 were recorded as having ‘other’ procedures.

The PROMS results are summarised in Table 2. The average increase in the EQ-5D Index was from 0.61 preoperative to 0.74 and 0.78 at 6 and 12 months post-operative respectively, a statistically significant change (Fig 5). In comparison to population norms (Kind 1999) this is favourable, as the mean EQ-5D index is 0.713 (Std Dev 0.229, Median 0.786) for England. At both 6 and 12 months the improvement was greater than the MIC, indicating a clinically relevant change. Regarding the EQ-5D Health VAS, at 12 months, no significant change was seen (Fig 6). The number of patients with scores recorded at 2 years is too small for meaningful analysis.

	Time Period	Cases		Total		95% Confidence Interval for Mean			
		N	Percent	N	Mean	Lower Bound	Upper Bound	Std. Deviation	Statistical difference
MOXFQ Pain	Pre-operative	379	39.60%	958	59.68	57.61	61.76	20.523	
	6 Months	219	22.90%	958	32.03	28.78	35.28	24.408	<.001
	12 Months	145	15.10%	958	29.14	24.59	33.68	27.685	0.368
MOFXFQ Walking	Pre-operative	379	39.60%	958	58.36	55.85	60.87	24.815	
	6 Months	219	22.90%	958	31.11	27.2	35.02	29.34	<.001
	12 Months	145	15.10%	958	26.7	21.89	31.51	29.301	0.156
MOXFQ Social	Pre-operative	379	39.60%	958	47.28	44.83	49.73	24.243	
	6 Months	219	22.90%	958	23.2	19.99	26.4	24.058	<.001
	12 Months	145	15.10%	958	20.72	16.29	25.15	26.982	0.817
EQ5D-L VAS	Pre-operative	379	39.60%	958	72.17	70.11	74.23	20.408	
	6 Months	219	22.90%	958	78.21	75.92	80.50	17.196	0.002
	12 Months	145	15.10%	958	76.27	73.01	79.55	19.919	0.492
EQ5D Index	Pre-operative	379	39.60%	958	0.61	0.59	0.63	0.198	
	6 Months	219	22.90%	958	0.74	0.71	0.77	0.203	<.001
	12 Months	145	15.10%	958	0.78	0.75	0.81	0.184	0.442
VAS Pain	Pre-operative	379	39.60%	958	51.53	49.11	53.96	24.010	
	6 Months	219	22.90%	958	25.41	22.13	28.70	24.680	<.001
	12 Months	145	15.10%	958	22.23	18.10	26.35	25.139	0.747

Table 2: PROMs recorded at different timepoints for the MTPJ Pathway. (N=number) Significance

The MOXFQ components all revealed a clinically relevant and statistically significant improvement in symptoms at 6 months post-operative, with changes greater than the MIC in all domains. The Pain scores improved from a pre-operative baseline of 59.68 to 29.14 at 12 months post-operative, the Walking/Standing scores improved from 58.36 to 26.7 and the Social Interaction scores from 47.28 to 20.72 (Figs 7-9). The number of patients with recorded scores at 2 years is too small for meaningful analysis. The VAS pain score again showed a significant improvement from 51.54 pre-operatively, to 25.42 and 22.23 at 6 and 12 months post-operative respectively (Fig 10). Details of complications and revision surgery were inconsistently documented and it is not possible to draw meaningful conclusions from the dataset as it currently stands.

1st MTPJ Arthrodesis Pathway PROMS

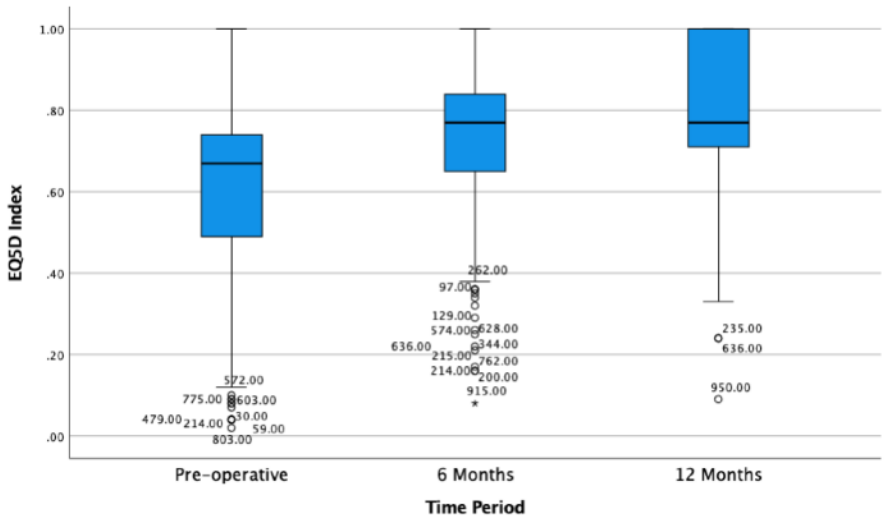


Figure 5: EQ-5D Index Scores, 1st MTPJ Pathway

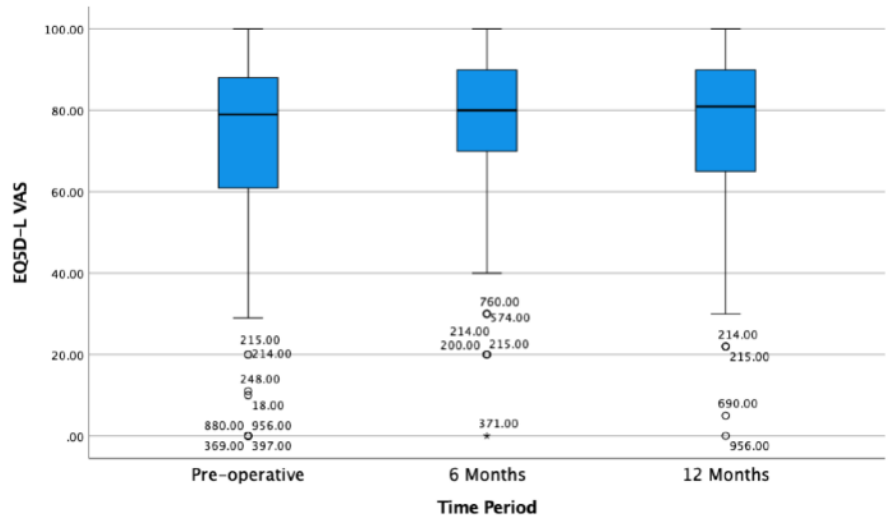


Figure 6: EQ-5D VAS Scores, 1st MTPJ Pathway

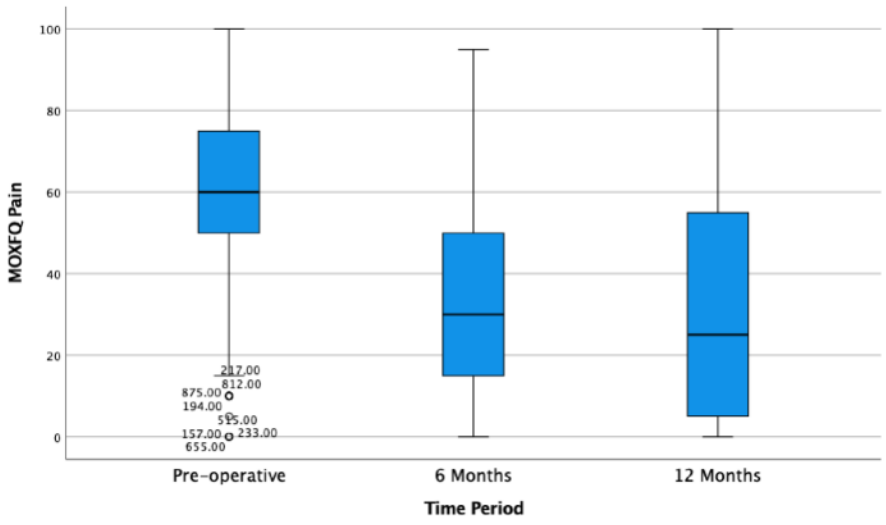


Fig 7: MOXFQ Pain, 1st MTPJ Pathway

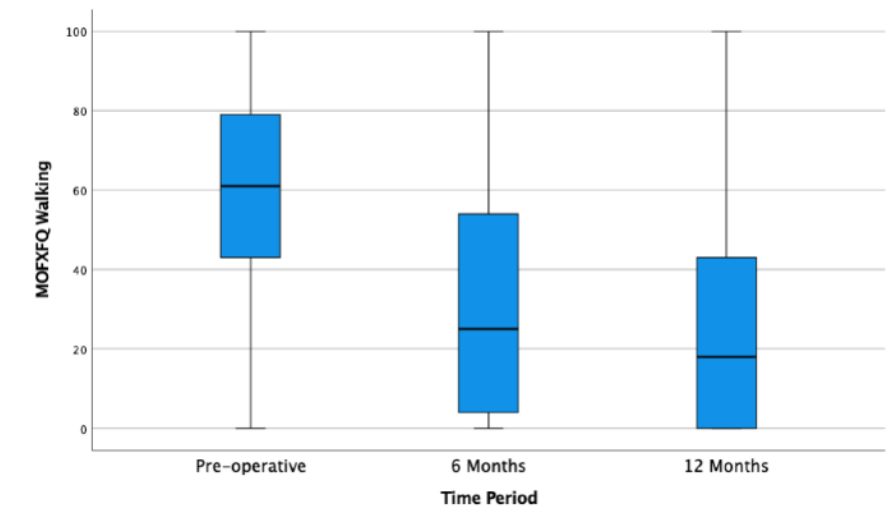


Fig 8: MOXFQ Walking/Standing, 1st MTPJ Pathway

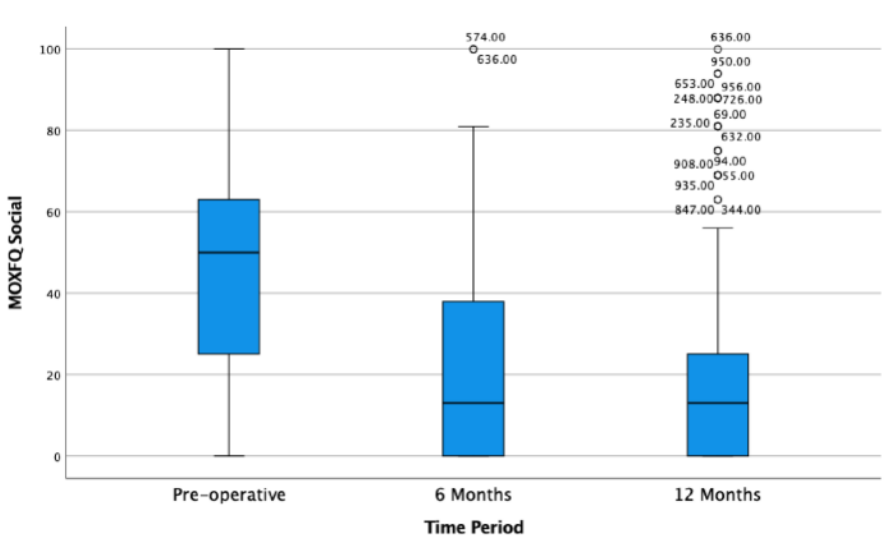


Fig 9: MOXFQ Social, 1st MTPJ Pathway

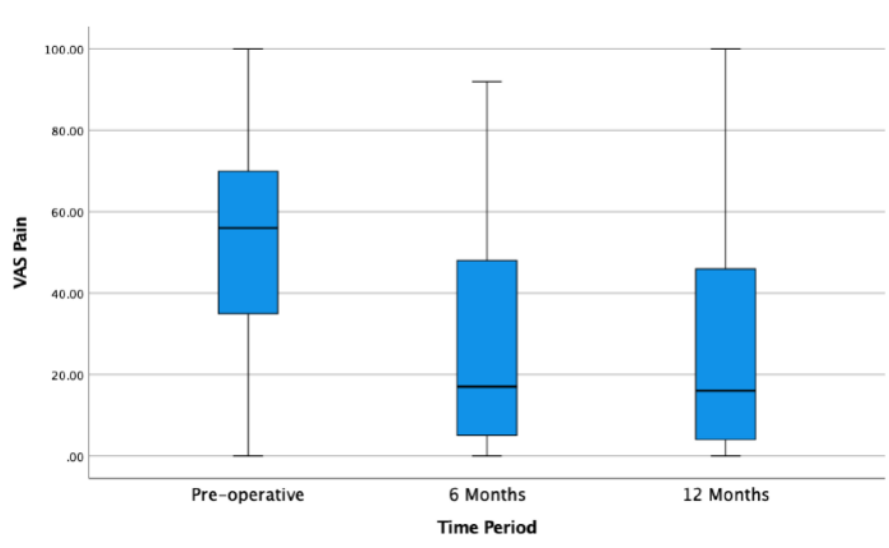


Fig 10: VAS Pain, 1st MTPJ Pathway

ANKLE ARTHRODESIS PATHWAY

Within the registry, 342 AA pathways have been instituted since the pathway went live in 2016. This is a 41% increase since last year and 20% more than the previous year. Completed procedure forms were available for 202 cases, that is 59% of the total pathways. There are twice as many males as females. The MOXFQ score was completed at baseline in 146 (42.7%) patients, 70 (20.5%) have completed 6 month and 50 (14.6%) patients have completed 12 months. The age range for this patient cohort is illustrated in figure 11.

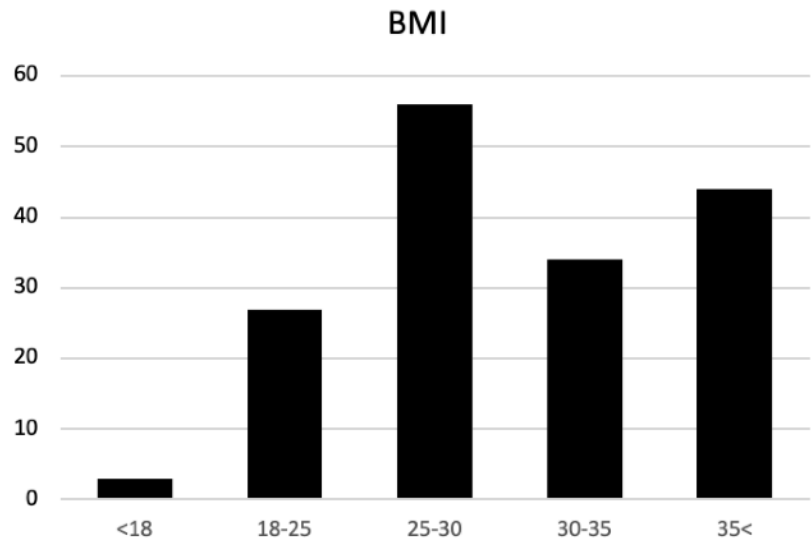


Fig 12: BMI Distribution, Ankle Arthrodesis Pathway

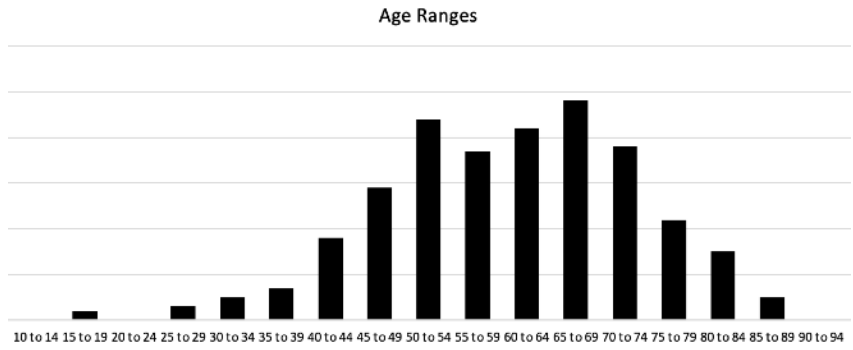


Fig 11: Age range, Ankle Arthrodesis Pathway

The BMI range is illustrated in figure 12. The majority of patients being overweight or obese(BMI≥ 25). Smoking was recorded in 7% of individuals, ex-smoker in 18% of individuals and non-smoker in 75% of individuals. The numbers for smoking was too small to make any comparison in outcomes. The most common indications for fusion was primary arthritis and post-traumatic arthritis. Other indications included inflammatory arthritis, and avascular necrosis of talus.

Primary fusion accounted for 97.5% of cases and revision in 2.5% cases. Arthroscopic fusions accounted for 52.1% of the recorded pathways and 45.4% were open. Mini-open arthroscopic assisted was used in 2.6% cases.

Ankle fusion fixation was undertaken using cannulated screws in 78% of patients. The other forms of fixation include plates (19%), an external fixator (1%). IM nail (1.5%) and staples. In those individuals undergoing fusion using screws, 2 screws were used in 78.8% and 3 screws in 12.4%. Most screws were inserted in parallel (73.3%) with some inserted crossed (19.3%). The most common combination of screw insertion were 2 screws in parallel (70%) and 3 screws crossed (12.4%). Open fusions used a combination of screws (51%), plates (43%) and the remaining with an external fixator,IM nail and staples. All arthroscopic fusions were fixed using screws.

The PROMS results are summarised in table 3. The MOXFQ Pain, Walking and Social interaction indices all improved significantly from baseline to six months (P<0.001) and 12 months (P<0.001) as illustrated for the bad (operated) leg in

figures 13 to 15. The average increase in the EQ-5D index was significant (P<0.01) from a baseline 0.44 preoperative to 0.68 at 6 months and 0.74 at 1 year post operative (Fig 16). In comparison to population norms (Kind P, Hardman G, Macran S 1999. "UK population norms for EQ-5D," Working Papers 172chedp, Centre for Health Economics, University of York), this is favourable as the mean EQ-5D index is 0.713 (Std Dev 0.229, Median 0.786) for England. The EQ5D-L VAS improved from a baseline 67.8 to 74.4 at 12 months. This was not significant (Fig 17). The VAS Pain score significantly improved from a baseline 64.3 to 33.7 at six months (P<0.001) and 26.2 at 12 months (Fig 18). The number of patients with scores at 2 years was too small for any meaningful analysis.

	Time Period	Cases		Total		95% Confidence Interval for Mean			
		N	Percent	N	Mean	Lower Bound	Upper Bound	Std. Deviation	Statistical difference
MOXFQ Pain	Pre-operative	146	42.70%	342	67.95	64.97	70.92	18.191	
	6 Months	70	20.50%	342	38.29	32.01	44.56	26.319	<.001
	12 Months	50	14.60%	342	30.7	23.25	38.15	26.206	0.228
MOXFQ Walking	Pre-operative	146	42.70%	342	80.98	77.85	84.11	19.135	
	6 Months	70	20.50%	342	51.21	43.44	58.99	32.625	<.001
	12 Months	50	14.60%	342	40.7	32	49.4	30.608	0.047
MOXFQ Social	Pre-operative	146	42.70%	342	59.84	55.89	63.8	24.182	
	6 Months	70	20.50%	342	35.13	28.31	41.95	28.59	<.001
	12 Months	50	14.60%	342	29.4	21.09	37.71	29.243	0.282
EQ5D-L VAS	Pre-operative	146	42.70%	342	67.8	64.8	70.8	18.328	
	6 Months	70	20.50%	342	73.27	69.54	77	15.648	0.076
	12 Months	50	14.60%	342	74.42	69.43	79.41	17.566	0.509
EQ5D-L Index	Pre-operative	146	42.70%	342	0.44	0.41	0.47	0.209	
	6 Months	70	20.50%	342	0.68	0.62	0.73	0.225	<.001
	12 Months	50	14.60%	342	0.74	0.69	0.79	0.18	0.478
VAS Pain	Pre-operative	146	42.70%	342	64.34	60.66	68.02	22.484	
	6 Months	70	20.50%	342	33.71	27.28	40.15	26.993	<.001
	12 Months	50	14.60%	342	26.22	19.55	32.89	23.483	0.360

Table 3: PROMs recorded at different timepoints for the Ankle Arthrodesis Pathway. (N=number)

Ankle Arthrodesis Pathway PROMS

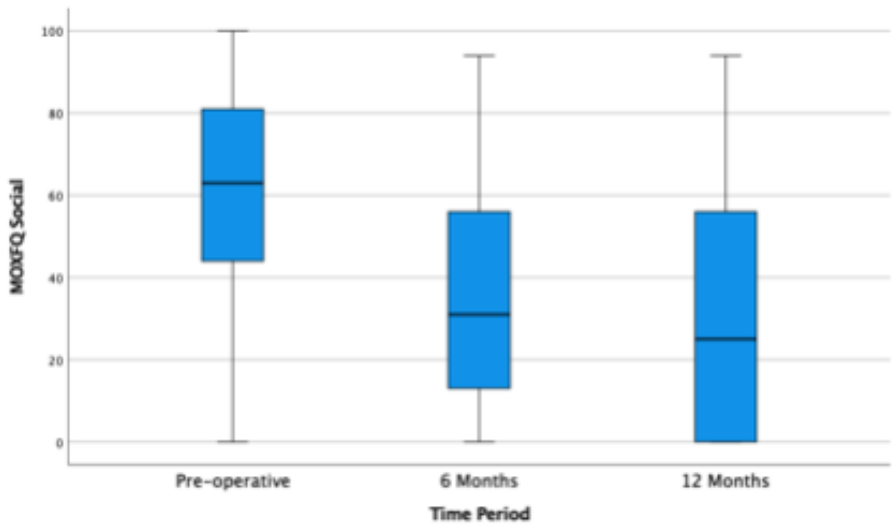


Fig 13: MOXFQ Social, Ankle Arthrodesis Pathway

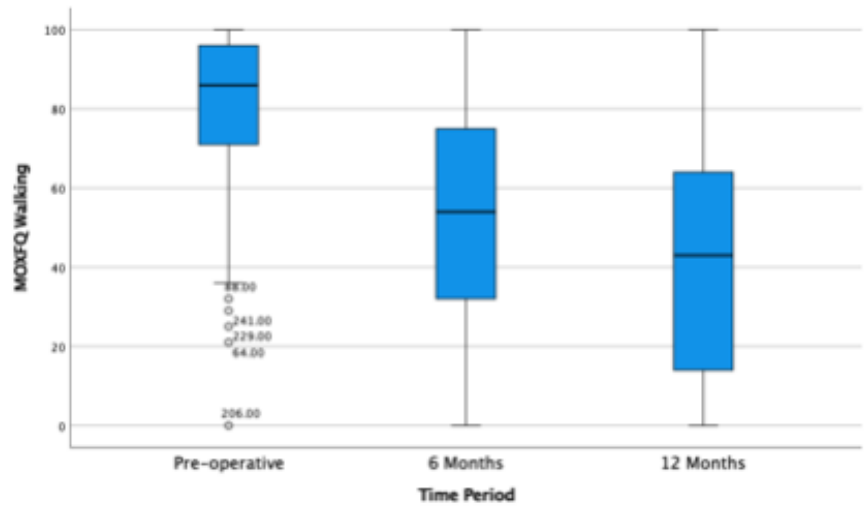


Fig 14: MOXFQ Walking, Ankle Arthrodesis Pathway

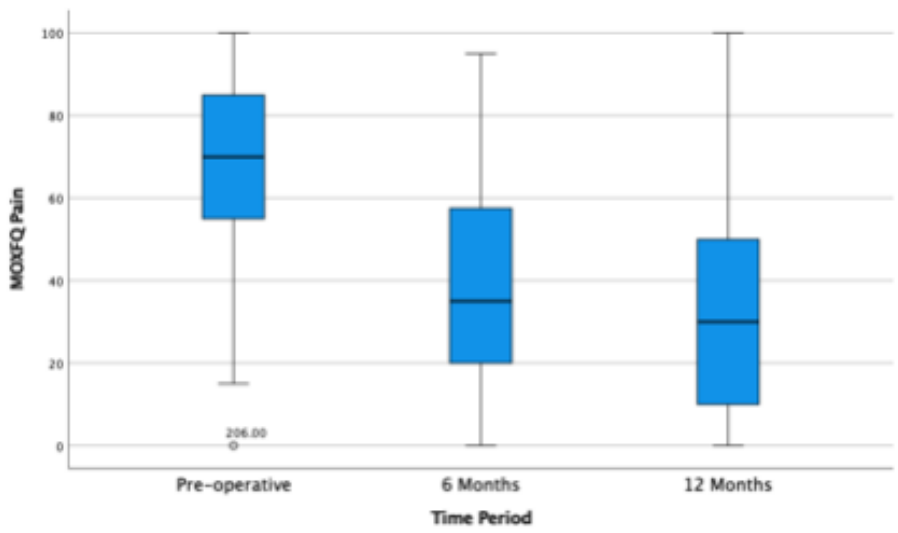


Fig 15: MOXFQ Pain, Ankle Arthrodesis Pathway

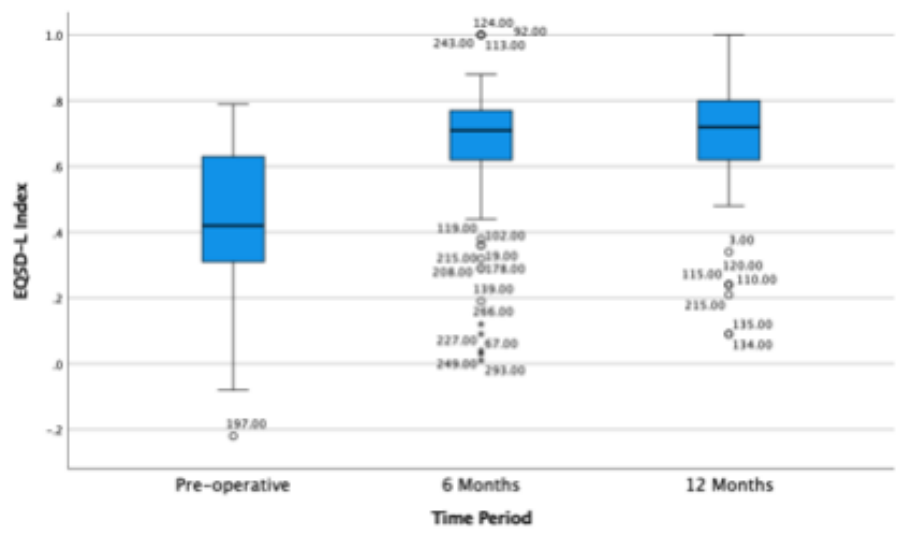


Fig 16: EQ5D Index, Ankle Arthrodesis Pathway

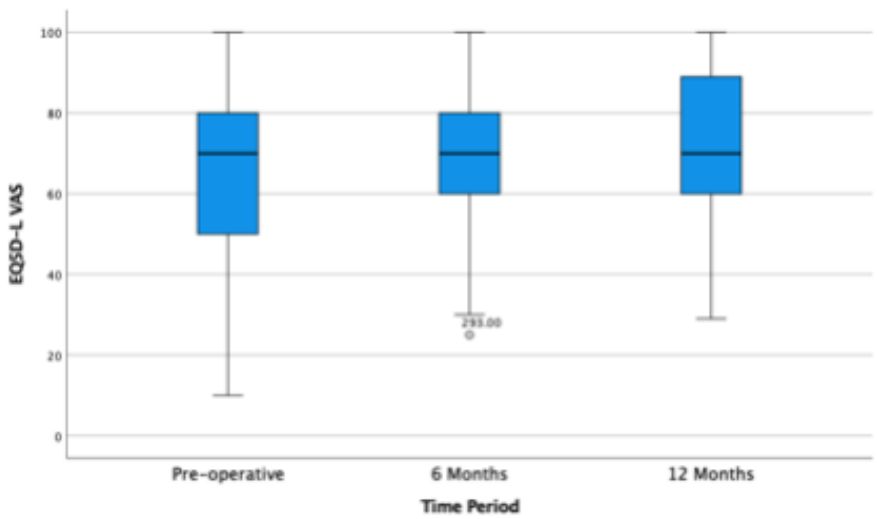


Fig 17: EQ5D VAS, Ankle Arthrodesis Pathway

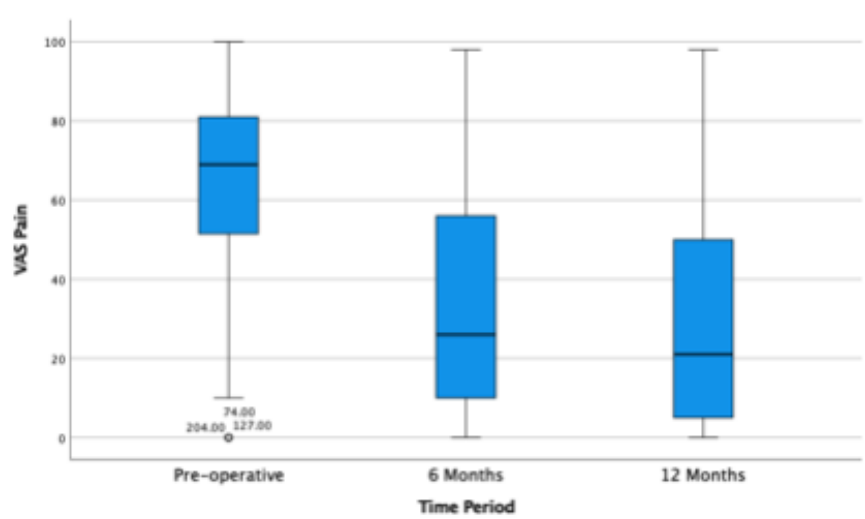


Fig18: VAS Pain, Ankle Arthrodesis Pathway

ACHILLES RUPTURE PATHWAY

The Achilles Tendon Rupture pathway was opened in 2020. Since then a total of 62 pathways have been generated. This pathway allows both operative and non-operative management to be recorded, along with radiological findings. The standard PROMS for this pathway are the Achilles Tendon Total Rupture Score (ATRS) and Achilles Tendon Rupture Repair Score (AS) although other scores, such as MOXFQ or EQ-5D, may be added in the pathway owner's registry settings, if desired.

Overall, the mean age was 48 (SD 21.54) (Fig 19) and the majority of patients were male (82%). The BMI was poorly recorded in the non-operative pathways, however in the surgically managed pathways documentation was more consistent, with 16 of 23 having a BMI recorded. In this group the mean BMI was 27.04. Smoking status was documented in 43 patients: 37 (86%) were non-smokers, 4 (9%) were smokers and 2 (5%) were ex-smokers. The left side was affected in 51% and the Right in 49%.

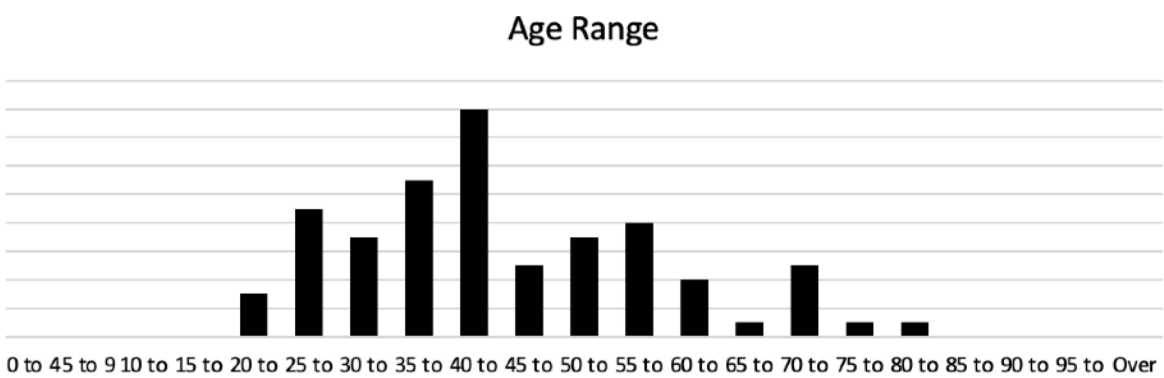


Figure 19: Age range, Achilles Rupture Pathway

Where documented, most ruptures occurred after an injury (55 of 57 patients). Ruptures predominantly affected the body of the Achilles tendon (74%), with musculotendinous ruptures (13%), chronic ruptures (6%), re-rupture after conservative treatment (3%) and insertional ruptures (2%) occurring less frequently (Table 4). Of the 62 ruptures, 23 were treated operatively and 39 non-operatively. Of the surgically treated cases the mean age was 39.32 and the non-operative group was 48.11.

Surgically the cases were all primary repairs and, where recorded, the techniques used were mini-open (11), open (10) and percutaneous (2). Detail of non-operative management was inconsistently recorded; the majority of patients being initially immobilised in a cast. Subsequent cast removal and splint application was not recorded in sufficient detail to comment. The treatment methods and indications are summarised in table 4.

		Diagnosis					Total
		Midportion Achilles	Re-rupture	Chronic rupture	Insertional	Musculotendinous junction	
Treatment	Mini-open/Percutaneous	12	0	1	0	0	13
	Open	6	1	2	1	0	10
	Conservative	28	1	1	0	8	38
Total		46	2	4	1	8	61

Table 4: Achilles Rupture Treatment Method & Indications

The pathway allows for detailed recording of the ultrasound findings, with the ankle in different positions, gap size and rupture site. Registry users are encouraged to review the parameters with their radiologists & radiographers to ensure reporting is standardised. Currently these data are insufficient for meaningful interpretation.

The completion rate for PROMS was low, with less than half of patients (37%) having Achilles Tendon Total Rupture Scores (ATRS) at 3 months, falling to 21% and 8% at 6 and 12 months respectively. Despite this, both clinically and statistically significant improvements were seen when comparing these scores (Table 5, Fig 20). There was an improvement of 25.24 and 27.10 comparing the 3 month scores with those at 6 and 12 months respectively, greater than the suggested clinically relevant difference (Nilsson-Helander *et al*). The completion rates for the Achilles Tendon Rupture Repair Score (AS) were such that meaningful interpretation was not possible. There was no significant difference between 6 and 12 month scores.

						95% Confidence Interval for Mean			
	Time Period	N	Percent	N	Mean	Lower Bound	Upper Bound	Std. Deviation	Standardised Difference
ATRS	3 Months	23	37.10%	62	44.3	35.6	53.01	20.126	
	6 Months	13	21.00%	62	69.54	57.72	81.36	19.564	<.001
	12 Months	5	8.10%	62	71.4	50.95	91.85	16.471	.808

Table 5: PROMs recorded for Achilles tendon ruptures all treatments. (N=number)

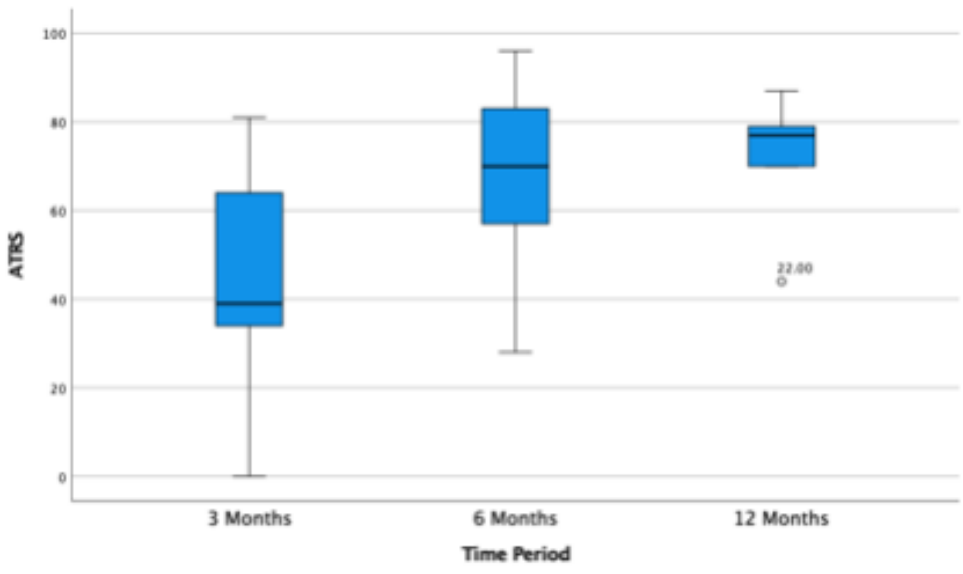


Figure: 20 ATRS Scores

ACHILLES TENDINOPATHY PATHWAY

This pathway has only recently been introduced and uptake is limited to only 23 pathways so far. The pathway allows PROMS collection for non-operative & operative management of Achilles Tendinopathy, both insertional and non-insertional.

The standard PROMS are EQ-5D and VISA-A, although additional PROMS may be used as the pathway owner's discretion.

The diagnosis was recorded as non-insertional tendinopathy in 14 pathways, insertional tendinopathy in 6 and a Haglund lesion in 1. Operative management was recorded in 10 pathways, with 5 undergoing decompression and debridement, 2 treated with tendon transfer, 2 with proximal medial head of gastrocnemius release and 1 with resection of Haglund lesion and gastrocnemius slide. Details of non-operative management were less well recorded with extracorporeal shockwave therapy used in 2 pathways.

Further analysis of the data will be undertaken as the dataset matures.

GENERAL FOOT AND ANKLE PATHWAY

The largest collection of pathways within the BOFAS registry is the 'General Foot and Ankle Pathway'. This pathway is designed to accommodate all the foot and ankle procedures that aren't covered by the other specific pathways. There are currently 11,809 foot and ankle general pathways in the registry since inception.

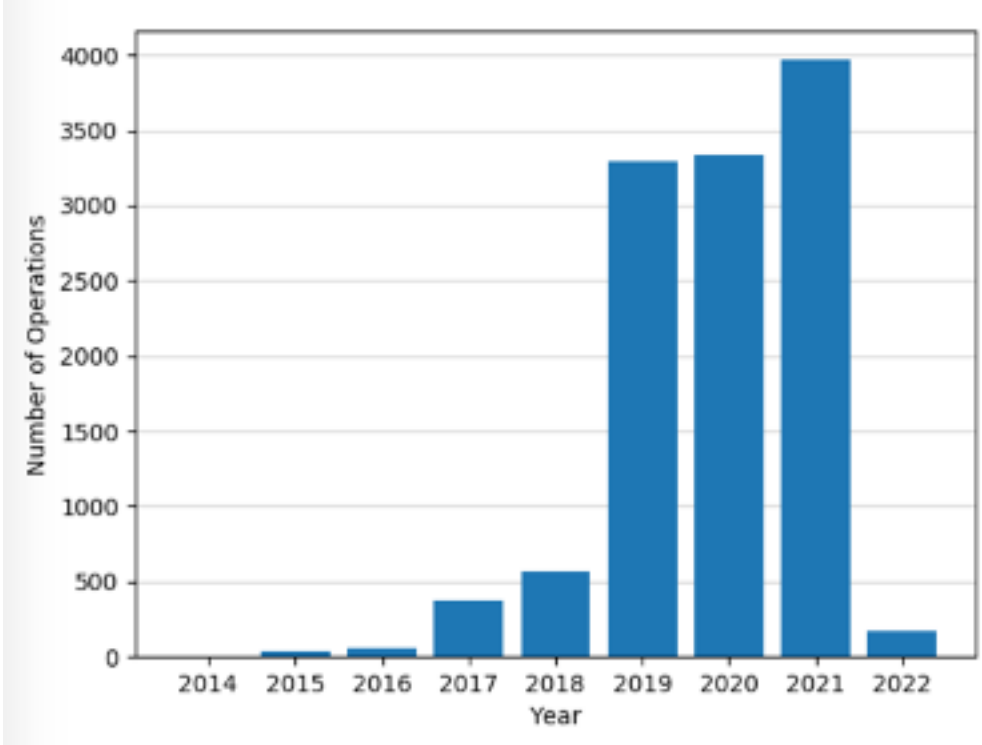


Figure 21: Number of unique pathways for the general Foot and Ankle Pathway in the BOFAS Registry started each year

Analysis of the registry to date demonstrates substantial uptake and growth of this pathway as demonstrated in figure 21. 2021 had nearly 4000 general foot and ankle pathways commenced. This growth suggests that there is increasing uptake and usage of the BOFAS registry across the country.

General registry completion and compliance data:

Previous BOFAS registry reports and analysis of the Foot and Ankle General Pathway have highlighted the importance of data completion. Table 6 demonstrates the completion rates of various data variables within the registry. There are a number of important findings from this; rate of data completion is extremely variable within the registry. Only ~50% of pathways had a patient date of birth with over 56% having no contact details available for patients. This is of crucial importance for ensuring that patients can be contacted to complete their patient reported outcome measure scores (PROMs).

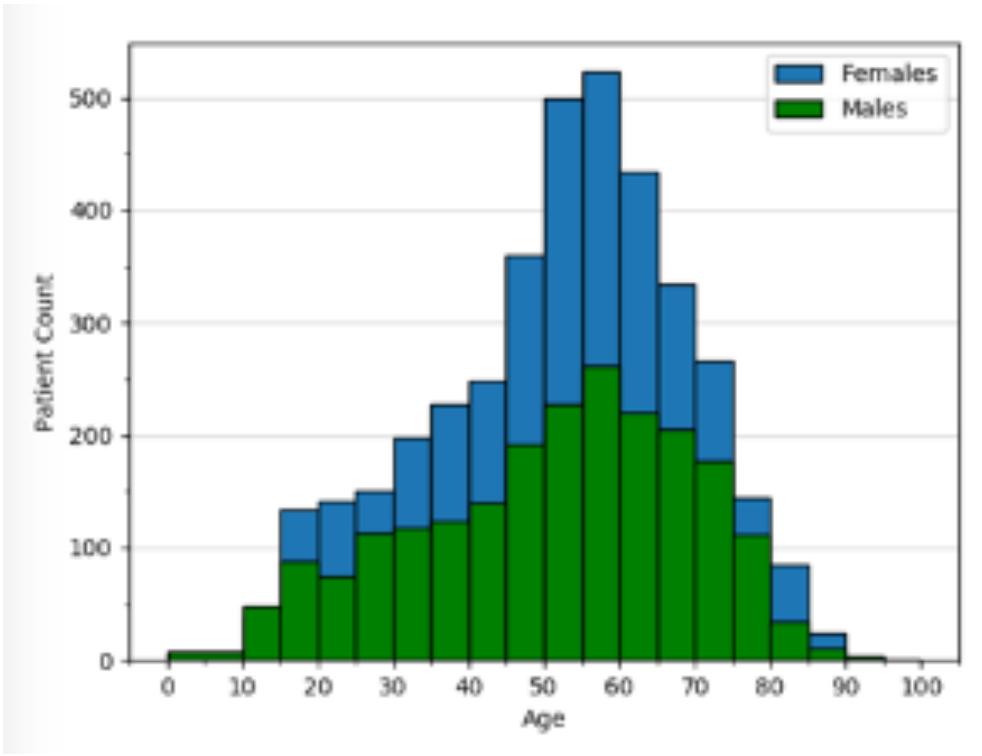


Figure 22: Age range and gender distribution of patients within the general Foot and Ankle Pathway in the BOFAS Registry

The mean age (±standard deviation) for male patients (n=2158) was 51.3±17.9 and female patients (n=3822) was 52.1±16.6. There was no statistically significant difference in patient ages between male and female p=0.10). Figure 22 shows the age and gender distribution of patients within the general Foot and Ankle pathway. The mean

BMI recorded was 28.3. Recording of BMI data was noted to be variable, with data errors present. 82 cases were excluded due to a BMI reported of <10 or >75 and it was assumed these were entered in error. Patient compliance with PROM completion is also variable as demonstrated in Table 6. This shows that there is quite a substantial drop off in responses after 12 months.

PROM Analysis

Three PROMs are routinely collected as part of the registry. These are the Manchester-Oxford Foot Questionnaire, EuroQol-5D general health related quality of life measure and the Visual Analogue Scale for Pain.

Table 6 demonstrate the overall PROM completion rates, scores and statistical change between each timepoints for the complete registry (eg pre-operative to 6 months, 6 months to 12 months). This illustrates that there is a statistically significant improvement in every MOXFQ domain between each time point. There is a statistically significant improvement in HRQOL (for both EQ-5D Index/VAS) and VAS Pain from pre-operative to 6 months however this improvement does not appear to be continue on to 12 months.

		Cases		Total	95% Confidence Interval in Mean				
	Time Period	N	Percent	N	Mean	Lower	Upper Bound	Std. Deviation	Statistical difference
MOXFQ Pain	Pre-Operative	2494	21.1	11819	58.6	57.7	59.5	22.0	
	6 Months	1233	10.4	11819	42.6	41.1	44.1	27.1	<0.001
	12 Months	519	4.4	11819	39.7	37.2	42.2	28.9	0.008
MOXFQ Walking	Pre-Operative	2496	21.1	11819	60.4	59.3	61.5	27.2	
	6 Months	1233	10.4	11819	43.9	42.1	45.7	32.6	<0.001
	12 Months	519	4.4	11819	40.7	37.8	43.6	34.0	0.003
MOXFQ Social	Pre-Operative	2394	20.3	11819	48.8	47.8	49.8	25.7	
	6 Months	1190	10.1	11819	36.4	34.7	38.1	30.2	<0.001
	12 Months	493	4.2	11819	32.0	29.3	34.7	30.2	0.001
EQ-5D-5L VAS	Pre-Operative	3339	28.3	11819	69.2	68.5	69.9	20.2	
	6 Months	1572	13.3	11819	71.4	70.4	72.4	20.9	<0.001
	12 Months	707	6.0	11819	72.0	70.4	73.6	21.4	0.275
EQ-5D-5L Index	Pre-Operative	3339	28.3	11819	0.577	0.593	0.607	0.240	
	6 Months	1572	13.3	11819	0.652	0.685	0.715	0.254	<0.001
	12 Months	707	6.0	11819	0.657	0.678	0.722	0.272	0.809
VAS Pain	Pre-Operative	3172	26.9	11819	49.8	49.0	50.6	24.3	
	6 Months	1493	12.6	11819	35.4	34.0	36.8	27.2	<0.001
	12 Months	501	4.2	11819	28.9	26.5	31.3	27.2	0.002

Table 6: PROMs recorded at different timepoints for the general Foot and Ankle Pathway all diagnoses Pathway. (N=number)

Common Diagnoses within the general Foot & Ankle pathway

The most common data point related to a foot and ankle pathology reported in the registry was the primary diagnosis. In total, there were 205 unique primary diagnoses recorded within the registry. The top 20, most common diagnoses are displayed in Table 7. There are still improvements to the coding of diagnosis and procedure needed which will allow more data analysis and potentially enable better long term.

Primary Diagnosis	No of Pathways
Hallux Valgus (Adult)	446
Primary Osteoarthritis (Joint other than Ankle or 1st MTPJ)*	163
Hallux Rigidus	133
Acquired Toe Deformity**	106
Osteochondral Defect	89
Ankle Instability (Chronic)	82
Osteoarthritis (Joint other than Ankle or 1st MTPJ) - Secondary to Trauma Malunion	78
Morton's Neuroma	69
Achilles Tendinopathy (Insertional)	63
Plantar Fasciitis	63
Hallux Valgus (Adolescent)	54
Acquired Flat Foot [Pes Planus]	41
Achilles Tendinopathy (Non-Insertional)	33
Anterior Impingement of Ankle Osteophytes	33
Congenital Toe Deformity	27
Primary Osteoarthritis of the Ankle	27
Hardware/Metalwork Problem	27
Impingement Syndrome of the Ankle	27
Primary Osteoarthritis of the 1st MTPJ	24
Metatarsalgia	22
*encompassing all foot and ankle joints **encompassing all pathologies affecting lesser toes	

Table 7: Top 20 most common diagnosis in the general Foot and Ankle Pathway

HALLUX VALGUS

The most frequently entered diagnosis in the general Foot and Ankle Pathway in the BOFAS Registry was Hallux Valgus. There were 446 hallux valgus pathways available for data analysis. The overall PROMs (regardless of technique) can be seen below in table 8 and figures 21-26. These show that there is a statistically significant improvement in all MOXFQ domain scores 6 months following surgery. Although there is a further improvement in mean score at 12 months, this was not considered a statistically significant difference in comparison to the 6 month outcomes.

		Cases		Total		95% Confidence Interval in Mean			
	Time Period	N	Percent	N	Mean	Lower	Upper Bound	Std. Deviation	Statistical difference
MOXFQ Pain	Pre-Operative	211	47.3	446	56.8	54.1	20.0	20.0	
	6 Months	144	32.3	446	27.1	23.5	22.1	22.1	<0.001
	12 Months	94	21.1	446	21.5	16.9	22.6	22.6	0.389
MOXFQ Walking	Pre-Operative	211	47.3	446	52.8	49.5	24.5	24.5	
	6 Months	144	32.3	446	23.4	19.6	23.2	23.2	<0.001
	12 Months	94	21.1	446	18.6	13.5	25.2	25.2	0.474
MOXFQ Social	Pre-Operative	207	46.4	446	48.1	45.0	23.0	23.0	
	6 Months	139	31.2	446	17.6	14.0	21.8	21.8	<0.001
	12 Months	92	20.6	446	14.2	9.9	21.0	21.0	0.665
EQ-5D-5L VAS	Pre-Operative	308	69.1	446	75.4	73.1	20.2	20.2	
	6 Months	179	40.1	446	82.1	79.8	15.8	15.8	<0.001
	12 Months	123	27.6	446	82.6	79.6	17.1	17.1	0.841
EQ-5D-5L Index	Pre-Operative	308	69.1	446	0.646	0.624	0.2	0.2	
	6 Months	179	40.1	446	0.814	0.791	0.155	0.155	<0.001
	12 Months	123	27.6	446	0.807	0.768	0.218	0.218	0.590
VAS Pain	Pre-Operative	299	67.0	446	47.9	45.2	24.1	24.1	
	6 Months	167	37.4	446	20.6	17.2	22.3	22.3	<0.001
	12 Months	121	27.1	446	18.1	13.9	23.7	23.7	0.068

Table 8: PROMs recorded at different timepoints for hallux valgus procedures (N=number)

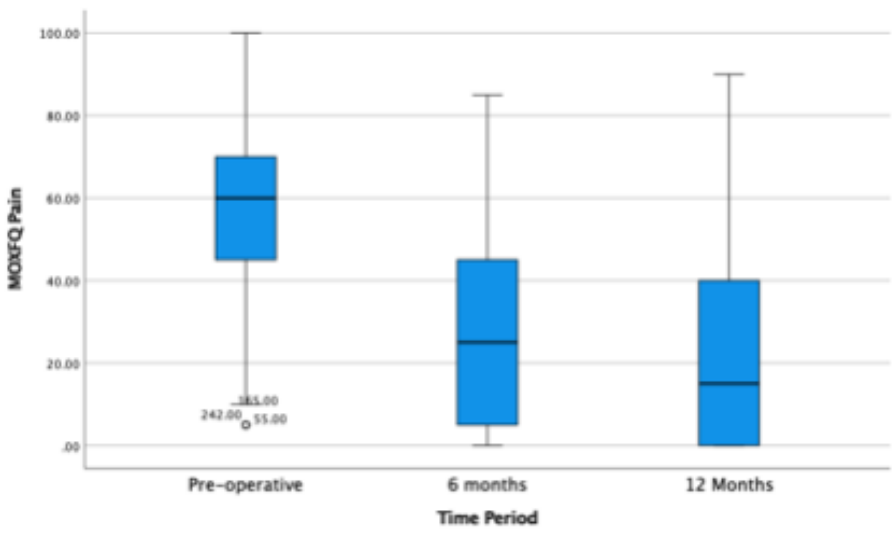


Fig 21: MOXFQ Pain, Hallux Valgus

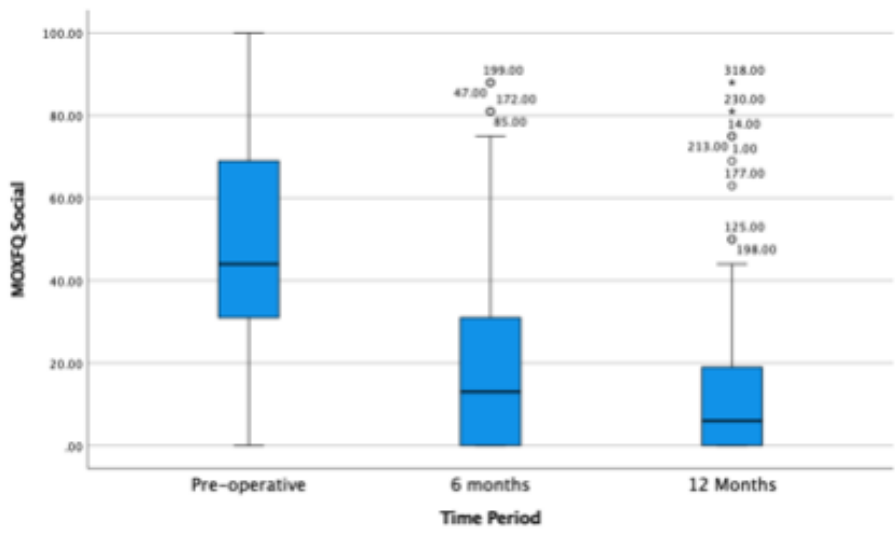


Fig 22: MOXFQ Social, Hallux Valgus

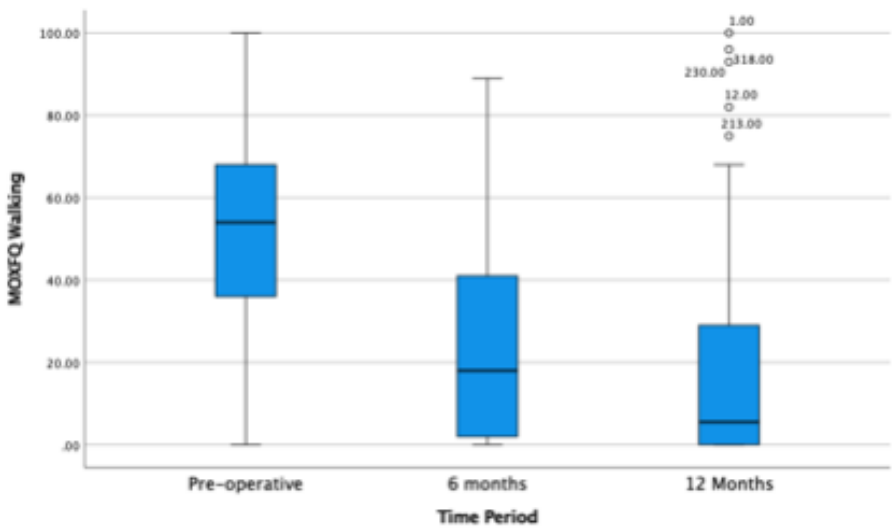


Fig 23: MOXFQ Walking, Hallux Valgus

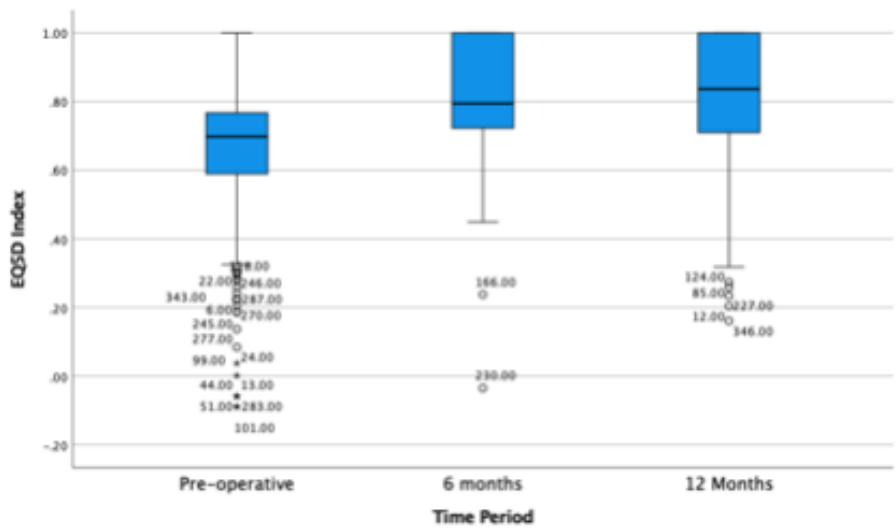


Fig 24: EQ5D Index, Hallux Valgus

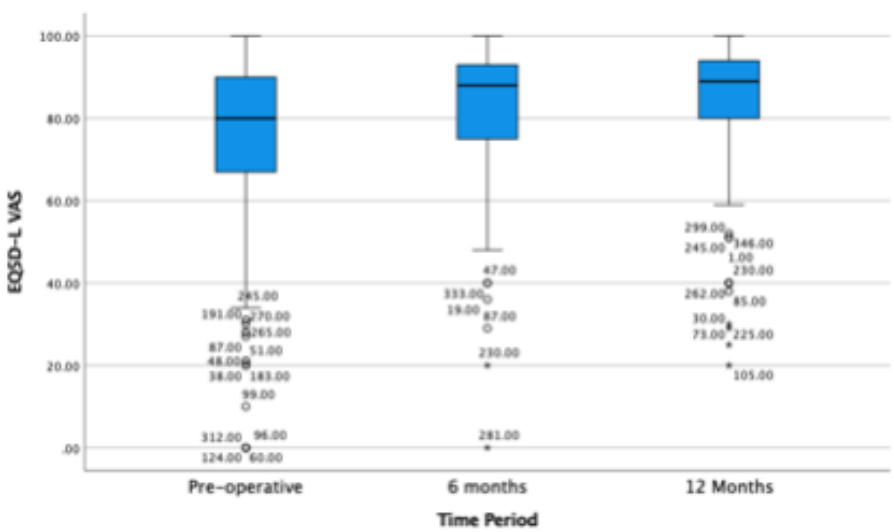


Fig 25: EQ5D VAS, Hallux Valgus

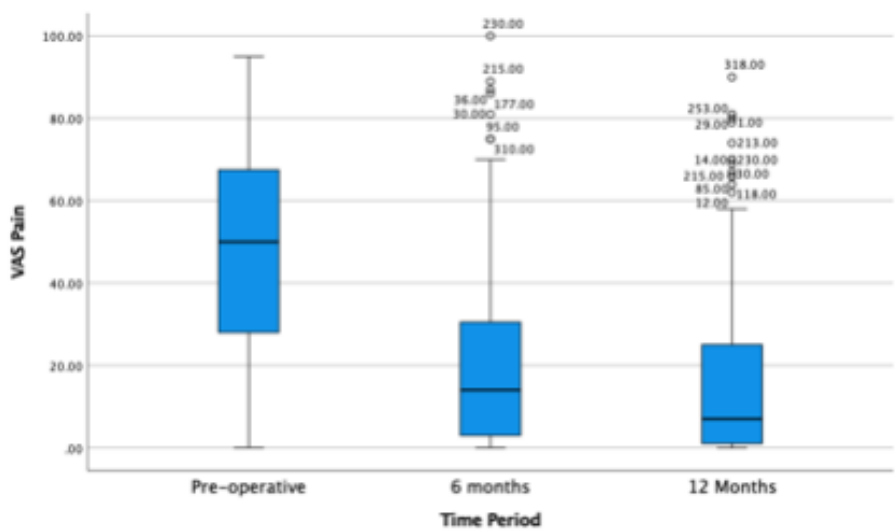


Fig 26: VAS Pain, Hallux Valgus

ANKLE INSTABILITY

Assessment of PROMs undergoing procedures for ankle instability are shown in table 9 and figures 27-32. These show that there is a statistically significant improvement in all MOXFQ domain scores 6 months following surgery. Data completion rates beyond 6 months are ~15% and show no statistically significant change in either foot and ankle specific PROMs or general HRQOL scores between 6 month and 12 month time periods.

		Cases		Total		95% Confidence Interval in Mean			
	Time Period	N	Percent	N	Mean	Lower Bound	Upper Bound	Std. Deviation	Statistical difference
MOXFQ Pain	Pre-Operative	65	69.1	82	57.8	52.5	63.1	21.6	
	6 Months	23	24.5	82	33.0	23.0	43.0	24.5	<0.001
	12 Months	15	16.0	82	35.0	22.3	47.7	25.1	0.893
MOXFQ Walking	Pre-Operative	65	69.1	82	60.0	53.8	66.2	25.5	
	6 Months	23	24.5	82	30.0	17.5	42.5	30.7	<0.001
	12 Months	15	16.0	82	29.8	14.1	45.5	31.1	0.709
MOXFQ Social	Pre-Operative	64	68.1	82	48.8	43.5	54.1	21.5	
	6 Months	23	24.5	82	29.4	18.9	39.9	25.8	<0.001
	12 Months	15	16.0	82	32.2	19.6	44.8	24.8	0.934
EQ-5D-5L VAS	Pre-Operative	69	73.4	82	70.7	66.7	74.7	17.1	
	6 Months	27	28.7	82	74.7	69.1	80.3	14.9	<0.001
	12 Months	16	17.0	82	79.0	71.1	86.9	16.2	0.504
EQ-5D-5L Index	Pre-Operative	69	73.40	82	0.56	0.50	0.62	0.26	
	6 Months	27	28.72	82	0.78	0.72	0.85	0.17	<0.001
	12 Months	16	17.02	82	0.77	0.67	0.87	0.20	0.263
VAS Pain	Pre-Operative	68	72.3	82	43.2	37.3	49.1	24.9	
	6 Months	26	27.7	82	24.2	16.4	32.0	20.4	<0.001
	12 Months	14	14.9	82	29.1	16.3	41.9	24.5	0.095

Table 9: PROMs recorded at different timepoints for ankle instability (N=number)

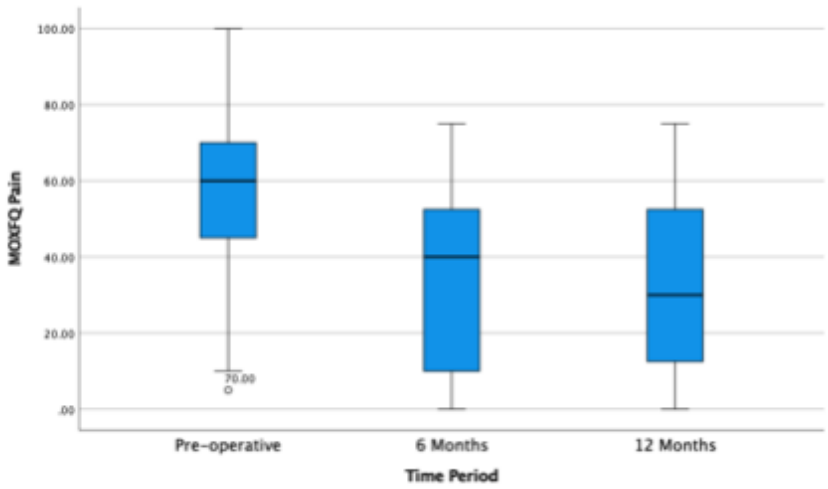


Fig 27: MOXFQ Pain, Ankle Instability

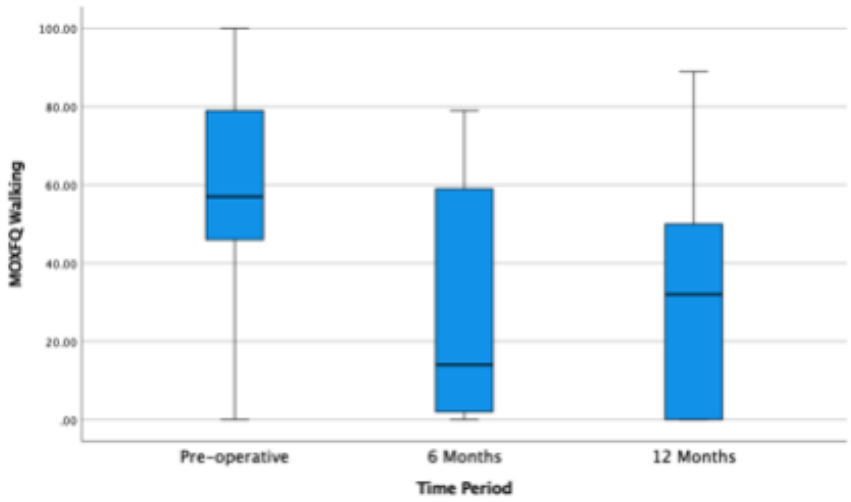


Fig 28: MOXFQ Walking, Ankle Instability

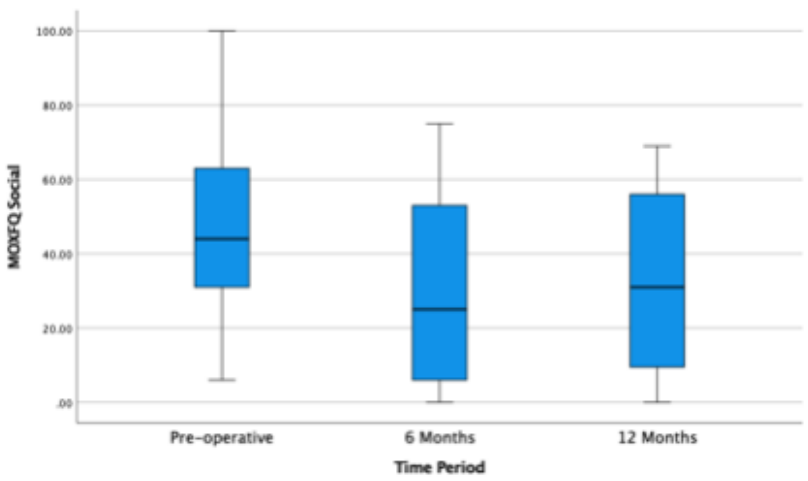


Fig 29: MOXFQ Social, Ankle Instability

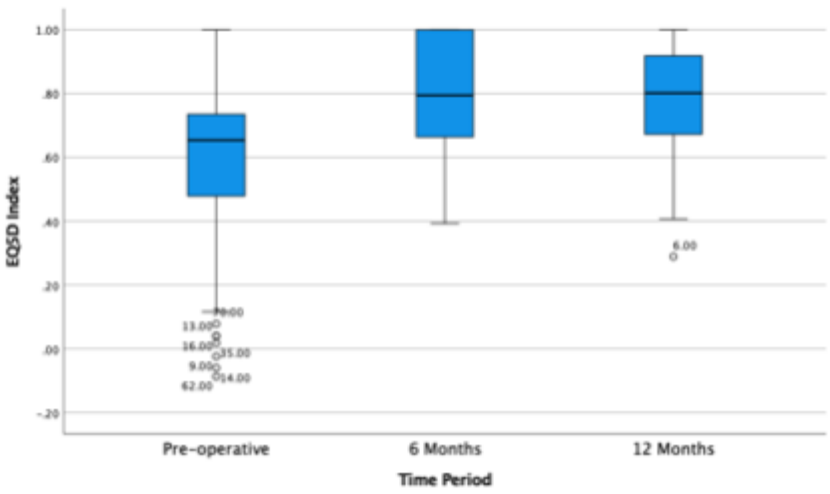


Fig 30: EQ5D Index , Ankle Instability

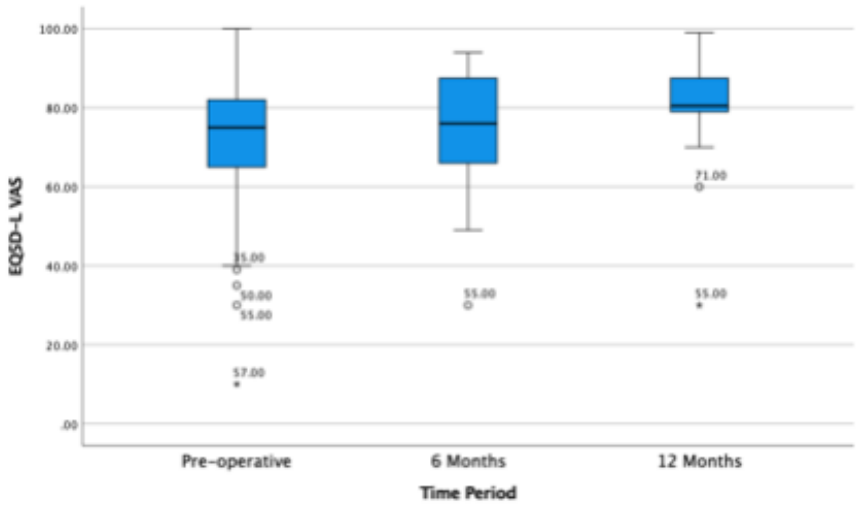


Fig 31: EQ5D VAS, Ankle Instability

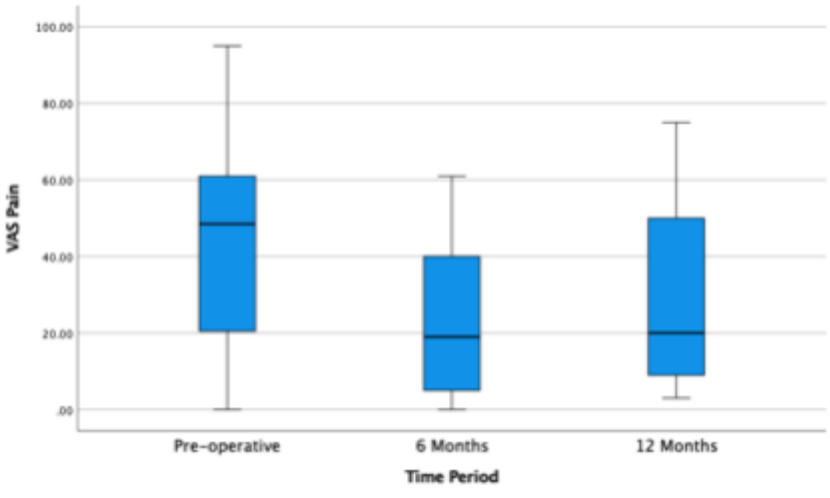


Fig 32: VAS Pain, Ankle Instability

MORTON'S NEUROMA

Assessment of PROMs for patients undergoing procedures for a diagnosis of Morton's neuroma are shown in table 10 and figures 33-38. These illustrate that there is a statistically significant improvement in all MOXFQ domain scores, VAS Pain and EQ-5D-5L Index score 6 months following surgery. Data completion rates beyond 6 months are low (~10-15%) and show no statistically significant change in either foot and ankle specific PROMs or general HRQOL scores between 6 months and 12 months.

		Cases		Total		95% Confidence Interval in Mean			
	Time Period	N	Percent	N	Mean	Lower Bound	Upper Bound	Std. Deviation	Statistical difference
MOXFQ Pain	Pre-Operative	33	46.5	69	59.5	53.3	65.7	18.2	
	6 Months	17	23.9	69	25.3	12.3	38.3	27.4	<0.001
	12 Months	7	9.9	69	9.3	-4.3	22.9	18.4	0.323
MOXFQ Walking	Pre-Operative	33	46.5	69	58.7	50.5	66.9	23.9	
	6 Months	17	23.9	69	18.9	7.5	30.3	24	<0.001
	12 Months	7	9.9	69	7.7	-2.3	17.7	13.5	1.000
MOXFQ Social	Pre-Operative	33	46.5	69	45	36.5	53.5	24.8	
	6 Months	17	23.9	69	14.6	3.5	25.7	23.4	0.001
	12 Months	7	9.9	69	9.0	-3.0	21.0	16.2	0.955
EQ-5D-5L VAS	Pre-Operative	40	56.3	69	74.9	69.0	80.8	19.1	
	6 Months	19	26.8	69	76.9	67.4	86.4	21.2	0.467
	12 Months	11	15.5	69	74.4	63.9	84.9	17.8	0.161
EQ-5D-5L Index	Pre-Operative	40	56.3	69	0.600	0.539	0.661	0.198	
	6 Months	19	26.8	69	0.812	0.733	0.891	0.176	0.013
	12 Months	11	15.5	69	0.813	0.693	0.933	0.203	0.814
VAS Pain	Pre-Operative	39	54.9	69	58.6	52.2	65.0	20.5	
	6 Months	19	26.8	69	17.6	6.7	28.5	24.2	<0.001
	12 Months	11	15.5	69	14.5	4.3	24.7	17.3	0.970

Table 10: PROMs recorded at different timepoints for Mortons Neuroma (N=number)

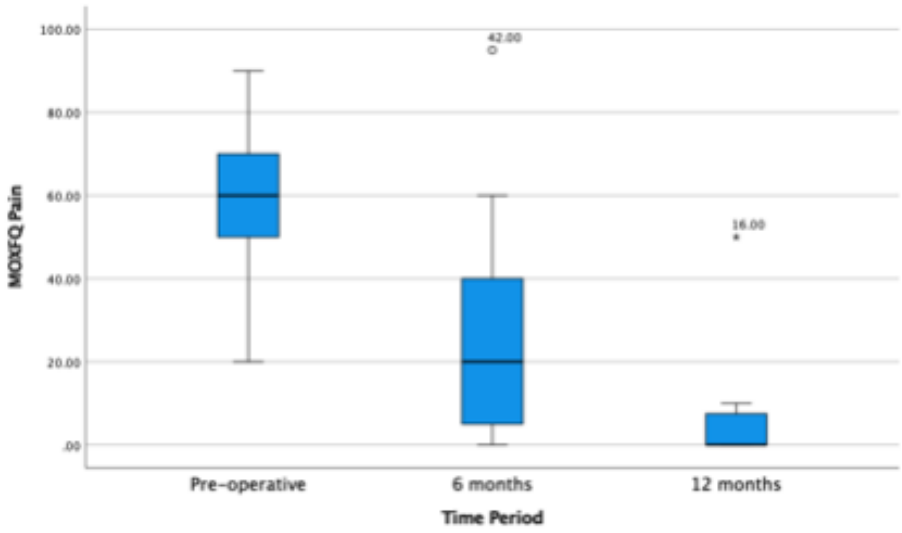


Fig 33: MOXFQ Pain, Morton's Neuroma

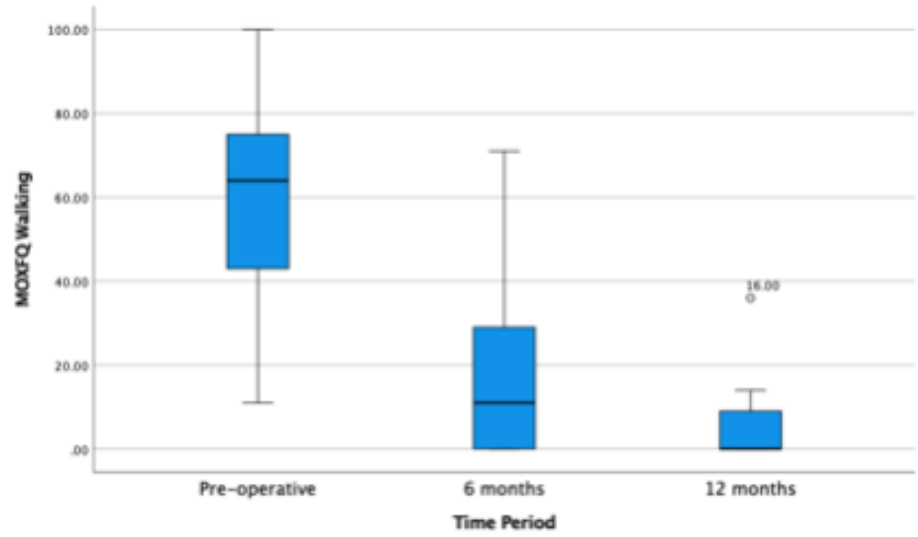


Fig 34: MOXFQ Walking, Morton's Neuroma

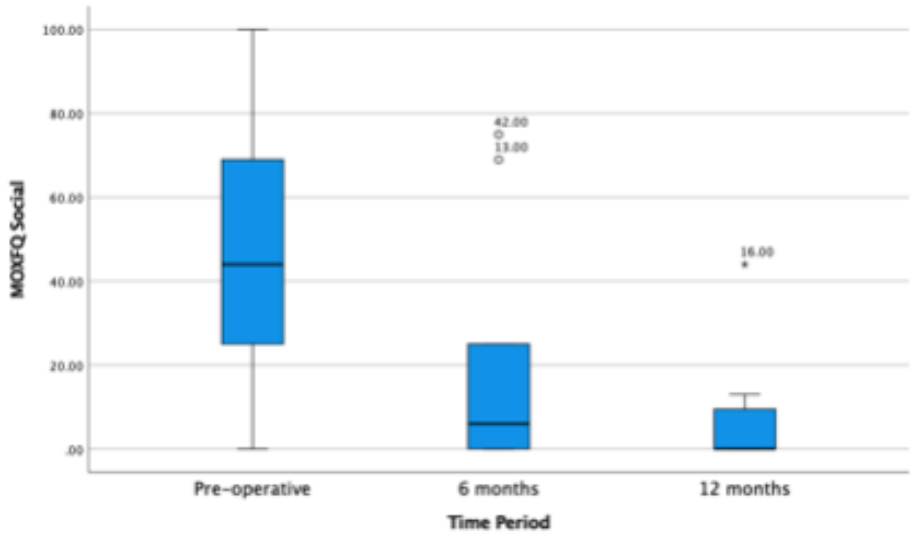


Fig 35: MOXFQ Social, Morton's Neuroma

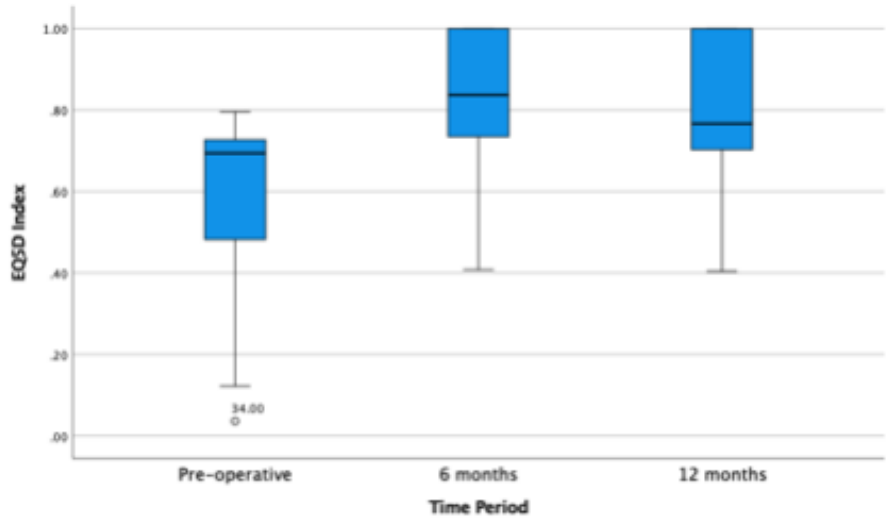


Fig 36: EQ5D Index, Morton's Neuroma

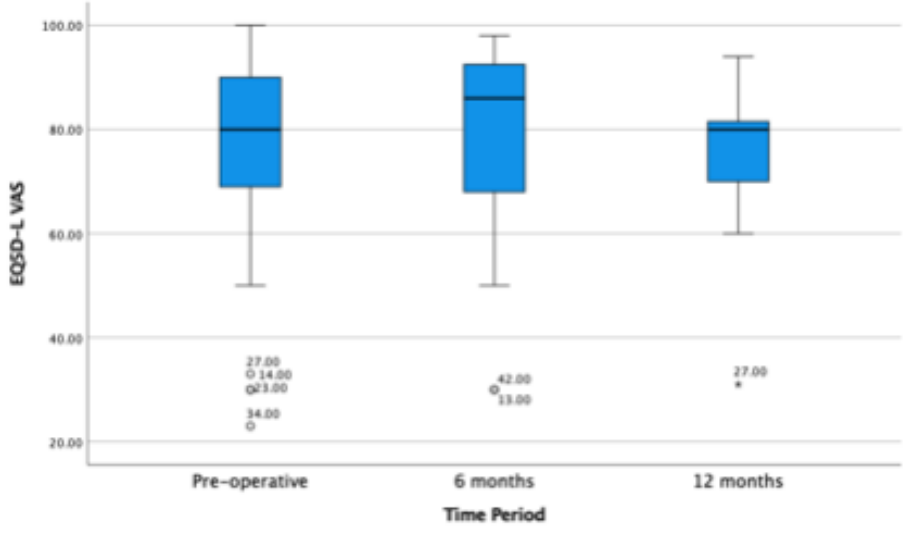


Fig 37: EQ5D VAS, Morton's Neuroma

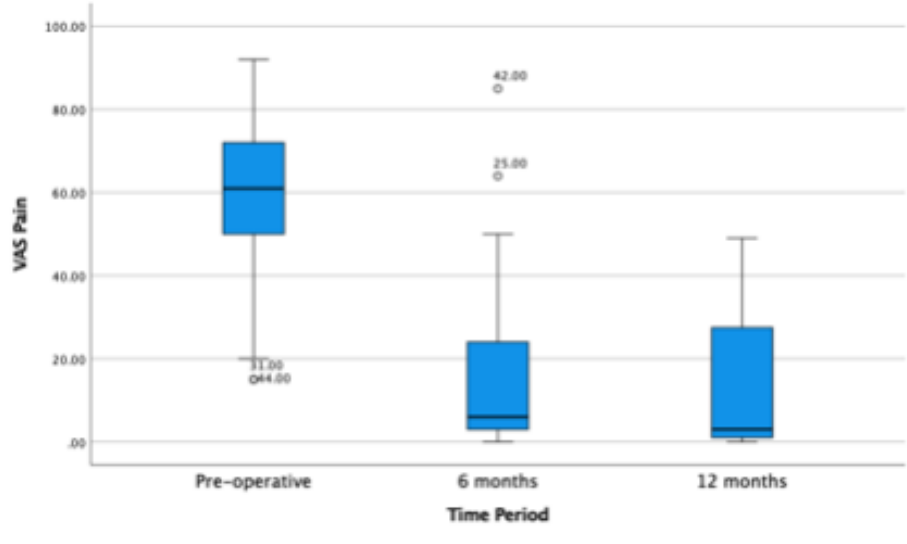


Fig 38: VAS Pain, Morton's Neuroma

VENOUS THROMBOEMBOLISM

VTE prophylaxis in the general Foot and Ankle pathway

Within this pathway there is the ability to record the use of VTE prophylaxis, both mechanical and chemical. Out of the 10,918 possible patients who could have had this recorded, 891 patients (7.5%) had mechanical prophylaxis recorded and 907 (7.7%) had a choice of chemical prophylaxis recorded. The choices of both mechanical and chemical prophylaxis was variable across the registry. We have divided the cases by anatomical location as illustrated in tables 11 and 12.

	Nil		Aspirin		Direct thrombin inhibitor		Factor X1 Inhibitor		Low Molecular Weight Heparin		Warfarin		Total
Location	N	%	N	%	N	%	N	%	N	%	N	%	N
Forefoot	209	46.04%	4	0.88%	0	0.00%	3	0.66%	237	52.20%	0	0.00%	454
Midfoot	3	4.92%	0	0.00%	1	1.64%	1	1.64%	56	91.80%	0	0.00%	61
Hindfoot	112	34.04%	4	1.22%	3	0.91%	4	1.22%	199	60.49%	1	0.30%	329
Achilles/Gastroc	18	32.14%	0	0.00%	1	1.79%	0	0.00%	37	66.07%	0	0.00%	56
EUA or injections	5	71.43%	0	0.00%	0	0.00%	0	0.00%	2	28.57%	0	0.00%	7
Total	347	38.26%	8	0.88%	5	0.55%	8	0.88%	531	58.54%	1	0.11%	907

Table 11: Chemical prophylaxis and location cross tabulation (N=number)

	Nil		Foot pump		Calf compression		Compression Stockings		Total
Location	N	%	N	%	N	%	N	%	
Forefoot	88	20.05%	144	32.80%	33	7.52%	173	39.41%	439
Midfoot	11	17.74%	21	33.87%	10	16.13%	20	32.26%	62
Hindfoot	43	13.07%	162	49.24%	47	14.29%	77	23.40%	329
Achilles/Gastroc	7	12.96%	10	18.52%	7	12.96%	30	55.56%	54
EUA or injections	4	57.14%	1	14.29%	0	0.00%	2	28.57%	7
Total	153	17.17%	338	37.93%	97	10.89%	302	33.89%	891

Table 12: Mechanical prophylaxis and location cross tabulation (N=number)

Cross-tabulation of mechanical and chemical prophylaxis also shows the use was variable, whether one or the other was chosen or both. This is illustrated in table 13.

		Chemical							Total
		Nil	Aspirin	Direct thrombin inhibitor	Factor X1 Inhibitor	Low Molecular Weight Heparin	Other	Warfarin	
Mechanical	Nil	84	1	0	2	65	1	0	153
	Foot pump	194	0	1	1	133	0	1	330
	Calf compression	23	3	2	2	63	0	0	93
	Compression stocking	44	4	2	2	245	5	0	302
	Other	1	0	0	0	0	0	0	1
Total		346	8	5	7	506	6	1	879

Table 13: Cross-tabulation of mechanical and chemical prophylaxis

Hallux valgus surgery was the most prevalent procedure amongst those with recorded VTE prophylaxis. Mechanical and chemical VTE prophylaxis data was available for 168 and 177 cases respectively (37.7%/39.7% of all hallux valgus cases). The breakdown of mechanical and chemical thromboprophylaxis can be seen in table 14.

Type of VTE prophylaxis		Number	%
Mechanical	TEDS	70	41.7
	Foot Pump	56	33.3
	TEDS & Foot Pump	11	6.5
	None	31	18.5
Chemical	LMWH	112	63.3
	Aspirin	1	0.6
	None	64	36.2

Table 14: VTE Prophylaxis for Hallux Valgus patients placed on the registry.

PRIMARY ANKLE ARTHROPLASTY

Within the registry, 91 primary arthroplasty pathways have been instituted since the pathway went live in 2020. Completed procedure forms were available for 52 cases, that is 57% of the total pathways. The average age was 71 (SD 11.89) and the age range is illustrated in figure 39. Recorded gender was 54% male and 46% female. The majority of arthroplasty patients were categorized either as overweight or obese with 67.2% having a BMI≥25. The operated side was the left in 37% and the right in 59% of cases, with unrecorded in 4%. The ASA grade was recorded in 37 cases with most being ASA 2 (62%) or ASA 3 (27%). The majority were non smokers (88%) with 9% ex-smokers and 4% smokers. The diagnosis was primary osteoarthritis in 73% of cases, secondary osteoarthritis in 20% and inflammatory arthritis in 7%. All recorded approaches were the anterior approach using an uncemented implant.

Numbers for complications were too small for any meaningful analysis.

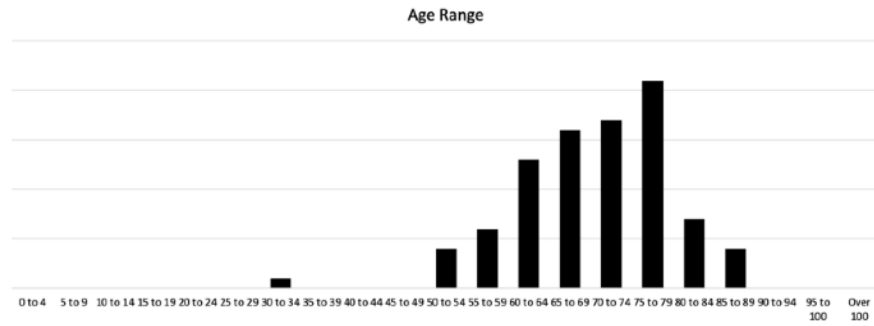


Fig 39: Age distribution, Primary Ankle Arthroplasty Pathway

The average increase in the EQ-5D Index was from 0.39 preoperatively to 0.78 and 0.66 at 6 and 12 months respectively. This was greater than the MIC, indicating a clinically relevant change. There was a non-significant increase in EQ-5D Health VAS from 64.26 to 76.50 at 6 months, but this dropped to 62.71 at 12 months. The MOXFQ components all showed a clinically relevant and significant improvement in scores, in all domains, which was greater than the MIC at both 6 and 12 months (Table 15, Figs 40-45).

		Valid		Total		95% Confidence Interval for Mean			
	Time Period	**N**	**Percent**	**N**	**Mean**	**Lower Bound**	**Upper Bound**	**Std. Deviation**	**Statistical difference**
MOXFQ Pain	Pre-operative	39	42.90%	91	69.74	64.13	75.36	17.319	
	6 Months	14	15.40%	91	31.43	20.84	42.02	18.337	<.001
	12 Months	7	7.70%	91	22.14	-2.01	46.3	26.118	0.6
MOXFQ Walking	Pre-operative	39	42.90%	91	87.77	83.23	92.3	13.99	
	6 Months	14	15.40%	91	36.93	24.37	49.49	21.759	<.001
	12 Months	7	7.70%	91	26.86	-5.08	58.79	34.527	0.702
MOXFQ Social	Pre-operative	39	42.90%	91	67.1	59.75	74.46	22.689	
	6 Months	14	15.40%	91	22	7.08	36.92	25.849	<.001
	12 Months	7	7.70%	91	18.86	-12.54	50.25	33.943	0.776
EQ5D-L VAS	Pre-operative	39	42.90%	91	64.26	57.34	71.17	21.341	
	6 Months	14	15.40%	91	76.5	69.6	83.4	11.947	0.172
	12 Months	7	7.70%	91	62.71	37.71	87.72	27.041	0.186
EQ5D-L Index	Pre-operative	39	42.90%	91	0.39	0.3	0.48	0.282	
	6 Months	14	15.40%	91	0.78	0.67	0.89	0.194	<.001
	12 Months	7	7.70%	91	0.66	0.44	0.88	0.241	0.094
VAS Pain	Pre-operative	39	42.90%	91	62.05	54.83	69.27	22.262	
	6 Months	14	15.40%	91	16.93	9.87	23.99	12.232	<.001
	12 Months	7	7.70%	91	17.71	-6.15	41.58	25.805	0.962

Table 15: Primary Ankle Arthroplasty Pathway PROMS.

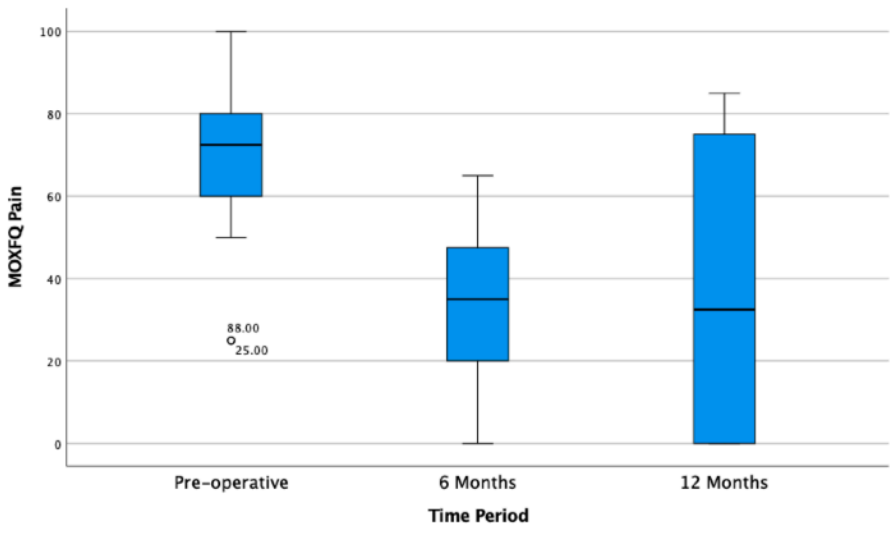


Fig 40: MOXFQ Pain, Primary Ankle Arthroplasty Pathway

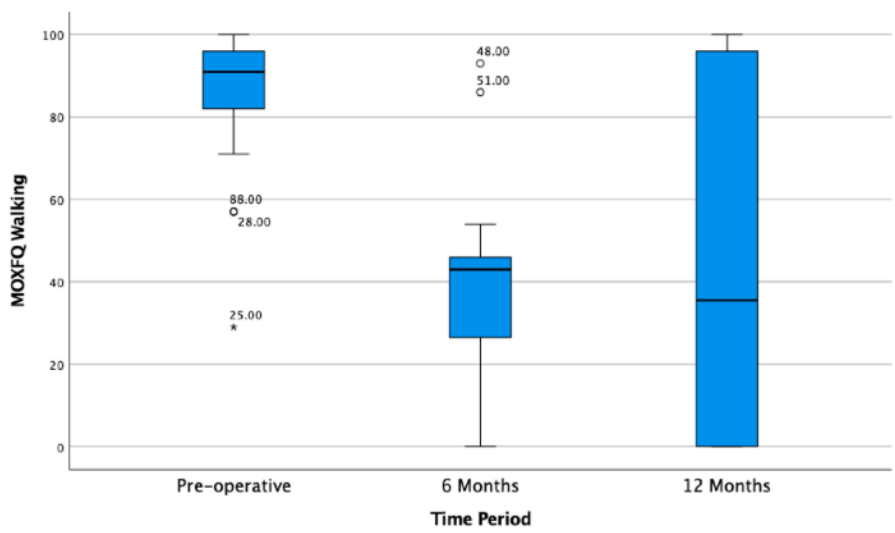


Fig 41: MOXFQ Walking, Primary Ankle Arthroplasty Pathway

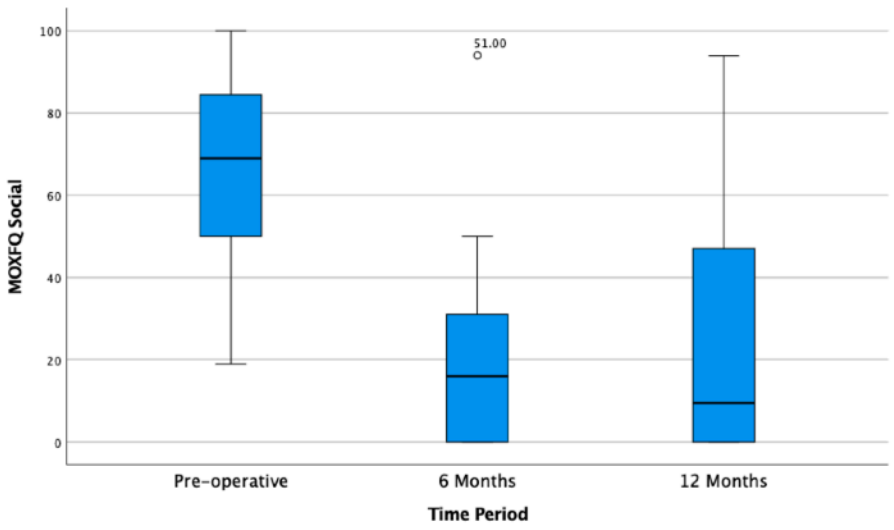


Fig 42: MOXFQ Social, Primary Ankle Arthroplasty Pathway

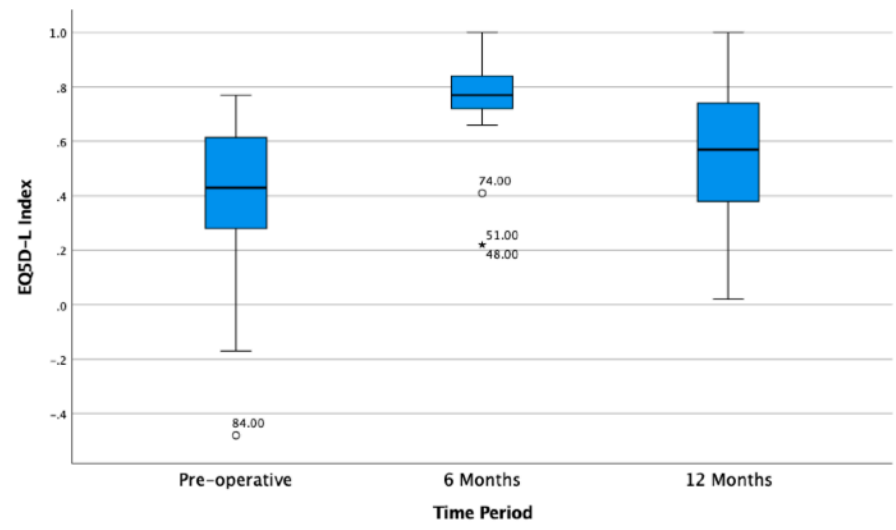


Fig 43: EQ5D Index, Primary Ankle Arthroplasty Pathway

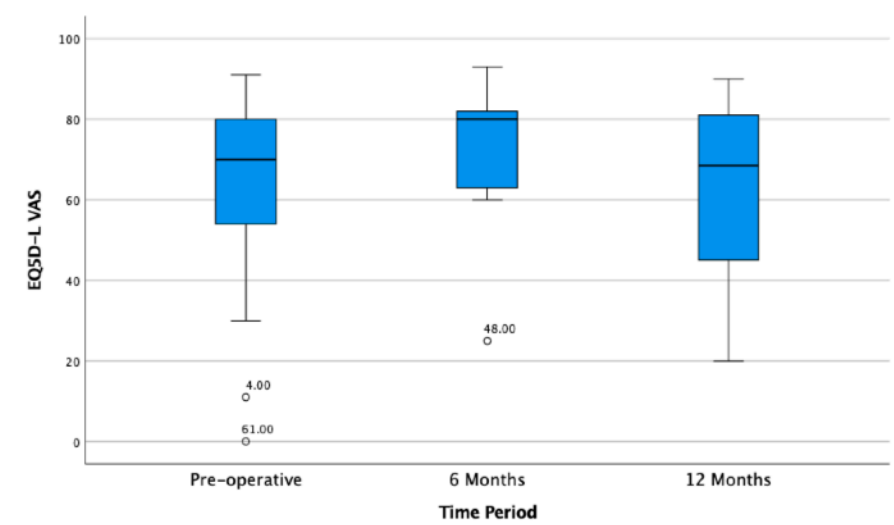


Fig 44: EQ5D VAS, Primary Ankle Arthroplasty Pathway

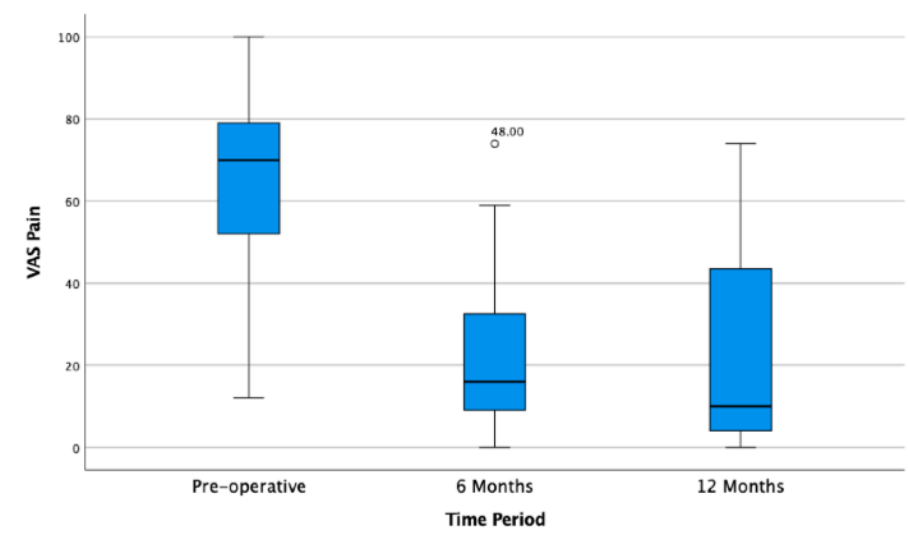


Fig 45: VAS Pain, Primary Ankle Arthroplasty Pathway

ADULT ANKLE FRACTURE PATHWAY

Within the registry, 73 adult ankle fracture pathways have been completed since the pathway went live in 2021. Completed procedure forms were available for 67 cases, that is 92% of the total pathways. The average age was 41 (SD 16.15) (Fig 46), recorded gender was 54% female and 46% male and the recorded BMI range is illustrated in figure 47, with 76% having a BMI≥25 (overweight or obese).

The operated side was the left in 41% ,right in 57% of cases, with unrecorded in 2%. The ASA grade was recorded in 28 (38%) cases with 82% being ASA 2 or ASA 3. This reflects the age of this cohort.

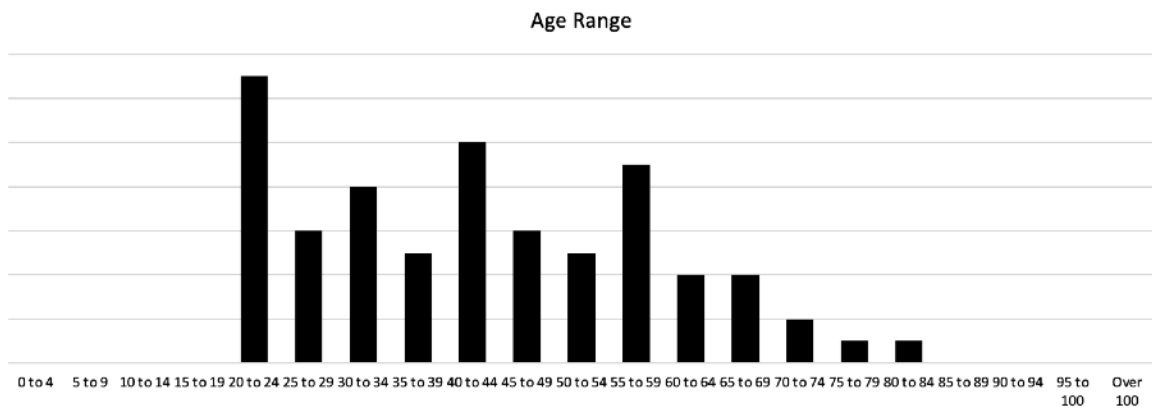


Fig 46: Age distribution, Ankle Fracture Pathway

The majority were nonsmokers (68%) with 14% ex-smokers and 14% smokers. Surgery was undertaken on an urgent basis in 56% of cases and scheduled in 44% of cases. The majority in 96% of cases were primary procedures with 4% revision surgery. Open surgery was used in 90% with the remaining being a mixture of combined open and arthroscopic (4%),closed (1%), percutaneous(1%) and mini open(1%). Numbers for complications were too small for any meaningful analysis. We currently don't have long enough follow up data to report on outcomes.

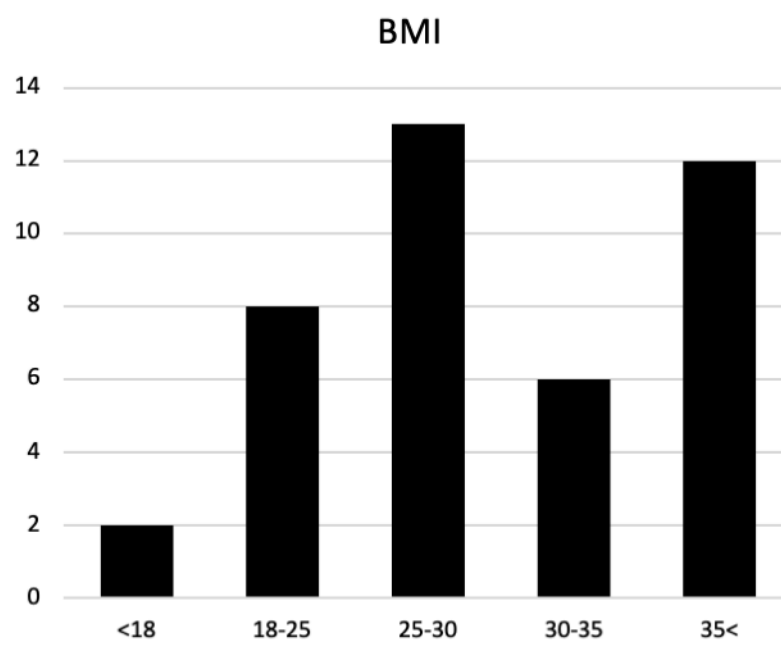


Fig 47: BMI, Ankle Fracture Pathway

OTHER NEW PATHWAYS

The Adult Foot and Ankle Trauma and Ankle Revision Arthroplasty pathways were both only recently introduced. As such the number of pathways is small and data too immature to complete a meaningful report for them. The numbers of pathways inserted on the Registry, for the recently introduced pathways are shown in table 16.

Pathway	Number on registry
Adult Ankle Fracture	71
Adult Foot and Ankle Trauma	17
Ankle Arthroplasty (Primary)	93
Ankle Arthroplasty (Revision)	5

Table 16: Number of patients in each new pathway (Dec 2021).

LIMITATIONS

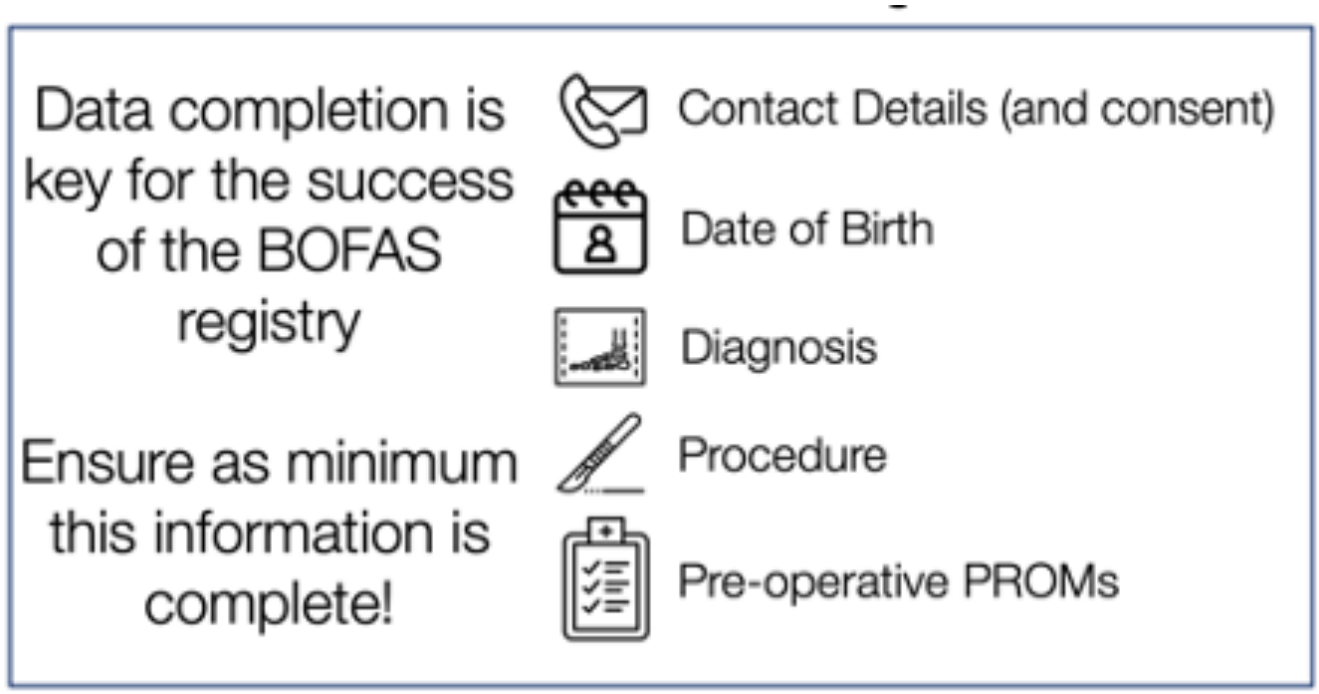
There are a number of limitations of this data which readers should be aware of. The most important factors are the limited data collection and compliance. For example, preoperative PROM completion rates for the MOXFQ are available for approximately 21% of pathways and this drops off to ~10% at 6 months and ~4% at 12 months for the general foot and ankle pathway. Other limitations include loss of data relating to age, procedure and diagnosis, which means making direct comparisons between different surgical approaches or procedures for a specific pathology should be avoided.

COMPLICATIONS

Accurate recording of complications following surgery is essential for ongoing audit, quality improvement and assessment of efficacy of a surgical procedure. One of the key functions of the registry is to enable national assessment of the complication rate for foot and ankle procedures, in order to ensure that patients are not put at harm, by identification of procedures with high complication rates. There were only 6 post-operative surgeon reported adverse events. Patient reported post-operative adverse events also displayed a paucity of data. Where reported, the early (26:No 32:Yes) and late complications (31 Yes: 25 No) suggested a substantial response bias where patients who unfortunately suffered a complication reported this whereas patients who did not have a complication failed to report this aspect of their positive outcome.

TAKE HOME MESSAGES AND FOCUS FOR 2022/2023

The key take home messages from this report are very encouraging. Uptake and usage of the registry is increasing year on year and there is now a growing body of data that can be used for analysis. The main focus of improvement for 2022/2023 is improving data compliance. In particular, there are 5 data points that all surgeons should focus on trying to reach 100% compliance with when adding patients to the pathways. These key data points have been identified as they will enable deeper understanding and analysis of the registry data.



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