



A report of UK experience in 917 cases of day care foot surgery using a validated outcome tool

Anthony John Maher*, Stuart A. Metcalfe

Dept of Podiatric Surgery, Solihull NHS Care Trust, Chelmsley Wood Primary Care Centre, Crabtree Drive Chelmsley Wood, West Midlands B37 5BU, United Kingdom

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ABSTRACT

Background: Day case surgery is an increasingly important treatment modality and one that foot surgery is particularly well suited to.

Objectives: This article presents an in depth evaluation of the outcomes of day case foot surgery undertaken in the primary care setting.

Method: 917 consecutive day surgery cases were evaluated with the Foot Health Status Questionnaire (FHSQ), patient satisfaction questionnaires and complication audits.

Results: 917 separate day care admissions were audited (696 females and 221 males). The average age at time of surgery was 50 years (range 14–100, S.D. 11). Post-operative follow up was usually complete by 26 weeks (range 21–218 weeks, S.D. 145). A total of 2772 individual procedures with patients receiving between one and five procedures per admission. The majority of patients (81%, $N = 743$) opted for local anaesthesia. The FHSQ scores for foot pain, foot function, foot health, shoe fitting, general health, physical activity, social capacity and vigour improved. Patient satisfaction results were favourable and complication rates were within acceptable limits.

Conclusions: Podiatric surgery is well placed to meet both the demands of government and patients in delivering a high quality, safe and efficient treatment for patients requesting elective surgical intervention for foot deformity.

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1. Background

Day surgery is not a new concept and today in the UK more than 60% of patients have elective surgery as day cases whereas the figure reaches 70% in the USA [1]. This is compared with only 15% of elective surgeries in the early 1980s [2]. The shift towards day surgery has been a gradual one and the concept can perhaps be traced back to 1910 when Dr Nicoll reported the results of operating on sick children in Glasgow [2–5]. The revolution in surgical practice through the 20th century cannot be over emphasised, the traditional approach of prolonged bed rest following treatment has been replaced with early ambulation and reduced stays in hospital [3,5].

However, it was not until the 1980s that day surgery was popularised in the UK following publication of a report by the Royal College of Surgeons titled “Report of the Working Party on Guidelines for Day Case Surgery”. This report emphasised the need to utilise day surgery, and made the suggestion that 50% of elective surgery was suitable for day care treatment [3,6]. The government became particularly interested in the concept of day surgery in the

1990s with the publication of a number of key reports. The Bevan report published in 1989 recommended day care surgery as a cost effective alternative to inpatient management [3,7,8]. This was followed by the Audit Commission which found potential cost savings of £10 million per year if the most common elective surgeries were performed as day cases [3,9]. The commission created a list or ‘basket’ of 20 elective procedures which could be provided as day cases, these procedures accounted (at that time) for 30% of all admissions [3,9]. A second report produced by the commission a year later concluded that 80% of patients preferred day surgery and 83% of patients would recommend such treatment to a friend [3,10].

The benefits of day surgery over traditional inpatient management are multilayered; patients may expect a rapid recovery, shorter waiting lists, and improved satisfaction rates [10–13]. Service providers may expect rapid throughput of activity, lower bed occupancy rates and improved cost effectiveness [7,9,12]. In addition day surgery need not be offered in traditional acute hospital settings with treatment now being offered in the community setting in purpose built stand alone units [11,14]. Further to this day surgery may also be offered at independent treatment centres run in the private sector and contracting back into the NHS [11]. The most recent report on the national health service by Lord Darzi continues to support day surgery noting that cataract surgery offers the highest quality of care but is provided almost universally as an

* Corresponding author. Tel.: +44 7894582901.

E-mail address: anthony_maher79@yahoo.co.uk (A.J. Maher).

outpatient service. The report also emphasises the importance of patient involvement in decision making and patient choice [15]. Offering patients the choice of outpatient foot surgery under local anaesthesia fulfils these requirements.

Advancement in surgical skills has also increased the scope of day surgery with techniques such as cataract surgery and minimally invasive key hole surgery particularly well suited to day care [16].

Podiatric surgery has historically been judicious in its use of resources driven by necessity with access to only relatively small primary care budgets. The sub-speciality has evolved to be an economical service pioneering the delivery of a broad range of corrective foot surgery as day cases with appropriate regional nerve block anaesthesia [17,18].

2. Objectives

This paper will present the experience and results of 917 episodes of community day care surgery in a Podiatric Surgery department over a 4-year period. The paper will concentrate on several key aspects of patient care; satisfaction as determined by outcome measures, anaesthetic choice, pain management and complications.

3. Method

A standard protocol was introduced within the Solihull Care Trust department of Podiatric Surgery to evaluate surgical outcomes in all NHS cases. Ethics approval was obtained locally for the implementation of a patient administered audit tool in conjunction with a perioperative and post-operative complication audit and post-operative patient satisfaction survey.

Audit data was collected between 01/01/2004 and 18/01/2008. All patients attending the department of Podiatric Surgery who subsequently went onto surgical intervention were included in the audit trail. During the preoperative evaluation all patients were advised of the likely benefits and potential complications of each planned procedure, in addition recovery periods and likely impact on leisure interests and occupation were also discussed. All patients were offered the choice of surgery under either general anaesthesia, regional local anaesthesia or regional anaesthesia with sedation. The procedures were undertaken at either an acute unit or a purpose built standalone primary care unit and all procedures were undertaken by a single Podiatric Surgeon (SAM).

The Foot Health Status Questionnaire (FHSQ) was chosen as the primary measure of outcomes following surgery. The FHSQ has been validated for this purpose but as yet it has not gained widespread acceptance amongst the medical community [19,20]. The FHSQ is a patient administered pre- and post-intervention questionnaire free from clinician bias which covers eight separate domains regarding foot health and general well being, each domain generates a score; low scores indicate higher levels of pain, dysfunction or poor health whereas high scores indicate an improvement. Therefore when the FHSQ scores are applied to the outcomes of surgery, higher scores would be hoped for post-operation.

In addition to the FHSQ scores participants also completed a patient satisfaction questionnaire (PATSAT) taken from the Podiatric Audit of Surgical Outcome Measures (PASCOM) [21]. PASCOM is a British audit system which has good repeatability but as yet has not been validated [22]. PASCOM is widely used in Podiatric Surgery departments for the collection of perioperative data. The PATSAT component is a patient administered questionnaire completed at final review focusing on the patients' experience of foot surgery, the recovery period, management of complications and return to normal footwear. Answers to all questions are collated to create a PATSAT score out of 100. Each patient has their own score sum-

marising their personal level of satisfaction. A score of 100 equates to being very satisfied with the outcome while a score of 0 equates to total dissatisfaction [21,22].

In addition to the FHSQ and PATSAT scores, complication rates were also recorded. Standardised forms were created by the senior author (SAM) solely for the recording of complications within the department. Two separate complication forms were utilised, the first related to perioperative complications, the second related to post-operative complications. The use of separate forms allowed for simple analysis of complications at differing stages through the care process.

All data was collected and analysed on Microsoft Access and Microsoft Excel software. The data was analysed for mean scores, range and standard deviations utilising the PAST statistics program [23] and PASCOM software. Statistical analysis for significance of the FHSQ results was undertaken with the Wilcoxon rank sum test at the 5% level of significance.

Data from the FHSQ questionnaires was further evaluated for minimal important differences (MID). The MID concept was proposed by Landorf and Radford [24] and is essentially a value added measure which determines the minimum score change necessary for the patient to feel actual benefit, the premise being that a statistically significant change in scores may not equate to an improvement (or deterioration) for the patient. At the time of writing the authors are not aware of any other wide-ranging published service report or performance review which has applied the MID concept in the interpretation of data.

4. Results

Study data was collected between 01/01/2004 and 18/01/2008. During this period 917 consecutive foot surgery day care admissions were audited (696 females and 221 males). The average age at time of surgery was 50 years (range 14–100, S.D. 11). Post-operative follow up was usually complete by 26 weeks (range 21–218 weeks, S.D. 145) at which point the patient was discharged from the service. The 917 admissions resulted in a total of 2772 individual procedures with patients receiving between one and five procedures per admission. Fig. 1 demonstrates the range of primary procedures undertaken. A primary procedure is defined as the treatment directed at the primary diagnosis.

4.1. Anaesthetic choice

The majority of patients (81%, $N = 743$) opted for local anaesthesia. Local anaesthesia was administered as a regional nerve block

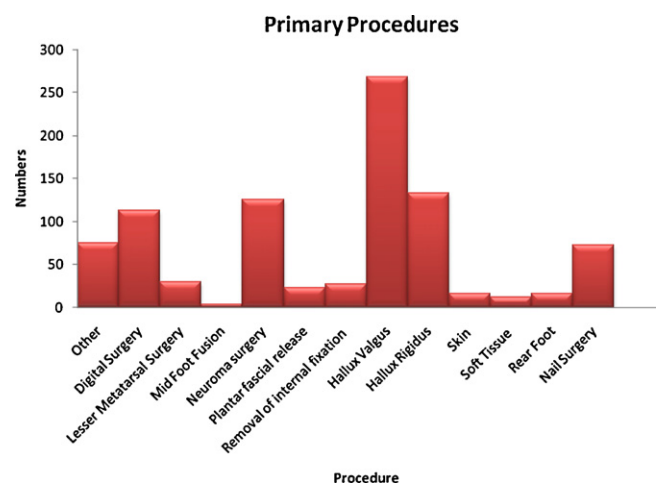


Fig. 1. Cases by primary procedure.

Table 1
FHSQ analysis.

Outcome	Pre-intervention score			Post-intervention score			Score change values			Numbers of patients who improved	Number of significant improvements, MID applied ^a
	Range	Mean	S.D.	Range	Mean	S.D.	Range	Mean	S.D.		
Foot Pain	0–100	47.5	35	1–100	75.1	20	–76 to 100	27.6	37	819	719
Foot function	0–100	60.3	26	0–100	77.6	24	–100 to 100	17.3	31	689	611
General foot health	0–100	30.1	24	0–100	48	34	–100 to 100	17.9	38	673	653
Shoe fit	0–100	36.3	26	0–100	60.3	27	–85 to 100	24.1	34	560	N/A
General health	0–100	69.9	26	0–100	73.8	24	–99 to 100	3.9	29	398	N/A
Physical activity	0–100	59.8	28	0–100	72	26	–88 to 100	12.1	33	558	N/A
Social capacity	0–100	72.9	27	0–100	79.9	24	–86 to 100	7	29	428	N/A
Vigour	0–100	50.9	20	0–100	56.8	21	–81 to 87	5.98	24	425	N/A

^a MID = minimally important difference; applied to pain, function and general foot health.

Table 2
Breakdown of key FHSQ scores against procedure type.

	Forefoot procedures, n = 787		Mid foot procedures, n = 31		Rear foot procedures, n = 99	
	Numbers improving	MID achieved	Numbers improving	MID achieved	Numbers improving	MID achieved
Foot pain	709 (90%)	606 (77%)	30 (96%)	28 (90%)	77 (78%)	62 (63%)
Foot function	587 (75%)	519 (65%)	21 (67%)	19 (61%)	70 (71%)	61 (62%)
General foot health	574 (72%)	553 (70%)	22 (71%)	21 (67%)	69 (70%)	69 (70%)

such as a popliteal or ankle block in 620 cases (68%). For minor procedures and digital surgery either a digital block or local infiltration was administered (13%, n = 123). A small proportion of patients opted for intravenous sedation in combination with local anaesthesia, or general anaesthesia supplemented by local anaesthesia (19%, N = 174).

4.2. Foot Health Status Questionnaire

The FHSQ was completed by all patients n = 917 (see Table 1). Pre-surgery the questionnaire was completed on the day ward. The follow up questionnaire was then completed in the outpatients' waiting room at three months post-operation. Foot pain improved in 819 cases (89%), pain failed to improve in 20 cases (2.18%) and deteriorated in 78 cases (8.51%). With reference to the MID, 719 patients (78%) exceeded the 14 point threshold for change in FHSQ scores indicating an actual perceived improvement in pain.

Foot function improved in 689 cases (75%), function failed to improve in 78 cases (8%) and deteriorated in 148 cases (16%). With reference to the MID, 611 patients (66%) exceeded the 7 point threshold for change in FHSQ scores indicating an actual perceived improvement in foot function.

General foot health improved in 673 cases (73%), but failed to improve in 107 cases (11.6%) and actually deteriorated in 137 cases (14%). With reference to the MID, 653 patients (71%) exceeded the 9 point threshold for change in FHSQ scores indicating an actual perceived improvement in foot function.

The FHSQ scores also improved for shoe fitting in 560 cases (61%), general health in 398 cases (43%), physical activity in 558 cases (60%), social capacity in 428 cases (46%) and vigour in 425 cases (46%). At the time of writing MID thresholds have not been developed for these domains.

Additionally the surgical procedures were divided into three major categories of forefoot, mid foot and rear foot for further analysis of FHSQ results. Table 2 summarises this data. Improvements in all three categories were greatest for foot pain although the improvements in the rear foot group were lower than for mid foot and forefoot. Improvements in foot function and general foot health were similar for all three categories.

Statistical analysis of the FHSQ data with the matched pairs Wilcoxon rank sum test at the 5% (p < 0.05) level of significance

Table 3
Perioperative complications (n = 917).

Complication	Numbers of cases	Percentage
Suspected CVA	1	0.1
Equipment failure	6	0.65
Fainting	7	0.76
Hypertension	19	2.1
Local anaesthetic failure	16	1.7
Local anaesthetic toxicity	1	0.1
Total	n = 50	

found significant improvements in foot pain; shoe fitting; foot function; foot health; general health; physical activity; social capacity; and vigour.

4.3. Patient satisfaction survey (PATSAT)

Patient satisfaction (PATSAT) questions were taken from the PAS-COM audit system. The PATSAT was completed post-operation by patients at our request but was only initiated part way through the audit period hence n = 739. Unfortunately owing to a flaw in the design of the questionnaire not all patients answered all questions. Table 3 details the PASCOM results.

The PASCOM audit system software is used to calculate a PATSAT score out of 100 for each patient. The mean score was 86.75, standard deviation, 9.05 (range 36–100).

Table 4
Post-operative complications (n = 917).

Complication	Numbers of cases	Percentage
Infection proven	18	1.96
Fixation removal	117	12.87
Non-union	2	0.22
Hypertrophic scar	1	0.11
Delayed healing	1	0.11
Delayed union	2	0.22
Thromboembolic events	0	0
CRPS	0	0
Sensory loss	3	0.33
Total	n = 134	

Table 5
Summary of PATSAT questionnaire results.

Question	Yes	No
Were the risks & complications of surgery explained to you? N = 739	733 (99%)	6 (1%)
Did you have a problem after your surgery? N = 732	Minor; 114 (15%), serious; 4 (2%)	614 (83%)
Would you have surgery under the same conditions again? N = 729	720 (98%)	9 (2%)
After your surgery how was your pain control? N = 723	Some pain but I coped; 546 (75%) Minimal or no pain; 150 (20%) Pain control failed; 27 (15%)	
When did you return to shoes N = 723	2 weeks; 72 (10%) 4 weeks; 197 (27%) 8 weeks; 394 (54%) <6 months; 54 (7%) >6 months; 6 (2%)	

4.4. Peri- and post-operative complications

Perioperative and post-operative complications were recorded on standardised audit sheets developed in the department. Tables 4 and 5 demonstrate the range of perioperative and post-operative complications.

5. Discussion

Day care surgery is now an accepted and popular choice for patients, service providers and government [1,11,24]. Day surgery may be provided with either general or local anaesthesia. General anaesthesia is typically only available in acute hospitals and requires a considerable staffing resource input in terms of the anaesthetic team and recovery team.

The use of local anaesthesia is a significant clinical and economic consideration when planning for and managing a day care service. The use of local anaesthesia allows for patient care to be provided in standalone day centres which do not necessarily have to be situated within the grounds of an existing general hospital. The use of standalone facilities has a positive economic impact avoiding the costs associated with general hospital admissions. Local anaesthetics administered by the theatre team also then avoid the costs associated with consultant lead general anaesthetic care.

However there are distinct disadvantages with local anaesthetics. Surgeons have often voiced concerns regarding local anaesthesia and have traditionally preferred to operate under general anaesthesia. Patients may also have considerable concerns and certainly anxiety can be a problem at the time of surgery resulting in white coat hypertension and possibly cancellation of the operation. Perhaps the most significant concern voiced by clinicians and physicians is the risk of local anaesthetic failure. This study demonstrated a local anaesthetic failure rate of 1.7% (16 patients) which compares favourably with previously reported failure rates for regional anaesthetic techniques of between 2 and 10% [25–28]. For the purposes of this study failure was defined as a patient in whom anaesthesia had not been achieved despite administration of the maximum safe dose of local anaesthetic. These patients were cancelled and subsequently rebooked. Local anaesthetic failure is difficult to predict although training in advanced techniques certainly improves success rates. Even in experienced hands there is a risk of failure and as such all patients are warned of this possibility during the preoperative assessment. At the same time patients are made aware of the alternative anaesthetic options and their associated risks and benefits.

Eighty-one percent of patients in this study specifically requested treatment under local anaesthesia demonstrating a def-

inite need for such services. Podiatric surgery has through a combination of serendipity and necessity developed as a subspeciality which excels in providing local anaesthetic based foot surgery, overcoming issues of access to facilities and services. The process of development over the last 30 years has resulted in a subspeciality in step with Department of Health policies providing high quality patient focused care often in standalone units supported by primary care services in community settings.

This study demonstrates the broad range of foot surgery which can be routinely offered on a day care basis and the associated high levels of patient satisfaction that can be expected. Satisfaction is not only a consequence of the positive outcome of a given procedure as determined by the FHSQ scores but is also directly influenced by the quality of care received throughout the care pathway. The PATSAT result demonstrates that the majority of patients (98%) would have surgery again under similar circumstances should the need arise. This compares favourably with the Audit Commission findings of 80% of patients preferring day surgery [3,10].

Both the Audit Commission and the British Association of Day Surgery have created baskets of elective procedures which can be considered suitable for day surgery [9,29]. Of relevance to Podiatric Surgeons both baskets include bunion surgery. This paper confirms that bunion surgery is suitable for day care treatment, however the basket lists of procedures fail to capture the broad range of foot operations which can be undertaken as day cases (as detailed in Fig. 1).

The majority of day case foot surgery procedures can be undertaken with local anaesthesia, however there are instances when general anaesthesia is a prerequisite. Complex rear foot surgeries such as major fusions require a thigh tourniquet. Typically in podiatric surgery an ankle tourniquet is applied and such a device is usually very well tolerated. Unfortunately thigh tourniquets are extremely painful if applied to a conscious patient, therefore rear foot surgery is typically performed under general anaesthesia [30]. Local anaesthesia relies on a patient lying prone for around 30–60 min. It has been reported that patients can start to complain of tourniquet discomfort after 30 min and so procedures of long duration should usually be performed under sedation or with general anaesthesia [30].

Previous studies have found that poor post-operative pain control is a characteristic of day surgery [12]. Only 3% of patients in this study reported poor pain control, the largest group (76%) reported only “some pain but I coped”. The department employs a number of strategies in managing post-operative pain. First and foremost preemptive analgesia is offered in the form of regional popliteal nerve blocks. These are administered pre-operation and have the potential to offer up to 30 hour pain relief [31]. The regional block is often supplemented with a distal infiltration of local anaesthesia or an ankle nerve block. In addition patients are counselled with respect to oral opioid analgesics and non-steroidal anti-inflammatory drugs. The pharmacological approach is coupled with careful attention to advice issued at the time of discharge. This includes advice to rest and elevate, particularly during the critical first 48 hour, in addition to the use of an ice pack, use of a post-operation trauma shoe and walking aids [32].

It is our belief that the combination of preemptive analgesic nerve blocks, oral medication and high quality patient advice has a positive impact on post-operative pain management.

With respect to perioperative complications, only a small number were reported. One patient suffered a suspected cerebrovascular accident and was referred to secondary care for further assessment. This patient was unfortunately lost to follow up. One case of local anaesthetic toxicity was recorded, the patient demonstrated neurological signs of toxicity during administration of a popliteal nerve block. Administration of the agent was halted and no further deterioration was noted. The patient was discharged

home with no long-term complications. Hypertension was a noted perioperative complication with 2% of operations cancelled for this reason. The department follows evidence-based guidance in setting a safe upper limit for maximum permissible blood pressures, if exceeded the scheduled procedure is cancelled [33]. In an attempt to minimise the likelihood of a cancellation, hypertension is screened for at two separate outpatient appointments. If hypertension is noted a referral is made to the patients general practitioner. Patients considered prone to white coat hypertension are offered intravenous sedation, however despite these measures a small number of patients do still arrive for elective surgery with raised blood pressure and are subsequently cancelled. There may be an argument for lowering the threshold for hypertension during the preoperative assessments and certainly further investigation in this area would be valid.

Analysis of post-operative complications demonstrates a significant number of patients (12%) requiring removal of internal fixation. Whether this is a true complication or rather a post-operative sequellae is open to debate. Fixation removal is an accepted consequence of certain procedures and fixation techniques [34]. Mid foot fusions for example often rely on plate fixation, plates are typically quite bulky in construction leaving them prominent under the skin and therefore likely to require removal. Improvements in design and manufacturing of internal fixation should further reduce the need for removal.

Post-operative infection rates were within the accepted limits for clean elective surgery [35]. Eighteen patients (1.96%) developed superficial wound infections which were confirmed by microbiology, all 18 cases resolved with oral antibiotics. No patients developed deep wound infections or osteomyelitis. There were no recorded cases of thromboembolic events which compares favourably with other studies of ambulatory foot surgery. The lack of this complication perhaps relates again to post-operative advice and early ambulation [36,37].

In determining the outcomes of surgery, this study utilised the FHSQ as the primary outcome measure. Following validation the FHSQ has now been utilised in a number of retrospective and prospective trials of conservative and surgical management of various foot health complaints [13,20,38–41]. The FHSQ was chosen because it is administered by the patient eliminating clinician bias and it is specific to treatment of the foot, despite these benefits the questionnaire has not yet gained widespread acceptance within the medical community. A number of criticisms can be levelled at our use of the FHSQ. First we asked patients to complete the questionnaire on the day ward pre-operation and in the outpatients waiting room 3 months post-operation. This may lead to bias in completion of the questionnaire and potentially skewed results. Second the questionnaire is rather extensive at 29 questions spread over seven pages which is time consuming to complete and to analyse.

A plethora of alternative outcome measures are available for assessment of health outcomes following surgery. These include generic measures such as the SF-36 [42] which has been shown to have good construct validity and is able to detect subtle changes following surgery particularly with respect to pain [43,44]. Foot specific measures have also been devised such as the foot function index (FFI) and the AOFAS scales [43,44]. The FFI has been found to be less responsive to change than the FHSQ in a trial of heel pain [40]. The AOFAS scores are perhaps the most widely utilised tool for the assessment of outcomes in foot and ankle surgery. However criticism has been levelled at the AOFAS scores particularly concerning validity and only weak correlation with the SF-36 [44]. The AOFAS scales also places an unequal weighting against pain scores which account for 40% of the total score and combine both patient focused questions with clinically assessed outcomes such as range of motion, this introduces potential bias into the assessment of outcomes. More recently another patient administered outcome

measure has been introduced in the form of the Manchester Oxford rating scale (MOXFQ) [45,46]. The MOXFQ has been successfully tested for validity against the SF-36 and AOFAS scales. Unfortunately it has only been validated for use in hallux valgus surgery at this time. A practical benefit of the Manchester Oxford scale is that it only requires the patient to complete a single side of A4 paper rather than the extensive series of questions included in the FHSQ.

The ideal outcome measure for use in foot surgery should be patient focused with minimal clinician input, simple to complete and straight forward to analyse. The FHSQ and MOXFQ are both patient administered minimising clinician bias. Both have been further developed to incorporate the concept of minimally important differences [24,45]. The MOXFQ is shorter in its construction (16 questions compared to 29 for the FHSQ) and may therefore be more appealing to patients. The validation of the MOXFQ with specific reference to hallux valgus surgery is encouraging although further research applying the MOXFQ to the wider scope of foot surgery would be of value.

6. Conclusion

Day care surgery is an increasingly important treatment modality. Day care treatment is seen as cost effective by government and health service managers while patients are attracted to the same day discharge and the presumed rapid recovery. Patients also appreciate the choice of anaesthesia and the majority appear to prefer local anaesthesia when it is available.

Podiatric surgery is well placed to meet both the demands of government and patients in delivering a high quality, safe and efficient choice for patients requesting elective surgical treatment of foot deformity. This paper has demonstrated high levels of patient satisfaction, positive outcomes and few complications when foot surgery is undertaken by podiatric surgeons in the primary care setting.

Conflict of interest

None of the authors of the attached article gained any financial benefit or other reward through the production of this manuscript. The authors have no relationship with the manufacturers of any products described within the manuscript. No grants or external funding were sort or received.

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