Rheumatoid arthritis (RA) is a chronic, inflammatory disease that causes joint pain and swelling. It is a difficult entity to classify with no universally accepted aetiology. Foot orthoses are a common used intervention for pes planus, however, evidence to support their use is limited. There are no clinical guidelines for the prescription of foot orthoses for pes planus. The aim of the review was to develop expert opinion to base individual prescription choice on evidence from intrinsic, behavioural and environmental risk factors. The aim of the review was to determine the occurrence and risk factors for falls in people with RA. A four round Delphi consensus survey was performed involving 24 podiatrists to identify and better manage patients with increased falls risk.

Methods: A search was conducted during July and November 2012 using AMED, CINAHL, Medline, Scopus and Cochrane Library online databases. All articles were obtained from English-language peer reviewed scientific journals. To be eligible for the review a study had to include adults with RA and have falls as a primary or secondary outcome measure. Results: Ten articles were identified for review. Falls incidence, over a 12 month period, ranged between 27 and 50%. Six studies evaluated potential falls risk factors. Falls were associated with decreased walking speed and standing balance, increased disease activity, co-morbid conditions, medications and fall history. Foot deformity was evaluated in only one study and found not to be associated with falls in RA.

Conclusion: Falls in this already vulnerable group can be devastating and falls prevention is vital to the podiatric management of the RA patient. An awareness of the risk factors associated with falls in RA may help podiatrists to identify and better manage patients with increased falls risk.

ORAL PRESENTATIONS

O1 A Delphi consensus: prescribing functional foot orthoses for the symptomatic pes planus adult
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Background: Symptomatic (flexible) pes planus is a difficult entity to classify with no universally accepted aetiology. Foot orthoses are a commonly used intervention for pes planus, however, evidence to support their use is limited. Currently there are no clinical guidelines for the prescription of foot orthoses for pes planus. The aim of this study was to seek expert consensus and agreement on prescription paradigms for foot orthoses in the adult symptomatic pes planus population.

Methods: A four round Delphi consensus survey was performed involving 24 podiatric experts from clinical, academic and research backgrounds to establish prescription preferences for the rearfoot, midfoot, forefoot and accommodation variables specific to adult pes planus. Round 1 sought individual input with open ended questions (consensus). Rounds 2, 3 and 4 measured individual levels of agreement to statements generated from Round 1 (agreement). Consensus and agreement were pre-determined at 70%.

Results: Consensus was reached for a single variable (forefoot balance). Agreement was reached for 58 statements involving 25 variables including agreement on when to prescribe: inverted/neutral pour, inverted rearfoot posts, medial heel skives, minimal/standard maximum arch fill, medial flanges, forefoot posts and other common orthotic accommodations.

Conclusion: The 26 agreed prescription variables provide a systematically developed expert opinion to base individual prescription choice on future research involving foot orthoses for people with symptomatic pes planus and will aid in the development of prescription guidelines specific to this population.

O2 Occurrence and risk factors for falls in adults with rheumatoid arthritis: a systematic review
Angela Brenton-Rule1, Keith Rome2, Nicola Dabbeth3
1Health and Rehabilitation Research Institute, AUT University, Auckland, New Zealand; 2University of Auckland, Auckland, New Zealand

Background: Rheumatoid arthritis (RA) is a chronic, inflammatory disease characterised by progressive joint destruction. Foot involvement is common in RA and the podiatrist is an important member of the multidisciplinary healthcare team. People with RA, of all ages, experience frequent falls and may be at greater risk of falling than the non-RA population. Falls are complex, resulting from intrinsic, behavioural and environmental risk factors. The aim of the review was to determine the occurrence and risk factors for falls in people with RA.

Methods: A four round Delphi consensus survey was performed involving 24 podiatric experts from clinical, academic and research backgrounds to establish prescription preferences for the rearfoot, midfoot, forefoot and accommodation variables specific to adult pes planus. Round 1 sought individual input with open ended questions (consensus). Rounds 2, 3 and 4 measured individual levels of agreement to statements generated from Round 1 (agreement). Consensus and agreement were pre-determined at 70%.

Results: Consensus was reached for a single variable (forefoot balance). Agreement was reached for 58 statements involving 25 variables including agreement on when to prescribe: inverted/neutral pour, inverted rearfoot posts, medial heel skives, minimal/standard maximum arch fill, medial flanges, forefoot posts and other common orthotic accommodations.

Conclusion: The 26 agreed prescription variables provide a systematically developed expert opinion to base individual prescription choice on future research involving foot orthoses for people with symptomatic pes planus and will aid in the development of prescription guidelines specific to this population.

O3 Mechanism of effective orthotic therapy for the painful cavus foot
Bjoen Najafi1, James Wrobil2, Joshua Burns3
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Background: People who have extremely high-arched feet or pes cavus often suffer from substantial foot pain. Custom-made foot orthoses have been shown to be an effective treatment option, but their specificity is unclear. It is generally thought that one of the primary functions of custom foot orthoses is redistribution of abnormal plantar pressures. This study sought to identify variables associated with pain relief after custom foot orthoses intervention.

Methods: Demographic, physical characteristics and Pedar® in-shoe plantar pressure data from a randomised controlled trial of 154 participants with painful pes cavus were retrospectively re-analysed at baseline and three
month post orthoses intervention. The participants were randomised to a treatment group prescribed custom-made foot orthoses or a control group given sham orthoses.

**Results:** No relationship between change in pressure magnitude and change in symptoms was found in either group. While redistribution of plantar pressure, measured with the Dynamic Plantar Loading Index, had a significant effect on pain relief (p=0.03). Our final model predicted 73% of the variance in pain relief from custom foot orthoses and consisted of initial pain level, BMI, foot alignment, and changes in both Dynamic Plantar Loading Index and pressure-time integral. Results indicate that a primary function of effective orthotic therapy is redistribution of abnormal plantar pressures.

**Conclusion:** This study provides the mechanism by which custom-made foot orthoses reduce pain and disability in patients with painful pes cavus. The proposed model may assist in better designing and assessing orthotic therapy for pain relief in patients with a variety of painful foot disorders.

### Table 1 (abstract O5) Mean category values

<table>
<thead>
<tr>
<th>Category</th>
<th>Pre-</th>
<th>Post-</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effort/ Importance</td>
<td>29.9±3.9</td>
<td>28.8±5.6</td>
<td>.198</td>
</tr>
<tr>
<td>Pressure/ Tension</td>
<td>24±4.7</td>
<td>20.8±4.3</td>
<td>.002</td>
</tr>
</tbody>
</table>

again after a period of exposure to public clinics. Scores for each of these factors were calculated. Paired t-tests were undertaken on scores pre- and post- scalpel learning.

**Results:** 27 students were recruited, 21 from UniSA and 6 from QUT. The mean age of the cohort was 21.4 ± 2.98 years old. None of the students had used a scalpel previously. A mean period of 109 ± 54 days was held between implementation (3 clinics at UniSA and QUT).

**Conclusion:** The IMI determined that during teaching and subsequent use of scalpels students ‘perceived competence’ improved and ‘pressure-tension’ reduced. This tool may be used to evaluate the impact of differing teaching methods.

### O6

**The reliability of non-invasive neurological examinations in people with diabetes**

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**Background:** Pinprick perception, 128-Hz tuning fork vibration detection, ankle reflexes, vibration perception threshold (VPT) with a biothesiometer or similar instrument, and four site 10g monofilament assessment are all currently recommended methods for screening for diabetic peripheral neuropathy (DPN). However, there is limited research investigating the reliability of these tests. The aim of this study was to determine the inter- and intra-tester reliability of the five neurological tests currently recommended for screening for DPN.

**Methods:** All five recommended neurological examinations were performed by three clinicians on people with diabetes to determine inter-tester reliability. The tests were repeated by the same clinicians seven days later to determine intra-tester reliability.

**Results:** Fifty participants with diabetes were recruited to this study, 44 returned for the re-test. The inter-tester reliability of the VPT with the neurothesiometer was substantial (K: 0.52-0.78), monofilament test was moderate (K: 0.34-0.67), and the pinprick and ankle reflex examinations was fair (K: 0.15-0.32 and 0.09-0.62 respectively). The inter-tester reliability of the neurothesiometer and monofilament was substantial (K: 0.61 respectively), the pinprick examination moderate (K: 0.52) and ankle reflex examination slight (K: 0.12). The reliability of the vibration perception examination using the 128-Hz tuning fork could not be calculated due to all participants recording an abnormal result.

**Conclusion:** For the purposes of clinical screening and ongoing monitoring of DPN the four site 10g monofilament test and the vibration perception threshold examination using the neurothesiometer are the most reliable of the recommended screening examination for people with diabetic peripheral neuropathy (DPN).

### O7

**Evaluating the impact of high risk foot training on undergraduate podiatry students**

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**Background:** Performance in learning has been linked to a number of factors, including trait-like differences and state-like individual differences such as self-efficacy and anxiety. The aims of this study were to identify the initial level of self-efficacy, motivation and anxiety experienced by students regarding learning scalpel technique and then to identify how this may change following a period of learning.

**Methods:** Participants were recruited from the 2nd year cohorts at the University of SA (UniSA) and Queensland University of Technology (QUT). The Intrinsic Motivation Inventory (IMI) was used to evaluate ‘perceived competence’, ‘effort’ and ‘pressure-tension’ associated with scalpel use. This was implemented prior to students learning scalpel use and then
Background: Diabetes is the leading cause of high risk foot (HRF) complications, admissions and lower limb amputation. Best practice training of podiatrists is known to have a beneficial impact on such outcomes; however, there has been a paucity of studies into undergraduate diabetes podiatry training. The primary aim of this paper was to investigate the changes in final year podiatry students’ confidence, knowledge and clinical practice in the management of HRF complications.

Methods: This was a prospective longitudinal study of final year podiatry students (n=25) at the Queensland University of Technology. All participants throughout 2011 undertook an intervention of a series of “hands on” HRF workshops, on-campus clinics and external clinical rotations. Outcome measures included customised confidence and knowledge surveys in HRF management across four time points. A timed simulated case scenario was used to evaluate changes in clinical practice at two time points. Friedman and Wilcoxon Signed Rank Tests were used to calculate differences between time points.

Results: Overall improvements between the first and last time points were demonstrated in 20/21 confidence items (p<0.001), 12/27 clinical practice items (p<0.05) and 3/12 knowledge items (p<0.001). Although 8/12 knowledge items recorded high baseline scores of over 80%.

Conclusions: Overall, it appears student confidence and clinical practice improved with the introduction of designated HRF activities, whilst knowledge remained high. This suggests “hands on” practice and not didactic lectures improve students’ clinical confidence and practice. Results from the 2012 student cohort will also be presented at this conference.

O8 Effectiveness of trigger point dry needling for plantar heel pain: a randomized controlled trial
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Background: Plantar heel pain (plantar fasciitis) can be managed with myofascial trigger point dry needling of myofascial trigger points, however there is only poor quality evidence supporting its use. Therefore, we aimed to evaluate the effectiveness of trigger point dry needling for plantar heel pain.

Methods: 84 participants with plantar heel pain were randomized to real or sham trigger point dry needling. The intervention consisted of one treatment per week for six weeks. Participants were followed for 12 weeks. Primary outcome measures included ‘first-step pain’ measured with a Visual Analogue Scale and foot pain measured with the pain subscale of the Foot Health Status Questionnaire. The primary end-point for predicting the effectiveness of dry needling for plantar heel pain was six weeks.

Results: At the primary end-point, significant effects favored real dry needling over sham dry needling for pain (adjusted mean difference: VAS first-step pain -14.4 mm, 95% CI -23.5 to -5.2, p=0.002; FHSQ foot pain 10.0 points, 95% CI 1.0 to 19.1, p=0.029), although the between-group difference was lower than the minimal important difference. The frequency of minor transitory adverse events was significantly greater in the real dry needling group (70 real dry needling appointments [32%] compared with only 1 sham dry needling appointment [<1%].

Conclusion: We found that dry needling provided statistically significant improvements in plantar heel pain, but the magnitude of this effect should be considered against the frequency of minor transitory adverse events.

O9 Understanding the physical activity promotion behaviours of podiatrists: a qualitative study
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Journal of Foot and Ankle Research 2013, 6(Suppl 1):O9

Background: Health professionals are encouraged to play a part in reducing health risks of physical inactivity. Little is known about the factors associated with podiatrists incorporating physical activity promotion into clinical practice.

Methods: We performed 20 semi-structured interviews with purposefully selected podiatrists to explore their physical activity promotion attitudes, beliefs, knowledge and practice. Transcribed interviews were coded using an iterative thematic approach to identify major themes and salient beliefs.

Results: Overall podiatrists had a positive attitude to physical activity promotion considering it a normal part of their role. They saw their role as giving information, encouraging activity and making recommendations, however in practice, were more inclined to follow up on recommendations, monitor activity levels or document the process. Their approach was generally opportunistic, informal and un-structured and the content of assessment and promotion dependent upon the presenting patient’s condition. Advice tended to be tailored to the patient’s capabilities and interests. They considered there are opportunities to promote physical activity during regular consultations however there were more likely to do so in patients with chronic diseases such as diabetes. Main barriers to physical activity promotion included unresponsive and unmotivated patients as well as a lack of time, skills and resources.

Conclusion: Physical activity promotion appears feasible in podiatry practice in terms of opportunity and acceptability to practitioners, but there is scope for improvement. Strategies to be employed need to consider the major issues, barriers and opportunities as well as a more structured approach to physical activity promotion by podiatrists.

O10 Footwear selection in an elderly population in relation to falls
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Background: The NHMRC Partnership Project “Evidence based targeting of state wide strategies for preventing falls among community dwelling older people in Victoria” is a five component project examining the uptake of falls prevention strategies to better understand issues that might impact on the health and well-being of older adults in our community. From this data, information regarding drivers of footwear selection was determined that is the focus of this study.

Methods: Cross-sectional population based telephone survey of 394 men and women 70 years and over living in the community in Victoria. The survey was conducted over December 2010 to January 2011 and in a second wave between January 2012 to March 2012. Questions were asked regarding footwear worn indoors and outdoors and the reasons for this selection.

Results: The choice of footwear worn indoors was overwhelmingly enclosed slippers with comfort as the reason for this selection. The outdoor footwear of choice was walking shoes with comfort once again the main driver for selection.

Conclusion: Understanding footwear selection of the elderly may assist health care providers when recommending falls strategies for this at risk population.

O11 High risk feet in subacute rehabilitation facilities: how many are there?
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1Brighton Health Campus & Services, Metro North Hospital and Health Service, Queensland Health, Brisbane, Queensland, 4017, Australia; 2Department of Podiatry, Metro North Hospital and Health Service, Queensland Health, Brisbane, Queensland, 4032, Australia; 3Allied Health Research Collaborative, Metro North Hospital and Health Service, Queensland Health, Brisbane, Queensland, 4032, Australia; 4School of Clinical Sciences, Queensland University of Technology, Brisbane, Queensland, 4059, Australia; 5Behavioural Basis of Health, Griffith Health Institute, Griffith University, Brisbane, Queensland, 4122, Australia

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Journal of Foot and Ankle Research 2013, 6(Suppl 1):O11
Background: Australian subacute rehabilitation facilities face significant challenges from the ageing population with increased burden of chronic disease. High risk foot complications are a negative consequence of many chronic diseases. With the rapid expansion of subacute services, it seems imperative to investigate the prevalence of foot complications in this population. The primary aim of this study was to quantify the high risk foot complication prevalence in a subacute rehabilitation population.

Methods: Eligible participants were all adults admitted overnight, over two 4 week periods, into a large Australian subacute rehabilitation facility. Consenting participants underwent a short non-invasive foot examination by a podiatrist. The standard Queensland Health High Risk Foot Form collected data on age, sex, co-morbidities and foot complications. Descriptive statistics, logistic regression and odds ratios were used to determine the prevalence of foot complications and associations with explanatory variables.

Results: Overall, 85 of 97 eligible participants consented; mean age 80(9) and 71% were female. At least one foot complication was present in 56.5% participants; including 21.2% defined as high risk and 11.8% current foot ulcer. A previous diagnosis of neuropathy increased the risk of presenting with a high risk foot by 13-fold (OR 13.504, p = 0.001).

Conclusion: This study highlights the significance of foot complications in the subacute population. It appears that one in every two patients present with a foot complication and one in eight with a foot ulcer. It is suggested all patients admitted to subacute rehabilitation services should be screened for foot complications.

Prevalence and characteristics of diabetic foot ulcerations in Western Sydney

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1Arthritis and Musculoskeletal Research Group, The University of Sydney, Sydney, NSW, 2137, Australia; 2Foot Wound Clinic, Department of Surgery, The University of Sydney, Westmead Hospital, NSW, 2145, Australia

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Journal of Foot and Ankle Research 2013, 6(Suppl 1):O13

Background: Patients with diabetes are at high risk of developing foot ulcerations that can develop into non-healing wounds. Recent studies suggest that the lifetime risk of developing a diabetic foot ulcer is as...
high as 25%. The aim of this study was to determine the prevalence and characteristics of diabetic foot ulcerations (DFUs) at the Foot Wound Clinic at Westmead Hospital.

**Methods:** In 2011, 318 patients were extracted for analysis from the Westmead Hospital Foot Wound Database on new diabetic foot ulcerations. Data on demographics, socio-economic, co-morbidities, foot ulcer characteristics and treatment were recorded on a standardised form adapted from the Eurodiale studies. Patients with Type 2 DM and Type 1 DM in outpatient clinics were included in the study.

**Results:** In total, 74.5% of patients were diabetic. Demographics of diabetic foot ulcerations were: male (66.2%), mean age 67 years (range: 19-95 years), low socio-economic status (mean ABS postcode score 969. SD 119). DFU characteristics were: cross sectional area of 684.1 mm², volume of 6.3 cm³, 33% on the forefront, 67.9% acute and 12.3% chronic. The University of Texas (U/T) foot classification was category 6: the ischaemic limb (61.5%); category 4A: neuropathic wounds (34.6%) and others (3.9%). Predominant U/T wound types: 29.4% 1A and 12.8% 1C.

**Conclusion:** Diabetic foot ulcers are prevalent in Western Sydney and are more likely to affect older males from a lower socioeconomic background. Understanding the other factors related to diabetic foot ulcers will assist the podiatrist in providing a more targeted management plan.

**O14 Things that go bump in the night: searching for therapeutic targets and underlying mechanisms of night-time calf cramps**

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**Journal of Foot and Ankle Research 2013, 6(Suppl 1):O14**

**Background:** Night-time calf muscle cramps are highly prevalent and painful, yet the underlying mechanism is poorly understood and no treatment has shown consistent efficacy or safety. The aim of this study was to identify factors associated with night-time calf cramping in adults.

**Methods:** 160 adults were recruited the Greater Newcastle and Central Coast regions of New South Wales, Australia; 80 who experienced night-time calf cramp at least once per week and 80 age- and sex-matched adults who did not. Participants were assessed using reliable tests of foot/ankle and toe strength, range of ankle dorsiflexion, hamstring flexibility, foot alignment, calf circumference, peripheral circulation and sensation. Participants also completed a bespoke survey examining health and lifestyle factors, diet, exercise, lower limb symptoms, sleeping habits and footwear characteristics.

**Results:** Presence of night-time calf muscle cramps was significantly correlated with weakness of foot and ankle inversion, eversion, dorsiflexion and plantarflexion; weakness of toe grip; restricted hamstring flexibility; lower limb tingling sensations; muscle twitching, and coldness of legs or feet. Multivariate logistic regression identified three factors independently associated with night-time calf muscle cramps: muscle twitching (OR 4.6; 95%CI: 1.6 to 15.5; p=0.01), lower limb tingling (OR 4.1; 95%CI: 1.6 to 10.3; p=0.003) and foot dorsiflexion weakness (OR 1.02; 95%CI: 1.01 to 1.03; p=0.002), which represented other measures of lower limb weakness in the model.

**Conclusion:** Night-time calf muscle cramps were associated with markers of neurological dysfunction and potential musculoskeletal therapeutic targets.

**O15 Clinical practice guidelines for the foot and ankle in rheumatoid arthritis: a critical appraisal**

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**Journal of Foot and Ankle Research 2013, 6(Suppl 1):O15**

**Background:** Clinical practice guidelines are recommendations systematically developed to assist clinical decision-making and inform healthcare. Many rheumatoid arthritis (RA) management guidelines are available. However, these guidelines under-represent the foot and ankle, even though foot and ankle problems are common. Guidelines must be high quality to be beneficial. This study aimed to identify and critically appraise clinical practice guidelines for foot and ankle management in RA.

**Methods:** Guidelines were identified electronically and through hand searching. Search terms ‘rheumatoid arthritis’, ‘clinical practice guidelines’ and related synonyms were used. Foot and ankle search terms were excluded, to ensure guidelines meeting the inclusion criteria were not precluded if foot and ankle management was not mentioned in the title or keywords. Critical appraisal and quality rating were conducted using the Appraisal of Guidelines for Research and Evaluation (AGREE) II instrument.

**Results:** Twenty-two guidelines were included. Five guidelines were high quality and recommended for use. Five high quality and six low quality guidelines were recommended for use with modifications. Six low quality guidelines were not recommended for use. Two guidelines were foot and ankle specific. Five early and eleven established RA guidelines were recommended for use. Five recommendation domains were identified in early and established RA guidelines. These were multidisciplinary team care, foot healthcare access, foot health assessment/review, orthoses/insoles/splints, and therapeutic footwear. Established RA guidelines also had an ‘other treatments’ domain.

**Conclusions:** Foot and ankle management for RA feature in most widely published clinical practice guidelines. Unfortunately, supporting evidence is low quality. Agreement levels are predominantly ‘expert opinion’ or ‘good clinical practice’. Clinical practice guidelines require better underpinning by high quality research evidence. Clinical relevance: Identification of recommendations from high quality guidelines for podiatric care of RA related foot and ankle issues.

**O16 Podiatry care in rheumatoid arthritis: differences between current and ideal service provision**

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**Journal of Foot and Ankle Research 2013, 6(Suppl 1):O16**

**Background:** Foot and ankle involvement in rheumatoid arthritis (RA) is common, impacting negatively on quality of life. Stakeholder perceptions of podiatric service provision are unknown. Given the importance of specialist podiatry care, this knowledge would be beneficial. This study explored opinions of people with RA and podiatrists regarding current and ideal podiatry care in NHS Scotland.

**Methods:** Two focus groups were conducted with participants from five NHS Health Boards in Scotland. One focus group involved people with RA who previously received podiatry care, and the other, podiatrists who treat people with RA. The Framework approach was used to identify core concepts and associated themes.

**Results:** Five people with RA (all female) with mean ± SD age of 53.6 ± 6.6 years and disease duration 15 ± 11 years participated in the first focus group. The average duration of podiatry care was 7 years (range 3-15). Six rheumatologist specialist podiatrists participated in the second focus group. Both groups identified similar issues with current care and steps that could be taken to achieve ideal service provision. ’Access to health care services’ (core concept one) had associated themes of ‘access facilitated’ and ‘access inhibited’. ‘Tailored podiatry service for the complex needs of people with RA’ (core concept two) had associated themes of ‘podiatry service location’, ‘profile of podiatry’, ‘foot health interventions’, ‘podiatrist skills’, and ‘service review’. ‘Tailored service’ also emerged from the podiatrist focus group.

**Conclusions:** Podiatry care was regarded as a positive and important part of overall care for people with RA. However, more integrated specialist services with moves towards a national model of care may be beneficial. Participating podiatrists widely endorsed these themes. Greater concurrence...
between stakeholders could lead to more flexible and accessible services better meeting patient need.

O17

Tibiofemoral kinematics: the effect of footwear and foot orthoses during running
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Journal of Foot and Ankle Research 2013, 6(Suppl 1):O17

Background: The knee is the most common site of running related injuries (42.1% of all injuries). Orthoses are thought to manage knee pain by reducing internal tibial rotation as the subtalar joint pronates. However, the influence of the footwear that orthoses are placed in is often ignored. This study aimed to determine the immediate effects of footwear and foot orthoses on transverse plane rotation of the tibiofemoral joint during the stance phase of running.

Methods: An experimental, within subjects, repeated measures design was used. Three-dimensional tibiofemoral kinematics were estimated in the transverse plane by surface-mounted markers as asymptomatic participants (n = 14) ran in four randomised conditions; neutral shoe, neutral shoe with customised orthoses, neutral shoe with prefabricated orthoses, and a stability shoe. Peak internal/external rotation joint angles and ranges of motion (ROM) during landing response, midstance and propulsion were determined. Immediate subjective comfort was also recorded.

Results: Significant main effects of condition were observed for all outcomes except tibiofemoral ROM during landing response (P < 0.05). All significant differences occurred between the stability shoe and another condition, with less tibiofemoral internal rotation in the stability shoe (mean difference ranged between 1.7° - 6.1°) (P < 0.05). The neutral shoe with prefabricated orthoses was reported as more uncomfortable than all other conditions.

Conclusion: The stability shoe reduced peak tibiofemoral internal rotation throughout stance phase of running more than any other condition. Importantly, it was as comfortable as the other conditions. These results identify the ability for footwear alone to induce proximal kinematic effects.

O18

Plantar heel pain: an update of its aetiology and diagnosis
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Journal of Foot and Ankle Research 2013, 6(Suppl 1):O18

Plantar heel pain/plantar fasciitis is one of the most common musculoskeletal complaints and the most frequent cause of heel pain. This presentation reviews some of the more recent important findings to update practitioners on the aetiology and diagnosis of plantar heel pain.

A critical, narrative review of key findings from recent research that our research group and other investigators have conducted relating to plantar heel pain.

Two main issues of interest have recently been investigated, including the role of heel spurs and diagnostic imaging. Firstly, recent research indicates that heel spurs – once thought to be an incidental, painless finding – may have a greater role in causing symptoms than previously thought. Secondly, medical imaging has an increasingly important role in the diagnosis of plantar heel pain, and has furthered our understanding of its aetiology. For example, recent power Doppler research that we have conducted revealed a vascular component to plantar fasciitis. These insights question what we know about plantar heel pain, and may have implications for how we manage the condition.

There has been much recent advancement in what we know about plantar heel pain, including the role of plantar heel spurs and the findings from diagnostic imaging. While these advancements have helped in our understanding of this common condition, there is still more research needed to unravel exactly what it is.

O19

Comparison of the pressure-relieving properties of various types of foot orthoses in people with forefoot pain
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Journal of Foot and Ankle Research 2013, 6(Suppl 1):O19

Background: Plantar foot pain is commonly experienced by older people and it is often treated with foot orthoses. However, studies have reported inconsistent results for the effectiveness of different pads on plantar pressure reduction, and optimum pad placement is still not clear. The aim of this study was to compare the effects of different footpads on plantar pressures under the forefoot in older people with forefoot pain.

Methods: Thirty-seven adults with current or previous forefoot pain and a mean age of 73.5 (SD 4.8) participated. In-shoe footpad plantar pressure data were recorded using the pedar®-X while participants walked along an 8 m walkway wearing a standardised shoe and four different forefoot padding conditions; (i) metatarsal dome positioned 10 mm proximal to the metatarsal heads, (ii) metatarsal dome positioned 5 mm distal to the metatarsal heads, (iii) metatarsal bar, and (iv) plantar cover.

Results: Compared to the shoe-only condition, each of the forefoot pads significantly reduced forefoot peak pressure and maximum force. The plantar cover and the metatarsal dome positioned 5 mm distal to the metatarsal heads were most effective in reducing peak pressure (19%, p<0.001 and 18%, p<0.001, respectively).

Conclusion: These findings indicate that footpads are effective in reducing forefoot pressures in older people with forefoot pain, and that the fore/aft position of the pad relative to the metatarsal heads may be more important than the shape of the pad.

O20

Reduction in the incidence of diabetes lower extremity amputations in Queensland: 2005-2010
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Background: Lower extremity amputation is a common end stage complication among people with diabetes. Since 2006, the Queensland Diabetes Clinical Network has implemented programs aimed at reducing diabetes-related amputations. The aim of this retrospective observational study was to determine the incidence of diabetes lower extremity amputations in Queensland from 2005 to 2010.

Methods: Data on all Queensland diabetes-related lower extremity amputation admissions from 2005-2010 was obtained using diabetes amputation-related ICD-10-AM (hospital discharge) codes. Queensland diabetes amputation incidences were calculated for both general and diabetes populations using population data from the Australian Bureau of
Overall, 4,443 admissions for diabetes-related amputation occurred; 32% (1,434) were major amputations. The diabetes-related amputation incidence among the general population (per 100,000) reduced by 18% (18.2 in 2005, to 15.0 in 2010, p < 0.001); major amputations decreased by 24% (6.6 to 4.7, p < 0.001). The incidence among the diabetes population (per 1,000) reduced by 40% (6.7 in 2005, to 4.0 in 2010, p < 0.001); major amputations decreased by 45% (2.3 to 1.2, p < 0.001).

Conclusion: This paper appears to be the first to report a significant reduction in diabetes amputation incidence in an Australian state. This decrease has coincided with the implementation of several diabetes foot clinical programs throughout Queensland. Whilst these results are encouraging in the Australian context, further efforts are required to decrease to levels reported internationally.

O21 Queensland’s high risk foot database: tracking the length and width of Queensland’s foot ulcers

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Methods: Data on all foot ulcer patients registered with a Queensland High Risk Foot Form (QHRFF) were collected at their first consult in 2012. Data is automatically extracted from each QHRFF into a Queensland high risk foot database. Descriptive statistics display age, sex, ulcer types and co-morbidities. Statewide clinical indicators of foot ulcer management are also reported.

Results: Overall, 2,034 people were presented with a foot ulcer in 2012. Mean age was 63(±17) years and 67.8% were male. Co-morbidities included 85% had diabetes, 49.7% hypertension, 39.2% dyslipidaemia, 25.6% cardiovascular disease, 13.7% kidney disease and 12.2% smoking. Foot ulcer types included 51.6% neuropathic, 17.8% neuro-ischaemic, 7.2% ischaemic, 6.6% post-surgical and 16.8% other; whilst 31% were infected. Clinical indicator results revealed 98% had their wound categorised, 51% received non-removable offloading, median ulcer healing time was 6-weeks and 37% had ulcer recurrence.

Conclusion: This paper details the largest foot ulcer database reported in Australia. People presenting with foot ulcers appear predominantly older, male with several co-morbidities. Encouragingly it appears most patients are receiving best practice care. These results may be a factor in the significant reduction of Queensland diabetes foot-related hospitalisations and amputations recently reported.

O22 Foot ulcer simulation training (FUST): are podiatrists FUST with long-term clinical confidence?

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Methods: Participants were podiatrists attending a two-day FUST course comprising web-based interactive learning, low-fidelity part-tasks and high-fidelity full clinical scenarios. Participants were all required to complete the Foot Ulcer Simulation Training (FUST) program. Participants were provided with a live patient scenario with which they were required to complete a non-removable offloading and follow-up. Participants were able to self-complete a QHRFF and submit this electronically for assessment.

Results: Thirty-four participants completed FUST. Survey response rates were 100% (pre), 82% (post), 74% (6-month post) and 47% (12-month post). Overall mean scores were 3.13 (pre), 4.49 (post), 4.35 (6-month post) and 4.30 (12-month post) (p < 0.05); post hoc tests indicated no differences between the immediately, 6-month and 12-month post group scores (p > 0.05). Satisfaction, knowledge, relevance and fidelity were also investigated. ANOVA and post hoc tests were used to test any differences between groups.

Conclusion: This study suggests that significant short-term improvements in self-confidence to manage foot ulcers via simulation training are retained over the longer term. It is likely that improved self-confidence leads to improved foot ulcer clinical practice and outcomes; although this requires further research.

O23 Is the clinical Queensland High Risk Foot Form valid or reliable for research?

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Background: High-risk foot complications such as neuropathy, ischaemia, deformity, infections, ulcers and amputations consume considerable health care resources and typically result from chronic diseases. This study aimed to develop and test the validity and reliability of a Queensland High Risk Foot Form (QHRFF) tool.

Methods: Phase one involved developing a QHRFF using an existing diabetes high-risk foot tool, literature search, expert panel and several state-wide stakeholder groups. Phase two tested the criterion-related validity along with inter- and intra-rater reliability of the final QHRFF. Three cohorts of patients (n = 94) and four clinicians, representing different levels of expertise, were recruited. Validity was determined by calculating...
sensitivity, specificity and positive predictive values (PPV). Kappa and intra-class correlation (ICC) statistics were used to establish reliability.

Results: A QRHF tool containing 46-items across seven domains was developed and endorsed. The majority of QRHF items achieved moderate-to-perfect validity (PPV = 0.71 – 1) and reliability (Kappa/ICC = 0.41 – 1). Items with weak validity and/or reliability included those identifying health professionals previously attending the patient, other (non-listed) co-morbidity, previous foot ulcer, foot deformity, optimum offloading and optimum footwear.

Conclusions: The QRHF had moderate-to-perfect validity and reliability across the majority of items, particularly identifying individual co-morbidities and foot complications. Items with weak validity or reliability need to be re-defined or removed. Overall, the QRHF appears to be a valid and reliable tool to assess, collect and measure clinical data pertaining to high-risk foot complications for clinical or research purposes.

O24

Is foot ulcer simulation training (FUST) really effective? Participants’ supervisors speak out

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Background: Foot ulcers are a common reason for diabetes-related hospitalisation. Foot ulcer simulation training (FUST) programs have increased podiatry participants self-confidence to manage foot ulcers. However, supervisors’ perspectives on their participants attending these simulation programs have not been investigated. This mixed method (quantitative and qualitative) study aimed to investigate home clinical supervisors’ perspectives on any changes to their participants’ competence and practice following FUST.

Methods: Clinical supervisors of fifteen podiatrists, who participated in a two-day Foot Ulcer Simulation Training (FUST) course, were recruited. Supervisors completed quantitative surveys evaluating their participants’ foot ulcer competence pre-FUST and 6-months post-FUST, via a purposed designed 21-item survey using a five-point Likert scale (1=Very limited, 5=Highly competent). Supervisors also attended a semi-structured qualitative group interview to investigate supervisors’ perspectives on FUST.

Results: Supervisors surveys returned were pre-FUST (n=10) and post-FUST (n=12). Significant competence improvements were observed at the 6-month survey (mean scores 2.84 cf. 3.72, p < 0.05). Five supervisors attended the group interview. Five sub-themes emerged: i) FUST provided a good foundation for future learning, ii) FUST modelled good clinical behaviour, iii) clinical practice improvement was evident in most participants, iv) clinical improvements were dependent on participant’s willingness to change and existing workplace culture, v) FUST needs to be reinforced back in the home clinic.

Conclusion: Overall, supervisors of FUST participants indicated that the course improved their participants’ competence and clinical practice. However, the degree of improvement appears dependant on the participants’ home workplace culture and willingness to embrace change.

O25

Australia’s ‘silent pandemic’ of diabetes complications: where do feet stand in this pandemic?

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Background: Diabetes is Australia’s leading cause of kidney failure, blindness (under 60yo), and amputation, plus, causes significant cardiovascular disease. Australia’s diabetes amputation rate has increased by 30% in the last decade and is one of the worst in the developed world, yet other Australian diabetes complication outcomes have improved. This paper aims to compare the national burden of disease for the four major diabetes-related complications and the availability of government funding to combat these complications, in order to determine where diabetes foot disease ranks in Australia.

Methods: Electronic databases, government and health websites were searched for papers (1995 – 2012) reporting Australian national diabetes-related complication numbers, incidence or prevalence rates, burden of disease, economic costs and program funding. Publications reviewed included epidemiological, health economic, evidence-based guidelines, government, Medicare and Pharmaceutical Benefits Scheme reports.

Results: Foot disease ranked second in numbers affected, deaths, cost per episode and overall burden of disease of the four diabetes complications in Australia. However, 50% of the national evidence-based diabetic foot disease guideline recommendations are funded via Medicare, compared to 100% of other national diabetes complication guideline recommendations. Furthermore, foot disease ranked last for additional program funding.

Conclusions: Findings suggest foot disease is the second leading cause of burden of disease, yet receives the least available government funding of the four major diabetes complications in Australia. This low level of clinical funding may be a major factor in Australia’s poor end stage foot outcomes (amputation rates) compared to other diabetes end stage outcomes.

O26

Dying feet in ICU: why might extracorporeal membrane oxygenation machines cause necrotic feet?

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Background: Extracorporeal membrane oxygenation (ECMO) is used for severe lung and/or heart failure in intensive care units (ICU). The Prince Charles Hospital (TPCH) has one of the largest ECMO units in Australia. Its use rapidly increased during the H1N1 (“swine flu”) pandemic and an increase in pedal complications resulted. The relationship between ECMO and pedal complications has been described, particularly in children, though no strong data exists. This paper presents a case series of foot complications in patients having received ECMO treatment.

Methods: We present nine cases of severe foot complications resulting from patients receiving ECMO treatment at TPCH in 2009–2012.

Results: Case ages ranged from 16 - 58 years and three were male. Six cases had an unremarkable medical history prior to H1N1 or H1N2 infection, one had Cardiomyopathy, one had received a lung transplant, and one had multi-organ failure post-sepsis. Common medications prescribed included vasopressors, antibiotics, and sedatives. All cases showed signs of markedly impaired peripheral perfusion whilst on ECMO and seven developed increasing areas of foot necrosis. Outcomes include two bilateral below knee amputations, two multiple digital amputations, one Reflex Sympathetic Dystrophy Syndrome, three pressure injuries, and three deaths.

Conclusion: Necrosis of the feet appears to occur more readily in younger people requiring ECMO treatment than others in ICU. The authors are conducting further studies to investigate associations between particular infections, medical history, medications, or machine techniques and severe
foot complications. Some of these early results will also be presented at this conference.

O27 Foot posture, foot function and low back pain: the Framingham Foot Study
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Background: Low back pain is a highly prevalent problem world-wide. Abnormal foot posture and function have been proposed as possible risk factors for low back pain, but this has not been explored in detail.

Methods: Data were collected on 1,930 members of the Framingham Study who completed the foot examination in 2002–2005. Low back pain, aching or stiffness on most days was documented on a body chart. Foot posture and foot function were evaluated using the Tekscan MatScan® system. Foot posture was categorized as normal, planus or cavus using static weightbearing measurements of the arch index. Foot function was categorized as normal, pronated or supinated using the center of pressure excursion index derived from dynamic foot pressure measurements. Asymmetry in foot posture and foot function was also determined. Sex-specific multivariate logistic regression models were used to examine the associations of foot posture, foot function and asymmetry with low back pain, adjusting for relevant confounding variables.

Results: Low back pain was reported by 661 (34%) participants, including 404 (37%) women and 257 (30%) men. Foot posture showed no association with low back pain. However, pronated foot function was significantly associated with low back pain in women (odds ratio [OR] = 1.51, 95% confidence interval [CI] 1.1 to 2.07, P=0.011) and this association remained significant after adjusting for age, weight, smoking and depressive symptoms (OR = 1.48, 95% CI 1.07 to 2.05, P=0.018). Asymmetry in foot posture or foot function was not significantly associated with low back pain.

Conclusion: This is the first population-based study to examine the associations of foot posture and function with low back pain using objective biomechanical measurements. The findings suggest that pronated foot function may contribute to the development of low back symptoms in women. Interventions which modify abnormal foot function, such as foot orthoses, may therefore have a role in the prevention and treatment of low back pain.

O28 Assessment of depression in people with diabetes attending outpatient clinics for the treatment of foot ulceration
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Background: People with diabetes and foot ulceration experience more depressed mood particularly when healing does not occur after prolonged treatment. Those who have depression and diabetes have poorer adherence to self-care or treatment regimes, poor glycaemic control along with a greater risk of diabetes related complications and mortality. Screening for depression has been shown to be effective in determining the severity of depression as well as the type of treatment required.

Methods: The study required participants to complete a validated self-reporting 9 item Patient Health Questionnaire (PHQ) that provides a diagnosis of major depressive syndrome and continuous severity score. Participants were classified in the depressed category if they had PHQ score ≥5. Group differences were examined using chi-square for categorical variables and t-tests for continuous variables.

Results: A higher proportion of participants had diabetes for >10 years, however no other demographic variables were associated with depression. Of the 60 participants, 31 (51.7%) were categorised as depressed, with 10 (17%) having had a prior diagnosis of depression and 21 (35%) participants had unrecognised cases of depression.

Conclusion: This study demonstrated the prevalence of depression in people with diabetes and the often hidden impact it has in managing diabetes foot ulceration.

O29 Are gait parameters altered in adults with hallux valgus?
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Background: Gait parameters such as excessive pronation have been suggested as contributing to the development of hallux valgus (HV). HV has also been linked to functional disability in older adults. However, the literature investigating gait parameters in HV has not previously been systematically evaluated.

Methods: A systematic review was conducted, searching electronic databases to October 2011. Cross-sectional studies with clearly defined HV and non-HV groups were included. Two investigators rated papers for methodological quality. Effect sizes (95% confidence intervals [CI]) were calculated as standardized mean differences (SMD) for continuous data and risk ratios (RR) for dichotomous data.

Results: Nine papers were included (total n = 589). One study showed that during terminal stance HV participants had reduced ankle dorsiflexion (SMD = -0.81, CI: -1.44 to -0.18) and less rearfoot supination (SMD = -0.63, -1.25 to -0.01) compared to controls. In another study HV participants showed early onset of intrinsic muscle activity (RR 1.6, 1.1 to 2.2). Four studies investigating spatio-temporal parameters found no significant differences between groups, although one study found reduced speed (SMD -0.73), step length (SMD -0.66 to -0.59) and less stable gait patterns (SMD -0.86 to -0.78) in older adults with moderate to severe HV. Six studies investigated plantar pressures with inconsistent findings.

Conclusion: Altered gait kinematics and muscle activity are apparent in HV, and these parameters warrant further investigation. Although conclusions regarding causality cannot be drawn from cross-sectional studies, interventions targeting these parameters may improve clinical outcomes in HV.

O30 Functional outcomes characterising mild, moderate and severe hallux valgus
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Background: Previous studies investigating functional performance and plantar pressures in HV have reported inconsistent findings. This study investigated functional performance, muscle strength and plantar pressures in otherwise healthy adults with mild, moderate and severe HV compared to controls.

Methods: Sixty adults with HV and 30 controls participated. Functional measures included: hallux muscle strength, walking performance, postural sway and forefoot plantar pressures. Cluster analysis was used to classify HV subjects as mild, moderate or severe based on radiographic HV angle. Multiple analysis of covariance and pairwise comparisons (P<0.05,
Bonferroni adjustment) were used to investigate differences between groups, adjusting for age, gender, body mass index and foot pain.

**Results:** In those with moderate and severe HV, we found reduced hallux plantarflexion (mean differences (MDs) -50.1N to -45.8N) and abduction strength (MDs -12.3N to -11.2N) compared to controls (P<0.001). A significant reduction in hallux peak pressure (PP) and pressure-time integral (PTI) was evident in moderate HV (MD: PP -90.8kPa; PTI -18.3kPa*s) and severe HV (MD: PP -106.3kPa; PTI -24.4kPa*s) compared to controls (P<0.001). Those with severe HV demonstrated increased mediolateral postural sway in single leg stance compared to controls (MD 3.5cm, P=0.01). There were no significant differences in walking performance across groups (P>0.05).

**Conclusion:** Adults with moderate to severe HV may have reduced hallux plantar pressures and muscle strength, whereas those with mild HV appear to function similarly to controls on these parameters. It is important to consider severity of deformity in HV, and target interventions towards specific functional deficits.

**O31**

**From Noordwijkerhout to Bendigo: lessons learnt in developing a high risk foot clinic in regional Australia**

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**Background:** In 2003 a podiatrist from Bendigo Health attended the 4th International Symposium of the Diabetic Foot in Noordwijkerhout, the Netherlands. Since then the regionally-based, outpatient, multidisciplinary Diabetic Foot Clinic (DFC) was developed.

**Methods:** On establishment, the overarching goal of the DFC was to provide the best evidence-based care possible to those at the highest risk of developing diabetes-related foot problems in the region. To achieve this, the DFC undertook a ten-year process of continual quality improvement activities that included a series of retrospective clinical audits. This paper describes the results of these audits.

**Results:** The DFC has a staffing profile similar to that of an intermediate model high-risk foot clinic (IDF 2005). The proportion of patients classified as high risk has significantly increased from 43% in 2003 to 91% in 2012. The number of wounds managed in the DFC has more than doubled, and wound healing rates have improved from an average of 110 (SD 102) days in 2003 to 71 (SD 73) days in 2012. The DFC has also developed an important leadership role in promoting the use of evidence-based practice in the region.

**Conclusion:** The DFC is a modest high-risk foot clinic that has vigilantly collected clinical data to inform clinical practice and service planning. Despite weaknesses in acute care, the DFC is achieving excellent outpatient clinical outcomes. This reporting of ten years of experience by the DFC may provide valuable information to other health services that aim to improve the foot-health of people with diabetes.

**O33**

**Toe brachial blood pressure measurement after 5, 10, and 15 minutes of rest**

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*Journal of Foot and Ankle Research* 2013, 6(Suppl 1):O33

**Background:** Toe Brachial Index (TBI) is used to evaluate peripheral arterial disease status, yet the effect of the duration of pre-test rest on TBI has not previously been evaluated. We aimed to investigate the effects of 5, 10, and 15 minutes of pre-test rest on TBI, and inter-rater and test-retest reliability.

**Methods:** Eighty participants (57.5% female, mean age 70 years) were recruited from local podiatry clinics and The University of Newcastle. Automated Systoe (Atys Medical) and Microlife (BP A100 Plus) devices were used to measure toe and brachial systolic blood pressures respectively, after 5, 10, and 15 minutes of rest. Two Podiatrists measured 20 participants on the same day to establish inter-rater reliability. Test-retest reliability was assessed by a single Podiatrist in 33 participants over two sessions, seven days apart. Effect of amount of pre-test rest on TBI was evaluated in 80 participants by a single Podiatrist.

**Results:** TBI inter-rater (ICC 0.71) and test-retest (ICC 0.77) reliability were highest at 15 minutes of pre-test rest. There was a significant increase in TBI between 5 and 10 minutes of pre-test rest (0.032; 95% CI: 0.52 to 0.012; p <0.0001), however the decrease in TBI between 10 and 15 minutes (0.004; 95% CI: -0.023 to 0.015; p = 1.000) was not significant.

**Conclusion:** Results of this study suggest 10 minutes of pre-test rest is most appropriate for performing a TBI. The establishment of an evidence-base for pre-test rest time may improve clinical utilisation of TBI measurements.

**O32**

**Meeting the demands of a podiatry service for patients with arthritis**

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**Background:** Despite evidence for the need of podiatry services, podiatry is frequently an underused and under-resourced service and in many areas in New Zealand there is no specialist podiatry service. In support of specialist foot care, a new podiatric rheumatology service was established following an evidence-based approach highlighting the need for improved access to podiatry care for rheumatology patients in New Zealand.

**Methods:** A retrospective study of 245 patients with rheumatic disease at Counties Manukau DHB was conducted. Foot pain, impairment and disability were measured using a self-reporting patient outcome measure, the Foot Function Index. A range of podiatric interventions were reported. An electronically administered postal patient satisfaction questionnaire was sent to 148 patients.

**Results:** Over two-thirds of patients were observed with hallux valgus (bunions). The results demonstrate a significant reduction in foot pain (p<0.001) from initial visit to second visit (18% reduction in pain). A significant decrease in foot disability (p = 0.04) was found from initial visit to second visit. No significant differences were seen with foot impairment (p=0.78). A variety of intervention measures were used with 24% of patients being prescribed foot orthoses and 28% of patients given footwear advice. The patient satisfaction survey found 84% of patients reported they were satisfied with the new service and 80% of patients reported that the service helped with their foot problems.

**Conclusions:** The current service meets the needs of patients who suffer from rheumatological foot conditions such as rheumatoid arthritis and gout. The need for good foot education, provision of foot orthoses and advice on footwear are crucial to reduce the burden on patients with rheumatological foot conditions. Further Research: POs available with only the Leeds Foot Impact Scale (LFIS).
to develop a new PRO, the Salford Rheumatoid Arthritis Foot Evaluation Instrument (SAFE), working closely with clinicians and patients, to create an instrument with multiple assessment strategies (fixed and patient-specific) and rigorous measurement properties.

Methods: Development of the SAFE was divided into 4 stages: conceptual basis and content development, clinimetric instrument development, instrument pre-testing and demonstration of instrument measurement properties, including construct validity and temporal stability of the fixed scale.

Results: A total of 123 items were initially generated for the SAFE, with 25 of them clinically selected for the fixed scale and 80 items initially included in the patient-specific scale. The pretesting strategy proved effective for improving and refining the SAFE, with the final draft consisting of 19 items in the fixed and 42 items in the patient-specific scale. The fixed scale has strong evidence for validity and temporal stability.

Conclusion: With further development to demonstrate additional measurement properties, the SAFE may prove a valuable tool for clinicians involved in managing the foot with RA, enhancing patient centred care and facilitating communication between clinicians and patients. The SAFE may also have application as an outcome measure for research and evidence-based practice.

O35 Power generation of the midfoot in children wearing sports shoes
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Background: During propulsion of walking the midfoot generates 35 to 48% of the peak power from the foot and ankle. This study aimed to investigate the effect of children’s sports shoes on midfoot kinetics during propulsion of walking and running.

Methods: Twenty children performed five walking and running trials at a self-selected velocity while barefoot and wearing a common sports shoe. Footwear testing order was randomised. A 14 camera motion analysis system was used to calculate retro-reflective marker trajectories at 200Hz. Markers were attached to the leg and to the foot through holes in the shoe to measure three-dimensional motion of the midfoot and ankle. Ground reaction force data were recorded at 1,000Hz. Data were normalised to the stance phase and analysed from 60% to 100%.

Results: Peak midfoot power generation during walking reduced from 1.67W/kg (SD 0.59) barefoot to 0.50W/kg (SD 0.26) in the sports shoe (P<0.0005). Peak ankle power generation during walking was increased from 1.49W/kg (SD 0.42) barefoot to 1.89W/kg (SD 0.44) in the sports shoe (P<0.0005). Peak midfoot power generation during running was significantly reduced from 3.92W/kg (SD 1.33) barefoot to 1.56W/kg (SD 0.76) in the sports shoe (P<0.0005). Peak ankle power generation during running increased from 4.77W/kg (SD 1.02) barefoot to 6.03W/kg (SD 1.14) in the sports shoe (P<0.0005).

Conclusion: Children compensate for a reduction in midfoot power generation in sports shoes by increasing ankle power generation with potential implications for overuse of the Achilles tendon and triceps surae muscle complex.

O36 Towards understanding foot mobilisation techniques: a pilot study evaluating the immediate effects
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Background: While considerable research has evaluated the effects of joint mobilisation on spinal, pelvic and shoulder biomechanics, there is a paucity of research evaluating the effects of foot mobilisation techniques (FMT) on gait. This pilot study evaluated the immediate effects of FMT on plantar pressure and temporal-spatial gait parameters.

Methods: Fifteen adults (18±21.4 years) that had no known balance problems or falls history participated. An instrumented treadmill system (Zebris FMD-T, Zebris Medical, Germany) was used to measure plantar pressure and temporal-spatial gait parameters. Data were recorded for 30 seconds of steady state walking immediately before and after intervention using a standardised protocol of FMT. Repeated measures ANOVAs were used to assess the effect of FMT on gait parameters at an alpha level of 0.05.

Results: Of the 34 gait parameters measured, only three changed significantly after FMT. Peak pressure beneath the lateral heel (4%) and lateral forefoot (9%) was increased immediately following FMT (p<0.05) and was accompanied by a delay (3%) in the time to peak pressure beneath the lateral forefoot (p<0.05).

Conclusion: Changes in plantar pressure following FMT were small and less than the reported measurement error of the treadmill system. Therefore, in this pilot study the immediate effect of FMT on gait parameters was negligible. Further research evaluating short and long term effects of FMT on specific aspects of the locomotor system are needed.

O37 Idiopathic toe walking – are common podiatric treatment options based on evidence?
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Idiopathic toe walking (ITW) is a condition that commonly presents to podiatrists. This presentation aims to give an overview of the quality of literature focused on the treatment of ITW and determine if common podiatric treatment modalities are evidence based. 24 articles reporting treatment modalities were appraised against the National Health and Medical Research Council Levels of Evidence. There currently is no evidence of any single treatment option having long term effect on ITW gait. The highest level of evidence was in support of serial casting or surgery with some evidence supporting the use of Botulism toxin Type A. Footwear and orthotic intervention with or without stretching programs are reported treatments with no rigorous studies to support these modalities yet anecdotally these are reported effective. This article aims to update the knowledge of podiatrists, to enhance how children who present with this gait style can be managed and highlight areas for future research.

O38 The motor skills and sensory processing abilities associated with idiopathic toe walking gait
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Background: This study aimed to investigate differences between the motor skills and sensory processing abilities of children between the ages of four and eight years with and without an idiopathic toe walking (ITW) gait.
Methods: Children in each cohort were tested with the following norm referenced assessments:
1. Bruininks-Oseretsky Test of Motor Proficiency 2nd edition (BOT-2)
2. The Sensory Profile (SP)
3. Subtests of the Sensory Integration and Praxis Tests (SIPT)
4. Vibration Perception Threshold (VPT)

Results: Sixty children participated in the study, 30 within each cohort. Those with an ITW gait were found to have different SP quadrant scores (p=0.002), poorer performance on the BOT-2 (p<0.001), a lower VPT (p=0.001) and poorer performance on the Standing Walking Balance subset of the SIPT (p=0.047) compared with peers.

Conclusion: While the results did not identify a causative factor for an ITW gait, they do suggest that the toe walking gait may not be idiopathic in nature. The results of this research highlight the importance of a fuller assessment of the toe walking child compared to that traditionally conducted by podiatrists, and suggest that multiple strategies may be required to manage this gait style.

O39
The foot and ankle characteristics in children with idiopathic toe walking gait
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Background: Idiopathic toe walking (ITW) has been associated with ankle equinus, and while equinus has been linked with foot deformity in adults, there has been limited investigation on its impact on structural foot change in children. This study used the weight bearing lunge (WBL) test and Foot Posture Index-6 (FPI-6) to evaluate the foot and ankle measures of children with an ITW gait.

Methods: Sixty children between the ages of four and eight years were grouped into an ITW (N=30) and a non-toe walking (NTW) (N=30) cohort. The ankle range of movement and FPI-6 was calculated during appropriate weight-bearing test stance.

Results: There was a highly significant difference in the WBL test measures between the ITW cohort and the NTW cohort. The FPI-6 comparison was not significant. The WBL test was also not predictive of an abnormal FPI-6 in the ITW cohort.

Conclusion: These results demonstrate that ITW gait style impacts only on the available dorsiflexion at the ankle. The WBL measure may be utilised within the clinical setting to guide and monitor treatment interventions.

O40
Statin use and peripheral sensory neuropathy: a pilot study
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Background: Peripheral sensory neuropathy is a neurological deficit resulting in decreased detection of sensation through the peripheral nervous system. Statins are a widely used medication and there has been some debate of association with their use and the presence of peripheral sensory neuropathy. This pilot study aimed to test the sensory perception of participants with long term statin use and compare these results to their peers who were not taking statins.

Methods: 30 participants were recruited for this study and equally divided into a statin and non-statin group. Healthy participants were screened by their medical and medication history, Australian Type 2 Diabetes Risk assessment and random blood glucose level. An assessor who was blinded to the participant group conducted sensory assessments using the 10g monofilament and neurothesiometer.

Results: There was no difference in monofilament testing results between the groups. The statin group was less sensitive at the styloid process (p=0.031) and medial malleolus (p=0.003) than the control group. Results at the hallucus were not statistically significant (0.183)

Conclusion: This result is suggestive of a potential association between long term statin use and the development of peripheral sensory neuropathy. As statins are a life saving medication, careful consideration should be applied to these results and further research be conducted to determine if these results are applicable to larger populations. Prescribers of statins should be aware and considerate of the potential decrease in sensory perception and monitor their foot health accordingly.

O41
Interventions for increasing ankle joint dorsiflexion: a systematic review and meta-analysis
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Background: Ankle joint equinus, or restricted dorsiflexion range of motion, has been linked to a range of pathologies of relevance to sports medicine practitioners. This systematic review and meta-analysis investigated the effects of conservative interventions on ankle joint range of motion in healthy individuals and athletic populations.

Methods: Keyword searches of Embase, Medline, Cochrane and CINAHL databases were performed. Studies were eligible for inclusion if they assessed the effect of a conservative intervention on ankle joint dorsiflexion in healthy populations. Papers were quality rated using a standard quality assessment scale. Standardised mean differences (SMDs) and 95% confidence intervals (CIs) were calculated and results were pooled where study methods were homogeneous.

Results: Twenty-three papers met eligibility criteria, with a total of 717 study participants. Results suggest that there is some evidence to support the efficacy of static stretching alone (SMDs: range 0.70 to 1.69) and static stretching in combination with ultrasound (SMDs: range 0.91 to 0.95), diathermy (SMD 1.12), diathermy and ice (SMD 1.16), heel lifts (SMDs: range 0.7 to 0.77), superficial moist heat (SMDs: range 0.65 to 0.84) and warm up (SMD 0.87) in improving ankle joint dorsiflexion range of motion.

Conclusion: Some evidence exists to suggest the efficacy of stretching programs as well as the combined use of stretching and ultrasound, diathermy, diathermy and ice, superficial moist heat, warm up and heel lifts in increasing ankle joint range of motion. These interventions may be beneficial in preventing or managing pathology in individuals with restricted ankle range of motion. There is currently a paucity of quality evidence to support the efficacy of other conservative interventions.

O42
Foot involvement in early rheumatoid arthritis: a prospective study of ultrasound features
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Background: Foot involvement in early rheumatoid arthritis (RA) is highly prevalent. Our understanding of foot progression and persistence is limited. This study aims to investigate ultrasound features of foot disease in early RA patients over 12 months.
Methods: Patients with early RA were assessed prospectively for 12 months using high-resolution B-mode and Power Doppler (PD) ultrasound. A cumulative ultrasound score was derived to measure change in the presence of joint effusions, synovitis, erosions, PD, and tenosynovitis between baseline and 12 months. Change in scores was calculated alongside change in global disease (DAS28), disability (HAQ) and foot-related impairment (FIS-RA) and disability (FIS-RA_d) using FIS-RA subscales.

Results: Thirty early RA patients with a mean ± SD age of 48.8 ± 12.2 years and median (IQR) disease duration of 7.5 (4, 18) months were studied. Over 12 months, participants treated with disease-modifying and biological drugs increased. Small or stable median (IQR) changes in global disability, foot-related impairment and disability and ultrasound features including joint effusions (-2 (-7, 2), synovitis (1 (-1, 3)), erosions (0 (-2, 2)), PD (1 (-1, 3) and tenosynovitis (0 (0, 1)) were observed despite a threefold increase in patients entering remission (Baseline: n=5; Exit: n=15). Significant differences (p<0.05) were observed between change in synovitis scores and DAS28 response where synovitis deteriorated in non-responders (3 (0, 5)) and improved with good response (-1 (-2, 1)).

Conclusions: A trend towards stable and persistent ultrasound features, foot impairment and disability despite an increasing proportion of patients entering remission supports earlier assessment and targeted foot care in early RA.

POSTER PRESENTATIONS

P1
Teaching of manual clinical skills in podiatry: theory and recommendations
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Journal of Foot and Ankle Research 2013, 6(Suppl 1):P1

It is the expectation of employers, regulatory bodies and the public, that graduating podiatrists sufficiently meet certain minimum competencies for that profession, including those for manual skills. However, teaching and evaluation methods seem to be inconsistent between countries, institutions and programs. This may be the consequence of uncertainty regarding the most effective method of teaching such skills. A review of available literature pertaining to psychomotor teaching across a range of health professions was undertaken. As a result of this broad review we present the available evidence and make recommendations pertaining to the teaching of psychomotor skills within the podiatry profession and relate it to current methods.

Traditional methods of teaching providing explicit content and appropriate demonstration are still useful. Learning may be promoted in a closed environment on low fidelity models with clear and immediate feedback. Further practice can occur over time (intermittent practice) with possible use of mental practice in between. The task can gradually increase in complexity such as moving from a model to work in a clinical setting such as a university clinic on real patients, as appropriate. Further detail regarding these methods will be provided. This review will support some current practices in clinical teaching and make further recommendations with respect to current evidence.

P2
The effect of pre-measurement rest time on systolic ankle pressure measurements
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Background: Systolic ankle pressures are measured as part of an ankle-brachial index (ABI) to screen for the presence of peripheral arterial disease (PAD). Despite widespread use of the ABI, there is currently no research evidence investigating the amount of pre-measurement rest required for the systolic ankle pressure to stabilise.

Methods: One hundred and forty participants meeting current guidelines for screening for PAD volunteered for this study. Following 5 minutes of rest in the supine horizontal position, ankle systolic pressures of the left or right lower extremity were taken using hand-held Doppler. Measurements were repeated at 10 and 15 minutes. Testing was repeated 7-10 days later.

Results: A significant drop in ankle pressure of 5.02 mmHg occurred between 5 and 10 minutes (p<0.05) however no significant change occurred between 10 and 15 minutes (mean change 0.15 mmHg, p=0.99). Presence of diabetes was associated with a smaller drop between 5 and 15 minutes (mean change 1.85 mmHg) and predicted 14% of the variance in change in ankle pressure (beta=–3.72; p<0.05). Test-retest reliability after 5 minutes was excellent (intraclass correlation coefficient (ICC) 0.84) however increased for measurements taken at 10 and 15 minutes (ICC: 0.89 and 0.89 respectively).

Conclusions: Results suggest ankle systolic pressures stabilise after 10 minutes of rest. Longer periods of pre-measurement rest did not improve reliability of the measurement significantly. Presence of diabetes affects ankle pressure changes in response to rest, however further investigation is required to identify the cause.

P3
The sensitivity and specificity of the toe brachial index in detecting peripheral arterial disease
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Background: Peripheral arterial disease (PAD) is reported to affect up to 12% of the adult population and has significant health ramifications. PAD is associated with delayed wound healing and amputation. Podiatric vascular assessment plays an important part of identifying PAD. Traditionally, ankle brachial indices (ABI) have been used as a screening tool for non-invasive assessment of PAD however recent evidence has suggested that in certain populations there may be a decrease in the ABI’s sensitivity and specificity. The toe brachial index (TBI) has been suggested as potentially a more reliable indicator of the presence of PAD however, there is limited evidence currently on the validity of the TBI.

Methods: Participants were recruited from a Private Vascular Clinic, and a Community Health Centre Podiatry Service. ABI and TBI’s were performed on all participants. Colour duplex ultrasound (CDU) was used to determine the presence or absence of PAD. Diagnostic accuracy of ABI and TBI results were then determined through comparison with CDU scans.

Results: 56 participants were recruited to this study (M:40 F:16). The results of this study demonstrated that sensitivity for the presence of PAD was reduced in the ABI compared to the TBI measurements (47% and 95% respectively). The ABI measurement had higher specificity for detecting PAD than the TBI measurement (79% and 91% respectively).

Conclusion: The results of this study indicate that the TBI measurement is more likely to detect the presence of significant PAD as diagnosed by CDU across a mixed population.

P4
Is it how they walk? Biomechanics in diabetic peripheral neuropathy: a review of the literature
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Journal of Foot and Ankle Research 2013, 6(Suppl 1):P4

Background

Is it how they walk? Biomechanics in diabetic peripheral neuropathy: a review of the literature
Background: Diabetic peripheral neuropathy (DPN) affects the sensory, motor, and autonomic nervous system. The biomechanical changes resulting from DPN may translate to increased plantar pressures in the foot, which contributes to the pathogenesis and development of foot ulcers. This review aims to investigate the existing biomechanical literature associated with gait, dynamic electromyography and plantar pressure of patients with DPN.

Methods: Electronic databases (MEDLINE, CINAHL, PubMed, Scopus and Google Scholar) were searched for papers reporting observational studies on patients with DPN in gait, dynamic electromyography or plantar pressure. Exclusion criteria were papers investigating children, interventional studies or studies published prior to 2000.

Results: Twenty-five papers met the inclusion criteria and were reviewed. Overall there were disparities between studies due to methodological differences in reporting such as the disease duration and degree of neuropathy of participants. DPN subjects walked slower, with smaller stride length and reduced knee extension and active ankle plantar/dorsiflexion compared to healthy and diabetes controls. Dynamic electromyography studies suggested an early activation of lateral gastrocnemius, whilst findings in the tibialis anterior and vastus lateralis muscles were inconsistent. Markedly elevated forefoot peak plantar pressures (PPP) were observed in those with a history of ulceration.

Conclusion: This review suggests marked biomechanical (gait, electromyography and plantar pressure) variation in DPN patients compared to controls. Studies investigating kinematic (description of movement) variables of the foot are lacking and further studies are needed. It is recommended that future DPN biomechanical studies should document the duration and degree of DPN.

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P5

Innovative student placements at Northern Health
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University course processes have recently changed with student enrolments increasing, ultimately placing new demands on student placements within the healthcare setting. In response to the changing university curriculum and in line with the Victorian Department of Health, Clinical Placement Networks and Health Workforce Australia, Northern Health (NH) Podiatry department identified a unique opportunity in provision of clinical placement education.

NH developed an innovative and exciting approach to the management and delivery of podiatry student clinical placements in order to increase capacity. Recruitment to a new Podiatry Clinical Educator (CE) position allowed implementation of strategies to significantly increase capacity, ensure provision of high quality, evidenced based and safe clinical education whilst supporting podiatrists and students.

To increase student capacity with limited resources, NH created a Podiatry CE position. This facilitated developments including: 2:1 Model of Supervision with peer learning and incorporating a focus on student feedback and reflection, integrating simulation into traditional clinical education, evidence based tutorials and support to podiatrists and students.

Preliminary evaluation findings show significant increase in capacity with high student and podiatrist satisfaction. Results of student placement evaluations will be presented including perspectives on simulation, peer learning and specific podiatrist professional experiences.

With a Podiatry CE position and great team functioning: strategies implemented allowed consistent provision of efficient, high quality, evidence based podiatry student clinical placements enabling increased capacity.

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P6

Extra-osseous talotarsal stabilization and sinus tarsi impingement syndrome: case report
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Pain at the anterior-lateral aspect of the ankle is common in people with flat feet. Sinus tarsi impingement syndrome (STIS), with osseous impingement between the talus and calcaneus, is often attributed to this pain. Impingement occurs with talotarsal subluxation and reduced sinus tarsi aperture commonly associated with excessive pronation.

Level 3 evidence supports the surgical insertion of extra-osseous talotarsal stabilization (EOTTS) devices to realign and stabilize the normal range of movement at the rearfoot. A case report of a 33-year-old female diagnosed with left STIS, and successfully treated with the insertion of an EOTTS is outlined here.

A 2 year history of left ankle pain was reported to be associated with walking intensity and duration of activity. Pain at its worst was rated as 8/10. A Foot Posture Index score of 9 and radiographs revealed a subluxed talus. Local anaesthetic injection into the sinus tarsi provided pain relief. Previous treatment with orthoses had varied success, however the patient requested a more permanent solution.

Postoperatively, follow-up of the case patient was positive without complication. Consistent with current literature, improvements were found in pain management with complete relief of symptoms reported, reductions in excessive subtalar joint pronation and Foot Posture Index (4). EOTTS devices represent a viable minimally invasive permanent treatment option for STIS. Referral for a surgical consult is an option when conservative management of STIS is not consistently effective and/or patients request a more permanent solution.

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P7

The effect of shoe-sole hardness on plantar pressure and comfort in older people with forefoot pain
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Background: Plantar forefoot pain is common in older people and is related to increased peak pressures under the foot during gait. Variations in the hardness of the shoe sole may therefore influence both the magnitude of loading under the foot and the perceived comfort of the shoe by this population. The aim of this investigation was to determine the effect of varying shoe sole hardness on plantar pressures and comfort in older people with forefoot pain.

Methods: In-shoe plantar pressures under the forefoot, midfoot and rearfoot were recorded from 35 older people (mean age 73.2, SD 4.5 years) with current or previous forefoot pain using the pedar®-X system.

Participants walked at their normal comfortable speed along an 8 metre walkway in shoes with 3 different levels of sole hardness: soft (Shore A25), medium (Shore A40) and hard (Shore A58). Shoe comfort was measured on a 100 mm visual analogue scale.

Results: There were statistically significant differences in peak pressure of between 5 and 23% across the forefoot, midfoot and rearfoot (p<0.01). The hard-soled shoe registered the highest peak pressures and the soft-soled shoe the lowest peak pressures. However, no differences in comfort scores across the three shoe conditions were observed.

Conclusion: These findings demonstrate that as shoe sole hardness increases, plantar pressure increases, however this appears to have minimal effect on shoe comfort. Therefore, if a reduction in plantar pressure is deemed to be of benefit for patients, soft-soled shoes are best.

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P8

Queensland diabetic foot hospitalisations (2005-10): in what state is our foot hospital problem?
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P9
Research skills of Queensland Health podiatrists: how do they rate and are they improving?
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Journal of Foot and Ankle Research 2013, 6(Suppl 1):P9

Background: For health professions to evolve in a highly evidence-based world it seems imperative for clinicians to build their research skills. This observational paper aims to report the research skills of statewide public-sector podiatrists at two different time points twelve-months apart.

Methods: The Research Capacity & Culture (RCC) survey was distributed to all Queensland Health podiatrists in January 2011 (n=58) and January 2012 (n=60). The RCC is a validated tool designed to measure indicators of research skill in health professionals. Participants rate skill levels against each individual questionnaire item on a 1 to 10 scale (1=lowest, 10=highest). Chi-squared and Mann Whitney U tests were used to determine any differences between survey samples.

Results: Thirty-seven (64%) podiatrists responded to the 2011 survey and 33 (55%) the 2012 survey. The 2011 survey respondents reported low skill levels (Median=4) on most individual research aspects. However, most reported that organisations’ skills to perform and support research have improved having higher levels (Median=6). The 2012 survey respondents reported significantly higher skill levels compared to the 2011 survey in individuals’ ability to secure research funding, submit ethics applications and provide research advice (p<0.05).

Conclusions: This research has assisted in developing a comprehensive, evidence-based clinical pathway to promote consistent and optimal practice in the assessment, diagnosis and management of acute CN. The pathway aims to support health professionals in making early diagnosis and providing appropriate immediate management of acute CN, ultimately reducing its associated complications such as amputations and hospitalisations.

P10
Developing an evidence-based clinical pathway for the assessment, diagnosis and management of acute Charcot neuro-arthropathy
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Journal of Foot and Ankle Research 2013, 6(Suppl 1):P10

Background: Charcot neuro-arthropathy (CN) is one of the most devastating complications of diabetes. To date it appears that no clinical tools based on a systematic review of existing literature have been developed for the management of acute CN. Thus, the aim of this paper was to systematically review existing literature and develop an evidence-based clinical pathway for the assessment, diagnosis and management of acute CN.

Methods: Electronic databases (Medline, PubMed, CINAHL, Embase, and Cochrane Library), reference lists and applicable websites were systematically searched for literature discussing the assessment, diagnosis and/or management of acute CN. At least two independent investigators then quality rated and graded the evidence of all identified literature. Consistent recommendations emanating from the included literature was then fashioned in a clinical pathway.

Results: The systematic search identified 267 manuscripts, of which 117 (44%) were assessed to meet the inclusion criteria for this study. As hypothesised, most literature discussing the assessment, diagnosis and/or management of acute CN constituted level IV or E0 evidence. The included literature was used to develop an evidence-based clinical pathway for the assessment, investigations, diagnosis and management of acute CN.

Conclusions: This research has assisted in developing a comprehensive, evidence-based clinical pathway to promote consistent and optimal practice in the assessment, diagnosis and management of acute CN. The pathway aims to support health professionals in making early diagnosis and providing appropriate immediate management of acute CN, ultimately reducing its associated complications such as amputations and hospitalisations.

P11
Navicular stress fracture injury: observational use of planar pressure measures in elite AFL footballers
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Background: Navicular stress fracture (NSF) is a relatively uncommon injury according to Australian Rules Football (AFL) injury surveillance data. Like all stress fractures, a disproportionate amount of compression-strain (dose) versus remodeling (response) accounts for bone breakdown. The exact mechanism of injury or anthropometric factors involved in navicular stress fracture remains largely unknown however; several authors speculate a short first metatarsal and metatarsus adductus as contributing...
Factors. It is thought that a long second metatarsal transmits forces unevenly through the medial cuneiform creating shearing stress at the avascular central zone of the navicular. To date no prospective data is available to support these theories. Navicular stress fracture is deemed high risk due to the potential of delayed or non union and often excessive time away from activity.

Methods: Retrospective plantar pressure mapping of two elite AFL footballers who’d sustained NSF injury were recorded. Testing involved unshod across a floor mounted pressure sensing mat (EMED SF™, Novel Munich Germany) using a two-step method following familiarisation. Five (5) trials were performed for each foot with the averages of the middle three (3) trials used for further analyses. Subsequent testing using an in-shoe pressure mapping system, (EMED ™ Pedar,Novel Munich Germany) was performed with custom moulded foot orthoses in situ. Data from twenty (20) steps were recorded, allowing for acceleration and deceleration with the middle ten (10) steps used for further analyses. Computer software generated data for Peak Pressure across 10 masked areas (kPa), Instant to Peak Pressure (ms), Contact Area (cm²), Force and Pressure Time Integrals were used for further analysis.

Results: Analysis of the derived variables demonstrated distinct asymmetries in plantar foot loading in both subjects. Between-subject similarities exist in terms of elevated Peak Pressure (kPa) beneath the 2nd metatarsophalangeal joint on the injured limb. Subject 1, demonstrates a deviation between the 1st and 2nd digits as a consequence of metatarsus primus adductus. Plantar pressure mapping depicted relative length differentials between the hallux and 2nd digits on both subjects injured limbs. Subject 2 demonstrates asymmetry in pressure time curves between injured and non injured feet with a pronounced initial impact peak on the injured side. The implication of this in terms of injury risk is unclear.

Conclusions: Presented is the use of plantar pressure mapping in NSF injury in two Elite AFL footballers. The results suggest increased FF pressure and anatomical variations such as a short 1st metatarsal and metatarsus adductus could contribute to NSF injury. Technology such as plantar pressure mapping may be used prospectively to assess or screen at risk groups for NSF injury.

P12
Instrumented treadmills: establishing measurement properties is necessary for evaluating clinical interventions

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Background: Instrumented treadmills that provide basic gait parameters in near real-time are emerging as valuable outcome tools in both clinical and research settings. Significant changes in step length and peak vertical force in the order of 2cm and 20-70N have been reported with footwear interventions and neurological disorders using these systems. However, published data about the systems’ measurement properties is lacking. This study evaluated the within- and between-day repeatability of spatiotemporal parameters and vertical ground reaction forces (vGRF) measured by a new instrumented treadmill system.

Methods: Thirty three healthy adults (mean age, 21.5±2.8 years) walked on an instrumented treadmill system (FDM™-THM™-S, Zebris Medical GmbH) at preferred speeds, on three separate occasions. Spatial, temporal and vGRF were collected over a 30-second capture period. Repeated measures ANOVAs were used to assess between- session differences in gait parameters, while agreement within- and between days were evaluated using 95% limits of agreement.

Results: Statistically significant differences were found for the majority (14/16) of spatiotemporal and kinetic gait parameters over the three sessions (P<.01). The minimum change that could be detected with 95% confidence ranged from 3.16% for temporal parameters, 12.32% for spatial parameters, and 5-18% for kinetic parameters.

Conclusion: Changes in gait parameters measured by the same treadmill and previously attributed to clinical interventions and neuromuscular pathology, fall within the measurement error of the treadmill determined in this study. The findings highlight the importance of determining the measurement properties of outcome tools in evaluating clinical interventions.

P13
Effect of pre-test rest duration on toe and ankle systolic blood pressure measurements

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Background: Measurement of toe and ankle blood pressure is used to evaluate the peripheral arterial status of patients, yet the pre-test rest period is inconsistent in published studies and among practitioners, and could affect results. The aim of this systematic review was to evaluate all research that has investigated the effect of different periods of pre-test rest on toe and ankle systolic blood pressure.

Methods: MEDLINE (from 1946), EMBASE (from 1947), CINAHL (from 1937), and Cochrane Central Register of Controlled Trials (CENTRAL) (from 1800) were searched up to April 2012. No language or publication restrictions were applied. Eighty-eight content experts and researchers in the field were contacted by email to assist in the identification of published, unpublished, and ongoing studies. Studies evaluating the effect of two or more pre-test rest durations on toe or ankle systolic blood pressure were eligible for inclusion. No restrictions were placed on participant characteristics or the method of blood pressure measurement. Outcomes included toe or ankle systolic blood pressure and adverse effects. Abstracts were independently assessed by two reviewers for potential inclusion.

Results: 1658 abstracts were identified by electronic searching. Thirty three of the 88 content experts and researchers in the field replied, identifying five potentially relevant studies. No studies were eligible for inclusion.

Conclusion: There is no evidence of the effect of different periods of pre-test rest duration on toe and ankle systolic blood pressure measurements. Rigorous trials evaluating the effect of different durations of pre-test rest are required to direct clinical practice and research.

P14
Peroneus brevis rupture associated with a hypertrophic peroneal tubercle: a case report and literature review

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Varying morphology of the peroneal tubercle can be associated with peroneal tendon pathology including tenosynovitis, tenon attrition and tears. The authors present a case of peroneus brevis rupture associated with an enlarged peroneal tubercle in a 59yo male. The clinical testing, medical imaging, diagnosis, surgical reconstruction and rehabilitation is discussed. The literature review results are also reported. A literature review was conducted across several scientific databases including Medline, CINAHL and PubMed using the search terms “peroneus brevis” AND “rupture” AND “peroneal tubercle” OR “peroneal trochlea”. Further information was sought with citation tracking and reference checking and reviewing unpublished data.

No report of isolated peroneus brevis rupture associated with a hypertrophic peroneal tubercle was found in the literature. However, there were several reports of peroneal tendinopathy associated with this pathology. Failing conservative care, good to excellent results were reported with surgical resection and tendon repair. In our case resection of the tubercle and peroneus brevisrepair with a split thickness peroneus longus graft was
performed. At 3 years post-op the patient was asymptomatic, had returned to previous level of activity and was satisfied with the result. The hypertrophic peroneal tubercle can cause significant lateral foot pain. It is important for clinicians to keep this pathologic process in the list of differential diagnoses. X-rays (particularly the axial calcaneal view), ultrasound, CT and/or MRI can identify the extent of the pathology. If conservative measures fail, generous resection and repair of any peroneal tendinopathy can result in return to normal function.

P15
An electronic diabetes foot risk calculator
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Background: The MMEx Diabetes Foot risk calculator was designed in response to the WA Department of Health’s High Risk Foot Model of Care to improve the systematic approach to screening and treatment for high risk foot complications and the 2011 National Health and Medical Research Council’s (NHMRC) National Evidence-Based Guideline on Prevention, Identification and Management of Foot Complications in Diabetes that state, “a solution to the current impasse on the integration of decision support tools into medical software is needed urgently” and “any trained health professional can complete a foot risk stratification”. Teaching foot assessments is straightforward, but practitioners have difficulty with risk stratification and deciding appropriate follow-up and referral.

Methods: The system has been developed as a collaboration between the University of Western Australia’s Combined Universities Centre for Rural Health and the Centre for Software Practice. The software design was based on the evidence-based foot risk stratification of the NHMRC and incorporated a risk calculator, or electronic decision support, as currently used in cardiovascular risk assessment.

Results: The MMEx Diabetes Foot risk calculator is modified based upon input from a number of service providers from different disciplines. It is now available in MMEx, a clinical information system for primary care, or from the App Store.

Conclusion: The calculator has translated clinically relevant research into practice enabling a systematic approach to Medicare Enhanced Primary Care plans, which includes patients receiving foot risk stratification at their first visit. It can improve time management, Medicare reporting requirements, clinical planning and communication.

P16
Abstract withdrawn

P17
The TiltMeter app is a novel and accurate measurement tool for the weight bearing lunge test
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Background: The weight bearing lunge test is increasing being used by health care clinicians who treat lower limb and foot pathology. This measure is commonly established accurately and reliably with the use of expensive equipment. This study aimed to compare the digital inclinometer with a free app, TiltMeter on an Apple iPhone.

Methods: Allied health practitioners were recruited as participants from the workplace. A pre-conditioning stretch was conducted and the ankle range of motion was established with the weight bearing lunge test position with firstly the leg straight and secondly with the knee bent. The measurement device and participant order was randomised.

Results: The intra-rater reliability and inter-rater reliability for the devices and in both positions were all over ICC 0.8 except for one intra-rater measure (Digital inclinometer, novice, ICC 0.65). The inter-rater reliability between the digital inclinometer and the TiltMeter was near perfect, ICC 0.96 (CI: 0.898–0.983): Concurrent validity ICC between the two devices was 0.83 (CI: 0.740–0.445).

Conclusion: The use of the TiltMeter app on the iPhone is a reliable and inexpensive tool to measure the available ankle range of motion. Health practitioners should use caution in applying these findings to other smartphone equipment if surface areas are not comparable.