



MEETING ABSTRACTS

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KEYNOTE SPEAKER PRESENTATIONS

A1

Diabetes and the diabetic foot in 2011

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Journal of Foot and Ankle Research 2011, **4(Suppl 1):A1**

We are facing a world epidemic of type 2 diabetes that is now one of the biggest threats to the health of the world for the 21st Century. Previously published figures by the IDF are already gross underestimates of the current situation as recent studies from China suggest a prevalence of diabetes of almost 10%: thus the combined population of diabetic individuals from China and India is likely > 150 million individuals. In Australasia, diabetes prevalence is increasing, particularly amongst the native population. Diabetic foot problems have been recognised as increasingly important in recent years as they represent the commonest cause of hospital admission amongst diabetic patients in Western countries, are responsible for much morbidity and even mortality and are a major economic drain on the health care system. Data from the USA suggests > \$30 billion is spent by the health care system on diabetic foot ulceration and amputation each year. In order to prevent foot ulcers there is a need to have a uniformly agreed screening programme that can be applied worldwide wherever the patient is screened, at home, in primary or secondary care. There is data to suggest that those patients with a history of previous neuropathic plantar ulcers who were randomised to self-monitor skin temperatures, were advised that if a difference of more than 1.5°C was found consistently between the two feet, they should rest: in that group compared to standard therapy, there was a highly significant reduction of recurrent ulcers from approximately 30% to 8% annual risk. There is also increasing evidence that the implementation of a multi-disciplinary foot care team across not only secondary but also primary care might help reduce the rate of amputations in people with diabetes. With respect to therapy, different modes of offloading remain the key to achieving appropriate healing in neuropathic ulcers. For complex diabetic foot wounds, negative pressure wound therapy using vacuum-assisted closure has supportive evidence from 2 randomised controlled trials in the area of wound healing. Most recently, hyperbaric oxygen therapy (HBO) whose efficacy has previously been questioned, has received support for improving wound healing in patients with ischaemic foot ulcers in whom vascular reconstruction is not possible. A well designed study from Sweden has confirmed the benefit of HBO and also suggests that this may result in few amputations and better quality of life. Other new areas such as gene therapy and other topical treatments are still awaiting confirmation of efficacy from properly designed randomised controlled trials rather than anecdotal case series.

A2

Diagnosis and management of diabetic neuropathy

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The diabetic neuropathies are common and chronic sensorimotor diabetic peripheral neuropathy (DPN) affects up to 50% of older type 2 diabetic patients. Up to half of these individuals may have painful symptoms of whom up to 20% will require some form of pharmacological therapy. The diagnosis of DPN remains a clinical one with exclusion of other causes of neuropathy important as no tests can determine that the neuropathy in any patient is caused by the diabetes. The most troublesome neuropathic symptoms include burning discomfort, altered temperature sensation (feet feel very hot or very cold), hyperaesthesiae, tingling, pricking and sudden shooting, stabbing pains. Examination usually reveals a stocking distribution sensory loss although in acute sensory neuropathy, the clinical examination may be normal. Evidence suggests that blood glucose flux, with erratic fluctuations of blood glucose during the day and night, contributes to the pathogenesis of neuropathic pain. With respect to treatments, the first step is to try and achieve optimal, stable glycaemic control: sudden improvement in control may however actually worsen neuropathic symptomatology. In addition to achieving stable glycaemic control, most patients require some form of pharmacological intervention and first line drugs include anti-epileptics such as Gabapentin and Pregabalin, the antidepressant and dual reuptake inhibitor, Duloxetine, or the tricyclic drug Amitriptyline. Strong evidence from randomised controlled trials supports the use of each of the above agents. For those patients with resistant neuropathic pain, synthetic Opioids such as Tramadol, or stronger drugs such as slow release Oxycodone may be useful in the short term. To date, no specific pathogenetic treatments are licensed in the UK for the management of neuropathic pain.

A3

Shifting paradigms in the approach to footstrikes, footwear and treatment of the foot

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Journal of Foot and Ankle Research 2011, **4(Suppl 1):A3**

The recent rise in popularity of barefoot and minimal footwear running has led to spirited debates within the scientific, clinical and public arenas. While there are no definitive injury studies that support barefoot over

shod running, there is a growing body of literature that suggests we may need to change our thinking about running mechanics, footwear and how we treat the foot. This presentation will review existing studies of the relationship between shod footstrikes, mechanics and injury. In addition, the direct effect of footwear on mechanics will be discussed. Finally, this evidence will also be used to suggest a change in our approach to common foot related pathologies. It is hoped that this presentation will be a catalyst for changing the way we view these issues.

A4

Evaluation of the injured runner: developing the clinical hypothesis

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Journal of Foot and Ankle Research 2011, **4(Suppl 1):A4**

The etiology of running injuries is multifactorial in nature. These factors can be simplified into those related to structure, mechanics and dosage. In order to fully understand the cause of an injury, one must carefully assess each of these factors. This includes taking a thorough history, as well as an evaluation of runner's structure and alignment. However, if the injury occurred during the running, then the runner should also be assessed while running. With information on structure, running mechanics and dosage, one can then develop a clinical hypothesis upon which the treatment is then based. This presentation will review the important components of an evaluation of an injured runner, as well as the development of the clinical hypothesis. The presentation will end with a case study, which will reinforce these concepts.

A5

Gait retraining: altering the fingerprint of gait

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Journal of Foot and Ankle Research 2011, **4(Suppl 1):A5**

Running injuries are common and are often associated with overtraining. However, it is well-accepted that these injuries are related, in part, to abnormal running mechanics. While standard interventions often result in resolution of symptoms, if the underlying mechanics are not addressed, the risk for recurrence is high. This presentation will describe a method of retraining gait patterns that requires providing realtime feedback to the runner. This feedback is slowly removed such that the runner can learn to depend upon their own internal cues and the new pattern becomes reinforced. Different types of feedback will be reviewed as well as ways to translate these methods from the lab to the clinic. The presentation will end with a case study to highlight these concepts.

A6

Why does gout target the foot? The pathogenesis of podagra

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Journal of Foot and Ankle Research 2011, **4(Suppl 1):A6**

Gout is the most prevalent inflammatory arthropathy. It displays a striking predilection to affect the first metatarsophalangeal joint (1st MTPJ) as well as joints within the mid-foot and ankle. The propensity of gout for the foot was recognised by the ancient Greeks who named it podagra, literally "foot-grabber". A number of mechanisms have been proposed to explain this clinical observation. Hyperuricaemia is an essential prerequisite for the development of gout, monosodium urate (MSU) crystal formation occurring as serum urate levels exceed the physiological saturation threshold of urate in body tissues. Decreasing urate solubility at cooler distal extremities has been suggested to account for the predilection of gout for the 1st MTPJ, but does not explain why gout targets this joint

ahead of the other small joints of the forefoot. *In vitro* mechanical shock leads to formation of MSU crystals and is consistent with the clinical observation that attacks of gout commonly follow minor trauma such as stubbing the toe or physical activity.

More recently, it has been suggested that MSU crystals more readily deposit in osteoarthritic joints. The 1st MTPJ joint is a target joint for osteoarthritis as well as gout, and is the foot joint most commonly affected by osteoarthritis. There is a strong clinical and radiographic association between joints that have been the sites of acute attacks of gout and the presence of osteoarthritis locally at those individual joints. Cadaveric studies demonstrate crystal deposition at the site of degenerate lesions in articular cartilage. Epitaxial MSU formation has also been observed on cartilage fragments. Changes in cartilage and synovial proteoglycans are thought to promote formation and growth of MSU crystals. Transient increases in the urate concentration of resolving synovial effusions owing to the differential permeability of synovium to urate and water, have also been postulated to account for the occurrence of gout at osteoarthritic joints.

In summary, the proclivity of gout for the foot, and the 1st MTPJ in particular, remains poorly understood, and is likely to be multi-factorial, in which the inclination of MSU crystals to deposit in osteoarthritic cartilage is a key component.

A7

Foot pain: common, of consequence, and consulted about

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Foot pain is highly prevalent in the community. Foot pain and ankle pain occurring on most days are reported by 25% and 15% of older adults, respectively. Both foot and ankle pain are more prevalent in women than men but no consistent relationship with age has been identified. Pain within the foot most commonly occurs at the toes or forefoot, followed by the arch or ball, with the heel and hindfoot least frequently affected.

Foot pain is commonly associated with locomotor disability. Almost two-thirds of adults aged 50 years and over with foot pain report problems related to physical function. Eight percent of older adults without disabling foot pain experience its onset over a three-year period whereas resolution appears to be uncommon, with 70% of those with disabling symptoms still having them three years later. Onset of physical impairment associated with foot pain most commonly relates to increased reliance on vehicular transport, and difficulty walking and standing. Furthermore, foot pain is also associated with poor balance and risk of falling.

Although musculoskeletal foot problems account for a substantial number of consultations in primary care, it appears that only a minority of people with foot problems consult about them. Eight percent of primary care musculoskeletal consultations (290 primary care consultations per 10,000 registered patients per year) involve musculoskeletal foot problems. However, only 20% of people with musculoskeletal foot problems see their family doctor over a three-year period and a similar proportion of those with foot pain see a podiatrist over twelve months. Primary care consultation with a musculoskeletal foot problem is more likely in those with foot pain, those who consult frequently about other problems, and those who believe effective treatments are available. Most primary care consultations for musculoskeletal foot problems are categorized by family doctors using non-specific terms describing pain location, eg foot pain or ankle pain, with specific diagnostic codes, eg plantar fasciitis, used less frequently.

In summary, foot pain is a common problem both in the community and in primary care, and frequently associates with locomotor disability. However, only a small proportion of those with musculoskeletal foot problems consult about them. Further studies are needed to explore why people choose to consult a particular health care professional about their foot problem, how the decision to consult can be influenced, and how foot pain and problems are managed in different healthcare settings.

A8

Epidemiology and impact of hallux valgus: more than just bunions

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Journal of Foot and Ankle Research 2011, 4(Suppl 1):A8

Hallux valgus (HV) is a common deformity characterized by progressive lateral deviation of the great toe at the first metatarsophalangeal joint (1st MTPJ). It commonly associates with a painful overlying soft-tissue prominence, the "bunion". A recent systematic review estimated the prevalence of HV to be 23% in adults aged 18 to 65 years. It becomes more frequent with increasing age and is more prevalent in women than men. Several potential risk factors for HV have been identified. Various mechanical factors are thought to associate with HV including metatarsal length and head-shape, first ray hypermobility and foot posture. HV is rare in unshod populations but associates with wearing high-heeled or narrow shoes. The relationship between HV and obesity is less clear. Some studies have found an association between HV and increasing body mass index (BMI) whereas others have found no association. Most recently, it has been suggested that the association between HV and BMI differs between the genders, with a lower prevalence with increasing BMI in women but no association in men. HV poses a significant health problem, and associates with foot pain, poor balance, gait impairment, immobility, and risk of falling. The likelihood of 1st MTPJ osteoarthritis (OA) increases with HV severity but nodal OA and pain at the low back, hip and knee are also associated with HV, suggesting that it is a component of generalised OA. Several recent studies have examined the relationship between HV and health-related quality of life (HRQOL). Symptomatic HV appears to associate with reduced HRQOL. However, both general and foot-specific HRQOL are progressively lower with increasing severity of HV deformity, regardless of foot pain. Importantly, the association of both the presence and severity of HV with impaired HRQOL is not limited to pain and physical function but extends to general health, vitality, social function, and mental health. In summary, the impact of HV extends beyond local influence on foot OA, balance, gait and falls, to impair HRQOL. Future prospective studies are required to identify risk factors for the development and progression of HV and hence possible targets for prevention and intervention.

INVITED SPEAKER PRESENTATIONS

I1

Conservative and surgical management of foot and ankle sporting injuries in the weekend warrior

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Journal of Foot and Ankle Research 2011, 4(Suppl 1):I1

A clinical based review of the injuries that are regularly suffered by Joan and John Average is presented. Common presentations of conditions such as lateral ligament tears, talar osteochondral lesions, syndesmotic injuries and 5th Metatarsal fractures are discussed along with the management and prognosis of these problems. Questions are answered including how does it occur; what should I do about it; what can somebody else do about it and what occurs in the future?

I2

Health workforce issues for podiatry

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Australia has one of the best health systems in the world on many parameters but is facing great challenges with an ageing population increasingly effected with chronic disease. There is also an unrealistic

expectation amongst the community as to what the health system can provide and at what cost. A major challenge is the workforce – since it too is ageing. What is important as we move forward is asking questions such as what health services we want to provide, who should provide those services and where, how are those health professionals to be trained and how are they going to be funded. Health services in the future will be increasingly delivered by teams – with different members of those teams performing various tasks – working in a loose delegation model and with all members trained to competency standards for that particular task. Routine tasks – including procedures now only carried out by medical practitioners may well be delegated to appropriately trained others – again working as part of that team. Current providers who wish to participate in delivering these advanced services will need to be appropriately trained and may well be required to work in teams rather than independently. Training will provide a standard of care delivered by the health professional that produces similar (if not better) clinical outcomes to that being provided at present. In this regard interprofessional learning and simulation should feature high on the educational agenda. Dialogue needs to occur between the various professional groups to see how the change agenda can be progressed. Current entrenched positions by existing professional groups need to be addressed in the context of patient care and equity and access of provision of service rather than professional 'turf'. New models of care need to be established, tested in the environment in which they will be used, and if successful then allowed to be implemented with all of the legislative and financial changes required to ensure appropriate uptake in the community.

I3

Recent advances in understanding the biomechanics of patellofemoral pain

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Journal of Foot and Ankle Research 2011, 4(Suppl 1):I3

While much of the major clinical and research interest in patellofemoral pain (PFP) has been targeted to the local knee muscles, it has long been recognized that proximal (hip and pelvis) biomechanics may be impaired in people with PFP. This clinical observation has led to recent research in pelvis and hip muscle contributions to PFP. Hip muscles (particularly the abductors and external rotators) are important in maintaining an optimal lower limb alignment during weight bearing activities. A growing body of contemporary evidence indicates that hip muscle function is compromised in PFP. This is highlighted by a recent systematic review, which found strong evidence for deficits in hip muscle strength (abduction, external rotation, extension) in women with PFP compared to uninjured controls. We have observed a delayed onset of gluteus medius electromyographic (EMG) activity in people with PFP compared to healthy controls, confirming earlier findings. Reduced strength or neuromotor control of these hip muscles may be associated with an increase in hip internal rotation and adduction, with deleterious consequences at the knee. Notably, altered proximal biomechanics (hip and pelvis) can influence local patellar alignments and joint stress. Thus, the available evidence supports altered proximal biomechanics as an important feature of PFP, and has provided impetus for contemporary clinical management, favouring hip muscle retraining. However, there is a dearth of clinical trials investigating the clinical efficacy of hip muscle retraining in PFP. Similar to vasti muscle dysfunction, individuals with hip muscle dysfunction form a subgroup of people with PFP. Interventions designed to enhance hip muscle function are likely to benefit patients with PFP. Further scientific evidence is required to confirm the role of hip muscle dysfunction in the development and management of PFP.

I4

Imaging-guided intervention of foot and ankle disorders

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Numerous degenerative, traumatic, overuse and inflammatory conditions occur about the foot and ankle both specific to the region and also as

part of generalised systemic processes. The risks, benefits, indications and contraindications of common imaging guided procedures will be discussed, such as the use of corticosteroids, autologous blood, platelet rich plasma, autologous tenocytes, alcohol, radiofrequency ablation and polidocanol, to name a few. The role that these interventions perform in the treatment algorithm will also be reviewed.

15

S4 prescribing for podiatrists

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Journal of Foot and Ankle Research 2011, **4(Suppl 1)**:15

This session will cover the legislation affecting the prescribing of scheduled medicines by endorsed podiatrists, possession, administration and supply. It will include the differences between state and territory drugs and poisons requirements, issues in the preparation of prescriptions and what can go wrong. Risk management and the role of podiatrists in the quality use of medicines in Australia will also be discussed.

16

The challenges of contemporary wound care

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Journal of Foot and Ankle Research 2011, **4(Suppl 1)**:16

Providing effective wound care to clients within the Australian context poses a number of challenges. For the clinician keeping abreast of continually changing arrays of products and supporting evidence is often daunting. For the client making sense of often conflicting advice and managing the personal costs of their treatment poses a significant challenge. For the health care provider providing efficient wound care within budgetary constraints is often difficult. Each of the above perspectives is examined and practical solutions discussed in order to help improve contemporary wound management practices. Approaches to categorising wound management products will be presented as well as a list of user friendly resources that can be used by the clinician to judge their efficacy. Contemporary wound management techniques will be discussed with a focus on simple interventions that will help reduce delayed wound healing. The community awareness campaign being conducted by The Australian Wound Management Association will also be presented providing clinicians with possible avenues for further involvement.

17

Podiatric surgery: friend or foe?

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Journal of Foot and Ankle Research 2011, **4(Suppl 1)**:17

Podiatric surgery within the UK remains controversial in some quarters and, despite being well established within many National Health Service (NHS) centres, myth and rumour remain. All too often individual concerns and misreporting can foster negative publicity, yet the quality and standard of practice have facilitated continued development and establishment of services. This presentation will review the common areas of confusion and overview training, regulation, interaction with government and other medical bodies. The available evidence base will be reviewed in relation to patient satisfaction and outcomes/complications. If the profession as a whole is to continue to develop, integrated care pathways will be an essential component. The relevance of podiatric surgery to the profession as a whole and methods for integrating practice will be discussed.

18

PASCOM

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Journal of Foot and Ankle Research 2011, **4(Suppl 1)**:18

PASCOM (Podiatric Audit in Surgery and Clinical Outcome Measure) is the national audit system used by the fellows of the Faculty of Podiatric Surgery, College of Podiatry, Society of Chiropractors and Podiatrists. This was initially developed as a 3 part audit system which captured data relating to the surgical event, post operative complications/outcome and patient satisfaction. Whilst this provided a wealth of data, there were limitations. In particular, data was captured locally and relied on centres submitting information. Furthermore, for training centres, it was more difficult to identify the role/interaction of the tutor and trainee. Extensive update with funding from the Society of Chiropractors and Podiatrists has enabled the development of Pascom-10. This is now a web based system which not only captures the previous data but also facilitates capture of outpatient information, injection therapy and includes a patient related outcome measure. Furthermore, it has been expanded to allow the general membership of the profession to record data relating to injection therapy and nail/skin surgery. This presentation will outline the original system and subsequent developments and detail how it can be integrated into practice.

19

The practical application of biomechanical theory for patient assessment

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Journal of Foot and Ankle Research 2011, **4(Suppl 1)**:19

Podiatric biomechanical assessment has become a fundamental cornerstone of podiatric practice. However, whilst there are many papers indicating the positive benefits of orthotic intervention, the underlying assessment philosophies remain controversial. The work produced by Root, Orien and Weed still underpins much of the current assessment and management techniques, yet key aspects of their concepts are not supported by scientific scrutiny. For every paper that seems to support aspects of function, there are more which do not support common theory. As a result, several conceptual assessment techniques have been developed and expounded although the evidence base to support these theories remains weak at best. This leaves the clinician who wishes to practice evidenced based medicine in a dilemma when presented with a patient in discomfort. To date, there has been little evidence to guide such an approach and thus replace the disproved theory. This workshop will review common assessment techniques and factors which effect limb function. It will outline an approach which can be taken to integrate these techniques and provide a basis for care utilising the current evidence available. This will include a practical demonstration of assessment techniques.

110

Neurological disorders affecting the lower limb in children

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Changes in foot and ankle posture are a normal aspect of infant and child development but may also reflect neurological conditions affecting the brain, spinal cord, peripheral nerves or muscles. Development of cavus or planus foot deformities often reflects underlying neurologic disorders and may predate development of more overt neurological signs. This session will concentrate upon signs and symptoms suggestive of occult neurologic problems in children presenting with positional or developmental abnormalities of the lower limbs.

I11

Evidence-based guidelines for the management of diabetic foot problems

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Journal of Foot and Ankle Research 2011, 4(Suppl 1):I11

Management of diabetic foot problems presents a series of complex challenges for patients and for health care professionals. Appropriate guidance on best practice is essential to delivering high-quality care. The NHMRC guidelines for the management of diabetic foot problems in primary care have just been updated to address this issue. The guidelines have been developed using systematic reviews of the literature, and broad consultation of organisations representing the relevant health care professionals and patients. The development of the guidelines, the evidence considered and the recommendations developed will be reviewed.

I12

The national registration and accreditation scheme

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Journal of Foot and Ankle Research 2011, 4(Suppl 1):I12

Australia is the first country in the world to have a national registration and accreditation scheme regulating health practitioners. All states and territories are part of the scheme, with Western Australia joining on 18th October 2010; the other states and territories commencing on 1st July 2010.

The theme of this conference is appropriately "Setting the Pace". The Podiatry Board of Australia (PodBA) was worked feverishly since its first meeting on 20th September 2009 to prepare for commencement day. The PodBA and the other nine national boards were challenged to prepare for the implementation of the "National Law" when the legislation had not been presented and passed through state and territory parliaments, when there were no offices and no staff for the support agency AHPRA (Australian Health Practitioners Regulation Agency) and when the Boards had no finances of their own.

The task has been enormous. Goodwill and faith in the process has been required of the community, governments, professions, accreditation organisations, educators, the state and territory boards and you the registrants. Thank you for your patience.

This presentation provides me with the opportunity to explain some of the functions of the PodBA and how they will impact you. Topics will include:

- The Registration and Accreditation Scheme
- Registration
- Registration Standards
- Codes and Guidelines
- The Public Register
- Notifications

The PodBA has a small booth in the Exhibition Hall. Please come to the display and introduce yourself to the Jenny Collis (Executive Officer for PodBA) and other members of the PodBA.

I13

The acute response of tendon to loading: implications for rehabilitation

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Journal of Foot and Ankle Research 2011, 4(Suppl 1):I13

Achilles tendinopathy is a common disorder involving physically active and sedentary individuals alike. Although the processes underlying its development are poorly understood, tendinopathy is widely regarded as an 'overuse' injury in which the tendon fails to adapt to prevalent loading conditions. Paradoxically, there is emerging evidence that heavy eccentric loading of the Achilles tendon may be an effective conservative approach for treatment of tendinopathy, with success rates of 60–80% reported. Interestingly, loading exercises involving other forms of muscle action, such as concentric activation, have been shown to be less effective treatment options. However, little is known about the acute response of tendon to exercise at present, and there are few plausible explanatory mechanisms for the observed beneficial effects of eccentric exercise, as opposed to other forms of strain stimuli. This paper presents the findings from a series of experiments undertaken to evaluate the effect of various strain stimuli on the time-dependent response of human Achilles tendon *in vivo*. It was shown for the first time, that heavy resistive ankle plantarflexion/ dorsiflexion exercises induced an immediate and significant decrease in Achilles tendon thickness (~15%). While thickness returned to pre-exercise levels within 24 hours, the recovery was exponential, with primary recovery occurring in less than 6 hours post-exercise. We proposed that such a diametral strain response with tensile loading reflects collagen realignment, Poisson's effects and radial extrusion of water from the tendon core. With unloading, the recovery of tendon dimensions likely reflects the re-diffusion of water via osmotic and/or inflammatory driven processes. Interestingly, prolonged walking was found to induce a similar diametral strain response. In subsequent studies, we demonstrated that eccentric exercise resulted in a greater reduction (-21%) in Achilles tendon thickness than isolated concentric exercise alone (-5%), despite a similar loading impulse. These novel findings, coupled with observations of a reduced diametral strain response with tendon pathology, highlight the importance of fluid movement to tendon function, nutrition and health. They also provide new insights into potential mechanisms underlying Achilles tendinopathy that impact rehabilitation strategies.

I14

The heel fat pad: mechanical properties and clinical applications

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The human heel pad is a highly specialised fibroadipose tissue that is hierarchically structured to dissipate the stress associated with weight-bearing activities. While the properties of the heel pad, as a whole, are believed to reflect those of the collagen- and elastin-rich septa which envelope adipocytes and confine their movement, the scientific literature provides little consensus on the properties of healthy heel pads. Experiments conducted *in vitro* typically yield stiffness and loss properties that differ by an order of magnitude to those performed *in vivo*. Such differences may, in part, reflect the difficulty in measuring heel pad mechanics *in vivo*. This paper reports the findings of a novel series of experiments in which a digital fluoroscope, synchronised with a pressure platform, was used to obtain force-deformation data of the heel pad during gait. Transient loading profiles associated with walking were observed to induce rapidly changing deformation rates in the heel pad and resulted in irregular load-deformation curves. Initial stiffness (32 N.mm⁻¹) of the heel pad was an order of magnitude lower than its final stiffness (212 N.mm⁻¹), which, in turn, was similar to that reported for cadaveric heel pads (296 N.mm⁻¹) when impacted at comparable energies of 1.45 J. While the energy dissipating ratio of the heel pad (0.66 ± 0.12) fell between those commonly cited for mechanical tests of cadaveric heels and impact loading *in vivo*, peak deformation of the fat pad (10.3 mm) approached that predicted for the limit of pain tolerance (10.7 mm), suggesting that the heel pad operates near its physiological maximum, even at the relatively modest speeds encountered during walking. In plantar heel pain, the elastic properties of the heel pad remained unaltered. However, energy loss within the tissue was reduced in symptomatic limbs and was also correlated with

the sonographic thickness of the plantar fascial enthesis. These findings suggest that viscosity, rather than elasticity, of the heel fat pad may play an important role in the severity of heel pain and provides a previously unidentified link between the mechanical behaviour of the plantar fat pad and plantar heel pain.

ORAL PRESENTATIONS

O1

The reliability of a new method for inter-metatarsal angle assessment in hallux valgus surgery

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Journal of Foot and Ankle Research 2011, 4(Suppl 1):O1

Background: The assessment of the intermetatarsal angle associated with hallux valgus has been investigated numerous times within the literature with multiple assessment methods, often producing conflicting results, being presented. The centre of the head method as described by Mitchell in 1958 is a common assessment method however the potential complications associated with post medial eminence cheilectomy is of concern.

Methods: The two presented methods including the standard method of measurements using the centre of the metatarsal head's articular surface was assessed and directly compared to the newly presented 'lateral' method whom use the most lateral border of the metatarsal head. 33 patients with pre and post operative AP/DP radiographic images were assessed by three clinicians of varied experience on three separate occasions using the two assessment methods. Pearson's Correlation Coefficient (PCC) and Bland Altman plots were used to assess agreement between the methods. Whilst ANOVA and Intraclass Correlation Coefficient were used to assess interobserver and intraobserver reliability.

Results: The correlation between the two assessment methods was strong with PCC demonstrating 0.903 on pre and postoperative assessment together. The agreement between the two methods showed no statistically significant difference ($p=0.392$) on the preoperative assessment results obtained. Postoperatively there was a statistically significant difference ($p<0.001$) with the Mitchell method demonstrating a $+2.8^\circ$ increase in IMA correction post intervention compared to the lateral method. The ICC demonstrated both methods to have very high intraobserver (range, 0.821 to 0.935) values although the lateral method was more superior in four of the six assessments undertaken. Both methods demonstrated very high interobserver (range 0.872 to 0.944) values with the lateral method demonstrating more superior results in both pre and postoperative assessments.

Conclusions: Intermetatarsal angles made on pre and postoperative radiographs were more reliable when using the newly presented lateral method. Further investigation is required to identify why the Mitchell method, on average, produces a 3° improved intermetatarsal angle post intervention. Based on the results presented the lateral method should be implemented into the clinical setting.

O2

Acute effects of a shoe with enhanced plantar sensory feedback on midfoot kinematics whilst walking

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Background: Excessive foot pronation has been associated with injuries of the lower extremity. No research has investigated the effect of altering plantar sensation on foot pronation. The aim of this study was to determine whether a shoe with enhanced plantar sensory feedback could reduce midfoot pronation.

Methods: The midfoot kinematics of 21 males were recorded whilst walking in a neutral shoe, a neutral shoe with a foot orthotic and a neutral shoe with nodules located on the plantar medial aspect of the foot (experimental shoe). Electromyography of the peroneus longus,

tibialis anterior and medial gastrocnemius was also recorded and analysed. A Friedman's ANOVA was used to evaluate differences between shoe conditions, and a Wilcoxon signed ranks test was conducted to establish where the differences occurred.

Results: The results demonstrated that midfoot-tibia angles were significantly more supinated during the loading phase when wearing the experimental shoe (median = 47.70°) than when wearing a neutral shoe (median = 41.50° ; $p = 0.008$) or a neutral shoe with a foot orthotic (median = 42.17° ; $p=0.008$). In the midstance phase, supination angles in both the orthotic and experimental shoes were higher than that of the neutral shoe, with the former reaching significance (median = 19.56° ; $p = 0.006$). During the propulsive phase findings were similar, with a significantly more supinated position in the experimental shoe (median = 48.30) than the neutral shoe (median = 37.47° ; $p = 0.006$) or the neutral shoe with a foot orthotic (median = 40.87° ; $p=0.010$). No significant differences were observed for any muscle group at any stage of the gait cycle.

Conclusions: Increasing plantar sensory feedback to the medial aspect of the foot reduces midfoot pronation during an acute bout of walking, this may have important implications in relation to our prescription of both athletic footwear and orthotic devices. Further work is needed to explore whether these effects remain over longer time periods.

O3

Tibial acceleration variability during consecutive gait cycles is influenced by the menstrual cycle

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Background: The relationship between the phases of the menstrual cycle and injury risk remains unclear. Neuromuscular function may be compromised during menstruation, which could result in reduced cyclicality of movement patterns. We hypothesize that mediolateral (varus/valgus) knee acceleration during running gait will possess increased variability during menstruation when compared to \approx ovulation in women who do not take the monophasic oral contraceptive pill (MOCP).

Methods: Thirty-six women (18 MOCP users: MOCP group and 18 non-pill users: NP group) performed six minute treadmill running trials at 10 km h^{-1} with an accelerometer fixed to the proximal tibia. Trials were performed at menstruation and \approx ovulation (for the MOCP group at a similar stage of the cycle) in a randomized order. The cyclicality of gross mediolateral tibial acceleration during 15 consecutive strides was assessed using combined wavelet and autocorrelation analysis. Longitudinal and anteroposterior accelerations were also examined. Repeated measures analysis of variance (ANOVA) tests were performed to assess differences at each stage of the menstrual cycle ($\alpha=0.05$).

Results: Gross mediolateral acceleration in the NP group had significantly ($P=0.022$) increased variability at the time of menstruation compared to \approx ovulation, and was also significantly ($P=0.011$) more variable than the MOCP group at the corresponding time point. No significant difference was observed for any measure in the MOCP group.

Conclusions: Increased variability in the NP users at menstruation may be a result of compromised motor control strategies. This provides further evidence of variability in performance and motor control during menstruation, and may have implications for a female athlete's risk of injury, particularly at the level of the knee.

O4

Kinematics associated with foot pronation in individuals with patellofemoral pain syndrome: a case-control study

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Background: Excessive foot pronation during gait is frequently linked to patellofemoral pain syndrome (PFPS) development, due a proposed coupling of increased foot pronation with increased tibial and femoral

internal rotation. However, there is a paucity of research which has compared kinematics associated with foot pronation between individuals with PFFS and controls. The aim of this study was to compare forefoot, rearfoot and tibial kinematics associated with foot pronation between individuals with PFFS and controls.

Methods: Twenty-six individuals with PFFS (5 males and 21 females) and 20 controls (4 males and 16 females) aged between 18 and 35 were recruited. Three dimensional motion data was collected during natural comfortable walking using the Vicon motion analysis system incorporating the Oxford Foot Model. Between-group comparisons were made for magnitude and timing of peak angles, and range of motion at the forefoot (dorsiflexion and abduction), rearfoot (eversion) and tibia (internal rotation).

Results: The PFFS group exhibited a trend towards slower walking velocity, ($p = 0.07$) so due to the potential of this to influence kinematics, all comparisons between the groups were adjusted for velocity. The PFFS group demonstrated earlier peak rearfoot eversion relative to the laboratory (30.4% versus 35.3% of the gait cycle, $p = 0.01$) and relative to the tibia (32.7% versus 36.5% of the gait cycle, $p = 0.03$). Effect sizes for these timing differences were -0.83 (-1.42 to -0.21) and -0.66 (-1.24 to -0.05), respectively. No significant differences were found for any variables associated with forefoot or tibial motion.

Conclusions: Earlier peak rearfoot eversion in individuals with PFFS may indicate more rapid foot pronation following heel strike when walking. Due to the potential influence of this on knee and patellofemoral joint loading, this may be a factor related to the pathomechanics of PFFS development.

O5

Clinical and kinematic predictors of foot orthoses efficacy in individuals with patellofemoral pain syndrome

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Journal of Foot and Ankle Research 2011, 4(Suppl 1):O5

Background: There is emerging evidence that foot orthoses are effective in the management of patellofemoral pain syndrome (PFFS), however the identification of those most likely to benefit from orthoses has not been adequately explored. The primary aim of this study was to develop a clinical prediction rule to help identify individuals with PFFS who are most likely to benefit from foot orthoses. The secondary aim was to determine whether kinematic measures of lower limb function are associated with foot orthoses efficacy.

Methods: Sixty individuals with PFFS were issued with non-customised prefabricated foot orthoses (Vasyli Pro, Vasyli International), and patient-reported level of improvement was documented at 12 weeks. Potential baseline predictor variables of interest included demographics, pain characteristics, foot and footwear characteristics, and functional performance measures. In a subset of 26 participants, 3D kinematics of the lower limb were measured using a motion analysis system and these variables were explored for their relationship with the degree of clinical improvement.

Results: Of the 57 participants who completed the study, 25% (14) reported marked improvement at 12 weeks. The probability of marked improvement was 78% if three out of the following four criteria were met: (i) a footwear motion control properties subscale of less than 5 (indicative of less supportive footwear), (ii) usual pain less than 22 mm on a 100 mm visual analog scale, (iii) ankle dorsiflexion range of motion with knee flexed less than 41 degrees, and (iv) immediate reduction in single leg squat pain when wearing the orthoses. In the kinematic sub-analysis, only one variable was significantly associated with marked improvement: greater peak rearfoot eversion.

Conclusions: Individuals with PFFS who wear less supportive footwear, report lower levels of pain, exhibit less ankle dorsiflexion range of motion and who report an immediate reduction in pain with foot orthoses when performing a single leg squat are more likely to benefit from foot orthoses. In addition, the kinematic analysis revealed that foot orthoses may be most effective in individuals with PFFS who demonstrate increased foot pronation during gait.

O6

Mapping load transfer from the plantar surface of the foot to the wall of the total contact cast (TCC)

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Background: The success of the total contact cast (TCC) is attributed to its ability to reduce pressure at the ulcer site coupled with forced patient compliance. The mechanism of offloading plantar pressure with a TCC is purported to be by redistributing weight-bearing force across the entire plantar surface of the foot and increasing the plantar surface contact area. An examination of the contact area data and regional pressure patterns between conditions in previous work suggested that this is not entirely the case. These results generally support the theory that total contact casting transfers load to the cast walls; however, this has not previously been measured.

Methods: Two 15x3 cm strips of capacitance sensors (novel pliance, Germany) with a resolution of 1 sensor/cm² were placed at various locations around the lower leg to map the load between the leg and the cast wall in one healthy and one diabetic participant. Seven different locations on the lower leg were required. Plantar pressure data were collected simultaneously using an in-shoe pressure sensor (novel pedar, Germany) in both the TCC and running shoe on the other foot. Data were collected dynamically whilst the participants travelled at approximately 0.4m/sec along a 9m walkway. Both capacitance sensor systems sampled at 50 Hz.

Results: Preliminary analysis reveals that the highest pressure values are visible in two locations on the leg: 1. postero-lateral, along a line posterior to the fibula head and posterior to the lateral malleolus, and; 2. along the lateral border of the tibia. Plantar pressure data indicate that the maximum pressure in the TCC was reduced compared to the running shoe. The healthy participant recorded mean maximum pressure values of 224±28 kPa in the running shoe and 159±34 kPa in the TCC. This between-shoe trend was similar in the diabetic patient (337±36 kPa and 177±18 for the running shoe and cast respectively) but with higher maximum pressures evident in the running shoe.

Conclusion: This study helps to understand the mechanism of pressure offloading by investigating the interaction between cellular urethane and the ulcer region during walking combined with biomechanical examination of the cast walls and moulding of materials.

O7

Lateral wedge shoe insoles for medial knee osteoarthritis: a 12-month randomised controlled trial

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Background: The majority of clinical guidelines recommend lateral wedge shoe insoles for medial knee osteoarthritis (OA), despite limited and equivocal evidence of efficacy. The objective of this study was to assess efficacy of lateral wedge insoles for improving symptoms and slowing structural disease progression compared with control insoles in medial knee OA.

Methods: A randomised participant- and assessor-blinded controlled trial was used. 200 people aged 50 or more with clinical and radiographic diagnosis of mild-to-moderately severe medial knee OA were recruited. The interventions consisted of full-length 5° lateral wedged insoles or flat control insoles worn inside the shoes daily for 12 months. The primary symptomatic outcome was change in overall knee pain (past week) measured on an 11-point numeric rating scale and primary structural outcome was change in medial tibial cartilage volume from magnetic resonance imaging. Secondary clinical outcomes included changes in measures of pain, function, stiffness, and health-related quality of life. Secondary structural outcomes included progression of medial cartilage defects and bone marrow lesions.

Results: There were no significant between-group differences for the primary outcomes of change in overall pain (-0.3 points 95% CI (-1.0 to 0.3)) and change in medial tibial cartilage volume (-0.4 mm³ (-15.4 to 14.6)). None of the changes in secondary outcomes demonstrated differences between groups.

Conclusion: In this study, lateral wedge insoles worn for 12 months provided no symptomatic or structural benefits compared to a flat control insole.

08

Diabetes related foot disease; 'know thine enemy'

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Background: Information describing variation in health outcomes for individuals with diabetes related foot disease (DRFD), across socioeconomic strata is lacking. Focussing on the clinical aspects of foot disease, in individuals with DRFD that reside in areas of known social disadvantage, may not result in the desired clinical outcomes. The aim of this study was to investigate variation in rates of hospital separations for DRFD and the relationship with levels of social advantage and disadvantage.

Methods: Using the Index of Relative Socioeconomic Disadvantage (IRSD) each Local Government Area (LGA) across Victoria was ranked from most to least disadvantaged. Those LGAs ranked at the lowest end of the socioeconomic scale (Group A) were compared with those at the higher end of the scale (Group B) in terms of total and per capita hospital separations for peripheral neuropathy, peripheral vascular disease, foot ulceration, cellulitis, osteomyelitis and amputation. Hospital separations data was compiled from the Victorian Admitted Episodes Database (VAED).

Results: Total and per capita separations were 2,268 (75.3/1,000) and 2,734 (62.3/1,000) for Groups A and B respectively. Most notable variation was for foot ulceration (Group A 18.1/1,000 Vs Group B 12.7/1,000, rate ratio 1.4, 95%CI 1.3, 1.6) and below knee amputation (Group A 7.4/1,000 Vs Group B 4.1/1,000, rate ratio 1.8 95%CI 1.5, 2.2). Males recorded a greater overall number of hospital separations across both socioeconomic groups with 66.2% of all separations for Group A and 81.0% of all separations for Group B recorded by males. However, when comparing mean age, males from Group A tended to be younger when compared with males from Group B (mean age 53 years Vs 68.7 years).

Conclusions: Variation appears to exist for hospital separations for DRFD across socioeconomic strata. Specific strategies should be incorporated into health policy and planning to combat disparities between social status and health outcomes.

09

Defining standards for modelling the biomechanics of the foot and ankle: a systematic review

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Background: The complex interaction of the bones of the foot has been explored in detail in recent years, which has led to the acknowledgement in the biomechanics community that the foot can no longer be considered as a single rigid segment. With the advance of motion analysis technology it has become possible to quantify the biomechanics of simplified units or segments that make up the foot. Advances in technology coupled with reducing hardware prices has resulted in the uptake of more advanced tools available for clinical gait analysis. The increased use of these techniques in clinical practice requires defined standards for modelling and reporting of foot and ankle kinematics. This systematic review aims to provide a critical appraisal of commonly used foot and ankle marker sets designed to assess kinematics and thus provide a theoretical background for the development of modelling standards.

Methods: An electronic database search was performed in March 2010. The search strategy used was "foot model* AND human* AND kinematic* AND (gait* OR ergonomic* OR automotive*)". The secondary snowball method was applied to identify literature not identified during the electronic database searching process. Inclusion/exclusion criteria were applied by one reviewer (CB). Data was extracted based on standardised protocol. The quality of studies was assessed by two reviewers (CB and DT) based on a custom built assessment tool.

Results: The initial electronic database search identified 287 articles. 224 were excluded on review of title and abstract only. Inclusion/exclusion criteria excluded 48 articles. A secondary snowball search identified a further 4 articles. 19 original articles were included in the final review.

Conclusions: The results of this systematic review suggests that the foot should either be modelled as a single rigid segment to analyse ankle joint kinematics or at least three segments to properly define hind-, mid- and forefoot kinematics. Future analysis of interventions such as in-shoe wedging, foot orthoses and footwear design requires such a model. However, health professionals must appreciate that the complexity of the marker set used should be indicative of the complexity of the analytical question being asked.

010

The effect of different depths of medial heel skive on plantar pressures

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Background: Foot orthoses are often used to treat lower limb injuries associated with excessive pronation. There are many orthotic modifications available for this purpose, with one being the medial heel skive. However, empirical evidence for the mechanical effects of the medial heel skive is limited. This study aimed to evaluate the effect that different depths of medial heel skive have on plantar pressures.

Methods: Thirty healthy adults aged over 18 years with flat feet and no current foot pain or deformity participated in this study. Using the in-shoe Pedar[®] system, plantar pressure data were collected for the heel, midfoot and forefoot while participants walked along an 8 metre walkway wearing a standardised shoe. Experimental conditions included the following 4 orthotic variants: (i) no heel skive, (ii) 2 mm heel skive, (iii) 4 mm heel skive and (iv) 6 mm heel skive.

Results: Compared to the foot orthoses with no heel skive, statistically significant increases in peak pressure were observed at the medial heel – there was a 15% increase (p = 0.001) with the 4 mm skive and a 29% increase (p < 0.001) with the 6 mm skive. No significant change was observed with the 2 mm heel skive. With respect to the midfoot and forefoot, there were no significant differences between the orthoses.

Conclusions: These findings indicate that a medial heel skive of 4 or 6 mm can increase peak pressure under the medial heel in asymptomatic flat-footed individuals. Plantar pressures at the midfoot and forefoot were not affected by a medial heel skive of 2, 4 or 6 mm. These findings provide some evidence for the effects of the medial heel skive orthotic modification.

O11

The evaluation of athletic footwear on postural stability in older adults: an exploratory study

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Background: A decrease in postural stability may increase the risk of falling in the older adult. The relationship between athletic footwear and postural stability has been reported in previous studies with conflicting results. The aim of the current study is to evaluate differences between two different types of athletic footwear and barefeet, in relation to postural stability in asymptomatic older adults.

Methods: Twenty-one older adults (mean: 74 SD: 5 years) were recruited from a University-based clinic. The cross-sectional study evaluated two different walking shoes (shoe 1: ASICS Gel Odyssey™; shoe 2: ASICS Cardio Velcro™) and barefoot. Participants gave informed consent and attended a laboratory setting where they carried out standard tests of quiet standing balance of 30 seconds duration on a Tekscan Matscan® pressure mat. Each participant performed three repetitions of bipedal standing with eyes open and eyes closed under three randomised conditions. Two-way, repeated measures, within-groups Analysis of Variance (ANOVA) examined significant differences between the three footwear conditions and two vision conditions in terms of postural sway in quiet standing. Postural sway was measured as centre of pressure excursions in an anterior-posterior (AP) and medio-lateral (ML) direction (cm).

Results: The results demonstrated a significant difference ($p < 0.05$) in AP postural direction with eyes open between barefoot (Mean: 1.39; SD: 0.58cm) and shoe 1 (Mean: 1.76; SD: 0.48cm); and shoe 2 (Mean: 1.74; SD: 0.52cm). The results also demonstrated a significant difference in AP postural direction ($p < 0.05$) with eyes closed between barefoot (Mean: 1.72; SD: 0.58cm) and shoe 1 (Mean: 2.25; SD: 0.86cm); and shoe 2 (Mean: 2.31; SD: 0.81cm). No significant difference in mean ML postural direction between the two footwear conditions and barefoot, with eyes open and eyes closed was found ($p > 0.05$).

Conclusions: In both of the walking shoes, when standing with eyes open and eyes closed, AP sway range was significantly increased when compared to barefeet. The results suggest that older adults demonstrate an initial destabilisation effect, which could possibly be of benefit to functional ability over a longer duration. The potential of athletic footwear to enhance postural stability requires further long-term investigation.

O12

Development, reliability and validity of the Charcot-Marie-Tooth disease Pediatric Scale (CMTPedS)

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Background: Charcot-Marie-Tooth disease (CMT) causes peripheral nerve demyelination, progressive foot weakness, cavus deformity, difficulty walking and sensory loss. There is a need for accurate, sensitive and disease-relevant measures of young children through to adolescents with CMT to enable accurate assessment of baseline performance, monitor disease severity longitudinally, and determine responses to existing and novel foot and ankle interventions. Our objective was to develop a

multidimensional scale to measure disease severity of children with CMT, known as the CMT Pediatric Scale (CMTPedS).

Methods: The CMTPedS has undergone a thorough development process: (1) definition of the construct; (2) generation of the item pool; (3) choice of scoring format; (4) peer-review (face validity); (5) pilot testing; (6) standardised training; (7) inter-rater reliability of four international centres assessing eight children with CMT; (8) multicenter implementation.

Results: Findings of the development process: (1) the CMTPedS is a composite scale with broad application to measure disease severity of childhood CMT with eight domains capturing symptoms, foot/ankle involvement, lower limb sensation, hand dexterity/strength, balance, motor function; (2) a large pool of items generated from the literature were reduced based on disease-specificity, functional/patient-relevance, reliability/validity, published norms, test duration and ease of interpretation; (3) items collapsed to 5-point Likert scales using z-scores based on age/gender norms; (4) quality, appropriateness and suitability of items peer-reviewed by 23 expert clinicians/researchers/patient representatives at the 168th European Neuromuscular Centre International Workshop; (5) pilot-tested on four children with CMT to check for administration problems, item instructions, order and duration; (6) clinicians from USA, UK, Italy and Australia trained through workshops, online manual and video resources; (7) all items exhibited good to excellent inter-rater reliability ($ICC_{2,4} 0.78-0.99$) (8) a multicenter natural history study of children with all types of CMT aged 3-17 years is underway, with 90 children recruited to date.

Conclusions: Application and psychometric validation of the CMTPedS continues. We plan to apply the final CMTPedS as the primary outcome in clinical trials of podiatric, pharmacological and surgical interventions.

O13

Are prefabricated foot orthoses still effective in reducing plantar pressures after 12 months of wear?

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Background: Foot problems are highly prevalent in older people, and prefabricated ('off-the-shelf') foot orthoses are frequently prescribed in this age-group. However, such devices are susceptible to material compression and deformation, which may reduce their effectiveness over time. Therefore, the aim of this study was to investigate the difference in plantar pressures between prefabricated orthoses worn for at least 12 months to new prefabricated orthoses in older people.

Methods: Thirty-one adults aged over 65 years who were taking part in a larger falls prevention trial were recruited (21F, 10M, mean age 75.4±5.2 years). Plantar pressure data was recorded using the PEDAR® in-shoe system while participants walked along an eight metre walkway wearing shoes only, new prefabricated orthoses and orthoses they had been wearing for at least 12 months. The orthoses used were Formthotics® dual density red. Pressure data (peak pressure, maximum force and contact area) were collected for the forefoot, midfoot, and rearfoot.

Results: The new and old orthoses functioned similarly, with both devices significantly reducing peak pressures at the heel (new=23%, old=18%) compared to the shoe only condition. The reduction in peak pressures was achieved by corresponding increases in maximum force at the midfoot (new=42%, old=44%), and contact area at the midfoot (new=51% and old=53%) and forefoot (new=11%, old=13%) compared to the shoe only condition. There were no significant differences between the old and new orthoses, with the exception of small but statistically significant increases in peak pressure at the heel (6%) and maximum force at the heel (5%) and forefoot (2%) in the old orthoses compared to the new orthoses.

Conclusions: Prefabricated foot orthoses worn by older people for at least 12 months are similarly effective at reducing plantar pressures compared to new orthoses, indicating there is only limited deformation over a 12 month period. Therefore, in this age-group, there may not be a need to replace the orthoses as frequently as previously thought.

O14

Radiographic correlates of hallux valgus severity in older people

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Background: The severity of hallux valgus is easily appreciated by its clinical appearance, however x-ray measurements are also frequently used to evaluate the condition, particularly if surgery is being considered. There have been few large studies that have assessed the validity of these x-ray observations across a wide spectrum of the deformity. In addition, no studies have specifically focused on older people where the progression of the disorder has largely ceased. Therefore, this study aimed to explore relationships between relevant x-ray observations with respect to hallux valgus severity in older people.

Methods: This study utilised 402 x-rays of 201 participants (74 men and 127 women) aged 65 to 94 years. All participants were graded using the Manchester Scale - a simple, validated system to grade the severity of hallux valgus - prior to radiographic assessment. A total of 19 hallux valgus-related x-ray observations were performed on each set of x-rays. These measurements were then correlated with the Manchester Scale scores.

Results: Strong, positive correlations were identified between the severity of hallux valgus and the hallux abductus angle, the proximal articular set angle, the sesamoid position and congruency of the first metatarsophalangeal joint. As hallux valgus severity increased, so did the frequency of radiographic osteoarthritis of the first metatarsophalangeal joint and a round first metatarsal head. A strong linear relationship between increased relative length of the first metatarsal and increased severity of hallux valgus was also observed.

Conclusions: Strong associations are evident between the clinical appearance of hallux valgus and a number of hallux valgus-related x-ray observations indicative of structural deformity and joint degeneration. As it is unlikely that metatarsal length increases as a result of hallux valgus deformity, increased length of the first metatarsal relative to the second metatarsal may be a contributing factor to the development and/or progression of hallux valgus.

O15

Development of a parental report questionnaire for restless legs syndrome (RLS) in children: the RLSQ

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Background: Restless legs syndrome (RLS) in children is commonly reported, yet frequently undiagnosed. RLS can cause significant sleep disturbance and its associated deficits may have cardiovascular and neurocognitive consequences. Growing pains (GP) is often confused or synonymous with RLS, yet has been better researched and can be identified by parental questionnaire. RLS has not been able to be so distinguished, which renders an outstanding need. Therefore this study aimed to develop and validate a questionnaire to identify RLS, in children. The significance of this project is that RLS in children will be better identified in children for the first time.

Methods: A process of triangulation was undertaken to develop the RLS questionnaire. The literature, parent interviews and a children's focus group were the sources of initial data. Themes were extracted by independent review of the transcripts and the questionnaire was subsequently constructed and validated. The reliability of the questionnaire was examined using a same subject, repeated measures study.

Results: The interviews covered the parent's accounts of RLS in six children (two girls, four boys) all aged between eight and 10 years. The focus group obtained the experience of children suffering RLS. A questionnaire of

11 questions was developed and validated from a small convenience sample ($n = 11$). Internal consistency yielded 65% and repeat measures reliability $\rho = 0.58$.

Conclusions: The questionnaire developed enables RLS to be identified in children specifically and for the first time. Such instrumentation may be used to establish prevalence, discriminate RLS from GP, to evaluate management programs and to assist treating clinicians.

O16

Assessment and management of pain in chronic wounds: a national survey of Australian health care practitioners caring for people with chronic wounds

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Background: Pain is one of the key characteristics which distress patients with chronic wounds. Chronic wound pain has a significant impact on the patient's quality of life and delays wound healing. Assessment and management of pain during wound dressing changes is well addressed, however, chronic persistent wound pain is under-assessed and under-treated resulting in patients' perception that wound pain is something they have to suffer or manage themselves. The purpose of this study was to investigate wound practitioners assessment of chronic persistent wound pain. It sought to identify what assessment tools are utilised in determining the level of pain, the frequency of assessment and how the pain is managed.

Methods: A national mail survey of members of the Australian Wound Management Association was conducted. The 54% response rate included nurses, podiatrists and doctors. A cross sectional descriptive analysis will be conducted of the results.

Results: Preliminary results showed that health professionals do ask patients about wound pain mostly during wound dressing changes. Methods routinely used to assess pain were by talking to the patient or pain rating scales. Several major themes emerged linking wound pain and limitations in providing effective wound pain management.

Conclusion: This study identified that various methods of assessment are utilized to identify pain in chronic wounds, however barriers exist that impact the implementation of effective pain management.

O17

Treating lower limb muscle cramps: a Cochrane systematic review

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Background: Muscle cramps affect approximately 1 in 3 people in the general community each year. Many interventions are available for lower limb cramps, but not all are efficacious or supported by evidence. Many treatments are controversial, no treatment guidelines exist, and many people experience no benefit from the interventions prescribed. In clinical trials, no drug treatment for cramps has demonstrated consistent effectiveness and safety and none are approved by the Australian Pharmaceutical Benefits Scheme or the American Food and Drug Administration for the most common form of cramp; nocturnal leg cramps. Due to the unclear risk/benefit ratio of many drug treatments, patients are encouraged to try non-drug treatments. The aim of this project was to systematically review the evidence for non-drug treatments for lower limb cramp.

Methods: We searched MEDLINE, EMBASE and CENTRAL up to April 2010 for randomised controlled trials of any type of non-drug treatment for lower limb cramp in adults and children. Review methods were according to a peer-reviewed Cochrane protocol.

Results: 1,284 potentially relevant trials were retrieved and screened for inclusion. Trials were translated from Swedish, French and German. Authors of five trials were requested to provide more information. Of these studies, four have been excluded and the inclusion of the final study is pending the provision of additional information by the author. Complete results will be presented at the conference.

Conclusions: This systematic review identifies a desperate need for clinical research of non-drug therapies for lower limb muscle cramps. We are now investigating factors associated with lower limb muscle cramp to help identify non-drug therapeutic targets for sufferers of this common complaint.

O18

Calf cramp in children with Charcot-Marie-Tooth disease: searching for therapeutic targets

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Background: Leg muscle cramps have been identified as the strongest independent predictor of worse quality of life in Australian children with Charcot-Marie-Tooth disease Type 1A (CMT1A). There is no accepted treatment for cramp in children with CMT and the cause of cramp is not well understood. Potential therapeutic targets should be carefully identified to direct clinical trials of interventions.

Methods: 81 children aged 2-16 years with CMT1A were recruited nationally through the Australasian Paediatric Charcot-Marie-Tooth Disease Registry. Body size and measures of strength, ankle range, foot posture, balance, agility, endurance, gait and neurophysiology were assessed at The Children's Hospital at Westmead (Sydney) and Royal Children's Hospital (Melbourne). Data analysis included Pearson product moment and Spearman rank correlation coefficients for normally and non-normally distributed continuous data respectively, and Fischer's exact test for dichotomous data.

Results: Of the 81 children, 26 reported calf cramp and 1 child each reported toe, quadriceps or arm cramp. Calf cramp was associated ($p < 0.05$) with older age; stronger foot inversion, eversion, dorsiflexion and plantarflexion measured with a hand held dynamometer; and better performance in long jump. When adjusted for age, foot strength and long jump performance were not associated with cramp. Interestingly, stronger fist grip and worse performance on the 9-hole peg test (a measure of fine motor coordination) were associated with calf cramp and remained associated when accounting for age. Children who experienced calf cramp were also more likely to experience hand tremors (42% vs 16%; $p=0.004$). Calf cramp was not associated with body mass index, ankle dorsiflexion range, foot posture, balance, agility, gait parameters or nerve conduction velocity. Results of logistic regression modelling will be presented at the conference.

Conclusions: No physical or neurophysiological lower limb measure was associated with calf cramp when accounting for age. The association between increased age and cramp may be due to disease severity and/or progression. This hypothesis is supported by the association of calf cramp with hand tremors and worse fine motor coordination, yet does not explain increased grip strength. Paradoxically, calf cramp is not associated with any lower limb measure of disease severity/progression.

O19

Frequent discordance between clinical and musculoskeletal ultrasound examinations of foot disease in juvenile idiopathic arthritis observed in the multidisciplinary setting

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Background: Ultrasound has shown promise for detection of sub-clinical disease in JIA. This may be particularly beneficial for the foot and ankle joints, which are difficult to examine in children. Early detection of sub-clinical foot disease permits earlier intervention which may improve outcome. The aim of this study was to evaluate agreement between clinical and ultrasound examinations of foot disease in JIA.

Methods: Thirty patients with JIA underwent clinical and US examination of 24 foot joints, 10 tendons and 6 peri-articular soft tissues. Each site was examined independently by a rheumatologist and a podiatrist for synovitis, and tenderness/swelling. At the same sites the sonographer examined independently for effusion, synovial hypertrophy, power Doppler signal (PS), tenosynovitis, or abnormal tendon thickening. Agreement was estimated using Cohen's unweighted kappa (κ) (>0.4 = moderate agreement) with associated 95% confidence intervals.

Results: 720 joints, 300 tendons and 180 soft tissue sites were assessed. Clinically detected synovitis, tenderness and swelling were recorded in 42 (5.8%), 78 (10.8%) and 73 (10.1%) joints respectively. US-detected effusions, synovial hypertrophy and PS were recorded in 88 (12.2%), 47 (6.5%) and 12 (1.7%) joints. Tenderness and swelling were recorded in 29 (9.7%) and 16 (5.3%) tendons and 28 (15.6%) and 9 (5%) soft tissues. US-detected tenosynovitis and PS were detected in 7 (2.3%) and 6 (2%) tendons. Abnormal thickening of the plantar fascia origin and Achilles tendon insertion were detected at a frequency of 4/60 (6.7%) and 1/60 (1.7%), and 3/60 (5%) effusions were recorded at the retro-calcaneal bursa. Subclinical foot disease was discovered in 52 (7.2%) joints, 5 (1.6%) tendons and 4 (2.2%) soft tissue sites. Agreement was consistently less than moderate ($\kappa < 0.4$) for each clinical and US interaction. There was moderate agreement between the rheumatologist and podiatrist for active synovitis versus joint swelling ($\kappa = 0.52$).

Conclusions: There is frequent discordance between clinical and US assessments of foot disease in JIA. Subclinical foot disease appears common; however clinical examination also detected features of active disease in structures that were recorded as normal on US. These findings suggest US may be a useful tool to aid clinical examination of the foot in JIA patients.

O20

Application of a novel multi-segment foot model to assess foot function in children and adolescents with juvenile idiopathic arthritis

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Background: Foot and ankle disease has been associated with impairments and disability in JIA, and altered gait patterns have been described. However, the extent to which disease-related foot impairments impact on localised biomechanical foot function remains unknown. The aim of this study was to compare biomechanical foot function between patients with JIA and healthy participants.

Methods: 14 JIA patients with a history of foot disease and 10 healthy controls were recruited. Participants underwent 3D gait analysis, plantar foot pressure and spatio-temporal gait evaluation. Each participant completed the Juvenile Arthritis Foot Disability Index (JAFI) and CHAQ. US scores for effusions and synovial hypertrophy, tender/swollen foot joint counts, and deformity scores were recorded to assess localised disease activity and impairments. Mean differences and 95% confidence intervals (CI) were calculated using the t distribution.

Results: In the JIA group there were low but variable levels of localised disease activity indicated by low median (range) scores for tender [0 (0-4); 0 (0-5)], and swollen foot joints [0 (0-3); 0 (0-3)], US effusions [2 (0-6); 3 (0-7)] and synovitis [0 (0-3); 0 (0-2)]. Mild to moderate foot related impairments [JAFI; 1 (0-3)] and foot deformity scores [forefoot; 2 (0-7), 0.5 (0-5); rearfoot; 2.5 (1-5); 3.5 (2-5)] were observed. No significant differences were observed between group means for all core variables except right peak mid-foot dorsi-flexion [mean (95% CI) difference -3.04° (-5.79, -0.30)]. There were trends towards reduced walking velocity [mean difference 7.81cm/s (-8.26, 23.88)], greater variability in mid-foot contact

area (cm²) [mean (SD) 19.77 (11.63); 19.04 (12.27) JIA group versus 19.31 (5.29), 19.01 (4.46) controls], and lower peak forefoot pressures (kPa) in the JIA group [mean difference 59.33 (-58.38, 177.03); 13.36 (-121.02, 147.73)].

Conclusions: At the group level, foot function appeared normal despite moderate levels of self reported impairment and disability in participants with JIA. At the individual level detailed changes in foot function relevant to flat-footedness or highly arched foot types were detected. Preliminary findings suggest that such foot types may be associated with abnormal foot segment rotations. Further study is required to evaluate foot biomechanics in clinically meaningful homogeneous subgroups of JIA patients.

O21

Improving the outcomes of foot and ankle surgery through the audit cycle: a case study

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The direct costs of managing adverse outcomes from Australian health care are estimated to be \$2 billion. The audit cycle is considered an important tool to assist in the preventive management of adverse outcomes. Australian guidelines for audit cycle design allow for comparison of data sets derived from similar surgical specialities. However a lack of data set standardisation inhibits meaningful comparisons of foot and ankle surgical audits. This research will assist development of a best practice model for auditing foot and ankle surgery. Data derived from this model will improve the safety and quality of foot and ankle surgery. The preliminary phase of this process is to identify and understand the attitudes and behaviours of *how* and *why* surgeons participate in the audit cycle. A descriptive embedded multiple case study research design is planned to provide an intense focus on a single phenomenon (the audit cycle) within its real life context (clinical governance). The measures to be included in the case study have been identified by the Balanced Patient Safety Measurement Framework. These include: audit and peer review activity, provider attitudes to patient safety, safety learning, action and performance. A purposive sample of 6 to 8 surgeons (units of analysis) from 3 to 4 specialities (cases) will undergo semi-structured interview. This will investigate: current audit tools and processes; attitudes; and behaviours of surgeons to the audit cycle. Similarities in and differences between the units of analysis will indicate which identified measures function as barriers or enablers of the audit cycle. Reliability and validity (external and construct) will be assessed using established methods for case studies. The descriptive embedded multiple case study will reveal *how* and *why* foot and ankle surgeons participate in the audit cycle. This will inform further research to improve the outcomes of foot and ankle surgery through development of an audit tool.

O22

The prevalence of risk factors for foot ulceration in patients with end stage renal disease on haemodialysis

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Background: End stage renal disease (ESRD) has been associated with foot ulceration and lower extremity amputation (LEA). However, the underlying risk factors for foot ulceration have received limited attention in this population. The aim of this study was to investigate the prevalence and type of risk factors for foot ulceration present in patients with ESRD on haemodialysis without the coexistence of diabetes mellitus (DM).

Methods: One hundred and ninety participants with ESRD and/or DM were recruited over a six week period. Participants were allocated into one of three groups: (i) ESRD without DM, (ii) DM without ESRD and (iii) coexisting ESRD and DM. Participants were screened for the risk factors for foot ulceration. Statistical comparisons were made between the three groups for both the prevalence and type of risk factors using a Fisher's Exact Test.

Results: Risk factors for foot ulceration were found to be highly prevalent in the ESRD population. Participants with both ESRD and DM exhibited statistically significant differences in risk factor presentation for peripheral neuropathy ($p=0.033$), vascular insufficiency ($p=0.001$) and footwear ($p=0.037$) in comparison to participants with DM alone.

Conclusions: There are high prevalence rates of risk factors for foot ulceration in the ESRD population on haemodialysis and are comparable to those with DM. Individuals with coexisting ESRD and DM have an even greater risk for foot ulceration and LEA. This highlights the importance that regular foot screening, preventative education and treatment are necessary for patients with ESRD to potentially reduce the risk of foot ulcerations and LEAs.

O23

Effectiveness of scalpel debridement for painful plantar calluses in older people: a randomised trial

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Background: Plantar calluses are often associated with foot pain, which can have a detrimental impact on the mobility and independence of an older person. Scalpel debridement is a key management strategy for painful corns and calluses, however the effectiveness of this treatment in older people has not been rigorously investigated. Therefore, we conducted a parallel-group randomised trial to evaluate the effectiveness of scalpel debridement in reducing pain associated with forefoot plantar calluses.

Methods: Eighty participants aged 65 years and older with painful forefoot plantar calluses were recruited from a university podiatry clinic, a retirement village, and community advertisements between May 2006 and November 2008. Participants were randomly allocated to one of two groups: (i) normal (experimental) scalpel debridement or (ii) sham (control) scalpel debridement. Participants were followed for six weeks after their initial intervention appointment. Both participants and assessors were blinded to the intervention. The primary outcomes measured were the difference between groups in pain (measured on a 100 mm visual analogue scale) and barefoot peak plantar pressure (measured using a MatScan® System). Secondary outcome measures included tests of balance and functional ability. The sample size was pre-specified using an appropriate sample size/statistical power calculation. Statistical comparison between the groups was made using a linear regression approach to ANCOVA and analysis was by intention to treat. The trial was registered with the Australian Clinical Trials Registry, ACTRN12606000176561.

Results: Both groups experienced large decreases in pain following intervention (up to a 41.9 mm decrease in pain on a VAS). A systematic, but small beneficial effect on pain was noted in favour of the normal scalpel debridement group immediately post-debridement to 4 weeks post debridement (from 6.0 to 7.2 mm ANCOVA adjusted mean difference between groups). These values, however, are likely to be a minimal important difference (i.e. clinically important to a patient) and there were no statistically significant differences ($p<0.05$) in pain levels between the two groups at any of the primary endpoints (immediately post-debridement, and at 1, 3 and 6 weeks post-debridement). In addition, there were no differences in peak plantar pressure or balance and functional ability between the two groups at any time-points. There were no adverse events of note.

Conclusions: The findings of this trial indicate that scalpel debridement of painful plantar calluses has minimal effect on its own. While we found a systematic effect favouring scalpel debridement, the benefits were small and not statistically significant. It is likely that scalpel debridement offers minimal pain relief, so other aspects of conservative care of painful calluses (e.g. padding) in addition to debridement may provide greater benefits that are clinically worthwhile to patients. In the absence any safety issues, we conclude that scalpel debridement of painful plantar calluses is of small benefit to patients, but other forms of conservative care in combination with scalpel debridement may provide clinically worthwhile benefits to patients.

O24

What are the major causes of lower limb amputations in a major Australian teaching hospital? The Queensland Diabetic Foot Innovation Project, 2006 – 2007

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Background: Lower extremity amputation (LEA) results in significant hospitalisation, rehabilitation, morbidity and mortality. In 2004, 3,400 LEAs, with an average length of stay of 26 days, were performed in Australia for diabetic foot complications alone. However, diabetic foot complications are commonly recognised as the most common cause of “non-traumatic” LEA internationally. Unfortunately, there seems to be a paucity of Australian data on total numbers and causes of all LEAs. This retrospective audit aimed to evaluate underlying primary indications for LEA at a major Australian tertiary hospital.

Methods: Cases of LEA performed at the Princess Alexandra Hospital (Brisbane, Australia) between July 2006 and June 2007 were identified through the relevant hospital discharge dataset codes (n = 197). In all cases clinical records were audited for indications of diabetes, trauma and other major causes for LEA. Exclusion criteria included records unable to be accessed during the operation of the clinical audit and cases that were found to have multiple possible major indicators of LEA.

Results: Eleven cases were excluded (9 inaccessible records and 2 multiple major indications). Cases included (n = 186) accounted for 160 unique patients. Overall mean age at LEA procedure was 67 years, 56% were first amputations, 54% were major amputations, and 9% died post-LEA in the audit year. Cases with diabetes indicated accounted for 60% of all LEAs, had a mean age at 70 years, 45% were first amputations, 50% were major amputations, and 7% died post-LEA. Primary indications for LEAs (n = 186) included: type 2 diabetes (53.2%), non-diabetes peripheral vascular disease (18.3%), trauma or accident (8.1%), type 1 diabetes (7.0%), cancer or tumour (5.4%), orthopaedic deformity (3.8%), and post-surgical emboli (2.2%).

Conclusions: Most literature indicates that diabetes is the largest cause of “non-traumatic” LEAs. Our findings seemed to indicate that diabetes was the largest cause or indication of total LEAs. More statistical analysis between non-diabetes and diabetes LEA populations in regards to differences in age at LEA, major amputations, first amputations and post-LEA death will be presented.

O25

Standardising practices improves ambulatory diabetic foot management and reduces amputations: the Queensland Diabetic Foot Innovation Project, 2006 – 2009

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Journal of Foot and Ankle Research 2011, **4(Suppl 1)**:O25

Background: Diabetic foot complications are recognised as the most common reason for diabetic related hospitalisation and lower extremity amputations. Multi-faceted strategies to reduce diabetic foot hospitalisation

and amputation rates have been successful. However, most diabetic foot ulcers are managed in ambulatory settings where data availability is poor and studies limited. The project aimed to develop and evaluate strategies to improve the management of diabetic foot complications in three diverse ambulatory settings and measure the subsequent impact on hospitalisation and amputation.

Methods: Multifaceted strategies were implemented in 2008, including: multi-disciplinary teams, clinical pathways and training, clinical indicators, telehealth support and surveys. A retrospective audit of consecutive patient records from July 2006 – June 2007 determined baseline clinical indicators (n = 101). A clinical pathway teleform was implemented as a clinical record and clinical indicator analyser in all sites in 2008 (n = 327) and followed up in 2009 (n = 406).

Results: Prior to the intervention, clinical pathways were not used and multi-disciplinary teams were limited. There was an absolute improvement in treating according to risk of 15% in 2009 and surveillance of the high risk population of 34% and 19% in 2008 and 2009 respectively (p < 0.001). Improvements of 13 – 66% (p < 0.001) were recorded in 2008 for individual clinical activities to a performance > 92% in perfusion, ulcer depth, infection assessment and management, offloading and education. Hospitalisation impacts recorded reductions of up to 64% in amputation rates / 100,000 population (p < 0.001) and 24% average length of stay (p < 0.001).

Conclusion: These findings support the use of multi-faceted strategies in diverse ambulatory services to standardise practice, improve diabetic foot complications management and positively impact on hospitalisation outcomes. As of October 2010, these strategies had been rolled out to over 25 ambulatory sites, representing 66% of Queensland Health districts, managing 1,820 patients and 13,380 occasions of service, including 543 healed ulcer patients. It is expected that this number will rise dramatically as an incentive payment for the use of the teleform is expanded.

O26

Is simulation training effective in increasing podiatrists' knowledge and confidence in foot ulcer management? A pilot study

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Journal of Foot and Ankle Research 2011, **4(Suppl 1)**:O26

Background: Diabetic foot ulcers are commonly acknowledged as the most frequent reason for admission into hospital for diabetes-related complications. Clinical training is known to have a beneficial impact on diabetic foot ulcer outcomes. Simulation clinical training has rarely been used in the management of diabetic feet or chronic wounds. The few simulation courses in this area have focused solely on training for a single technical skill. This pilot study aimed to investigate the effect of a mixed modality simulation training program on podiatry participants' clinical knowledge, confidence and satisfaction in the management of foot ulcers.

Methods: Sixteen podiatrists participated in a two-day Foot Ulcer Simulation Training (FUST) course. It included web-based interactive learning, low-fidelity part-tasks and high-fidelity full clinical scenarios. Primary outcome measures of evaluation of the course included participants' pre- and post completion of confidence and knowledge surveys. Participants' satisfaction and the relevance and fidelity of a range of course elements were also investigated.

Results: A significant improvement in clinical confidence was observed following completion of FUST (mean scores 3.10 cf. 4.40, p < 0.05). The lack of a significant change in pre- and post knowledge scores reflected participants' mandatory pre-course completion of web-based components. Satisfaction, relevance and fidelity of all course elements were rated highly by participants.

Conclusions: This pilot study demonstrates the successful use of simulation in the training of foot ulcer management. The approach has the potential to revolutionise training in wound care and to improve patient outcomes.

O27

Foot kinematics in people with medial compartment knee osteoarthritis

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Journal of Foot and Ankle Research 2011, **4**(Suppl 1):O27

Background: Foot orthoses are commonly used in the management of knee osteoarthritis (OA), although the relationship between foot function and knee OA is still unclear. Therefore, the aim of this study was to compare tibial, rearfoot and forefoot motion during gait in people with and without medial compartment knee OA.

Methods: Motion of the tibia, rearfoot and forefoot in 32 patients with clinically and radiographically-confirmed medial compartment knee OA (mean age 65.84 ± 7.57, height 168.83 ± 9.54 cm, body mass 85.13 ± 13.67 kg) and 28 age-matched controls (mean age 65.22 ± 11.41, height 168.61 ± 10.64 cm, body mass 73.12 ± 15.49 kg) was investigated using a three dimensional motion analysis system incorporating a multisegment foot model (the Oxford Foot Model). Multivariate analysis was used to investigate the differences between the groups for peaks and ranges of motion with gait velocity entered as a covariate.

Results: The knee OA group demonstrated greater peak rearfoot eversion (-3.8° ± 4.6 vs -0.7° ± 3.9; p < 0.001), contacted the ground with a more everted rearfoot at initial contact (0.6° ± 5.4 vs 3.8° ± 3.7; p < 0.001) and exhibited reduced rearfoot frontal plane range of motion (8.6° ± 2.7 vs 10.4° ± 2.6; p = 0.02) and rearfoot peak inversion (4.8° ± 5.4 vs 9.6° ± 3.6; p < 0.001). The tibia was more internally rotated throughout the gait cycle with reduced range of motion (9.7° ± 4.2 vs 14.4° ± 4.0; p = 0.001) and peak external rotation compared to the control group (-20.1° ± 6.5 vs -27.6° ± 6.4; p = 0.002). Moreover, the tibia was tilted significantly more laterally in the knee OA group (7.8° ± 3.4 vs 4.0° ± 1.9; p < 0.001) indicating a genu varum malalignment.

Conclusions: People with medial compartment knee OA exhibit altered foot kinematics during gait that are indicative of a less mobile, flat foot deformity. Given that genu varum is a common feature in medial compartment knee OA, it is likely that the kinematic pattern observed occurs as a result of compensatory foot pronation to enable the foot to be plantigrade during gait.

O28

Glyceryl trinitrate therapy for ischaemia, painful diabetic neuropathy, healing of foot ulceration and other podiatric conditions: a literature review

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Glyceryl trinitrate is a substance that causes vasodilation by donation of nitric oxide which causes relaxation of the endothelium of blood vessel walls. The vasodilatory effect of this substance has been known since 1870 and it has been used extensively in the treatment of angina via transdermal patches, sublingual tablets and sprays. Studies involving normal vasculature as well as diseased vascular states have been promising in terms of demonstrably consistent and significant vasodilatory effects on both systemic and peripheral systems. Podiatric application for this pharmacologic intervention seems to have received little attention in the literature to date. Its efficacy in equine treatment of laminitis, an ischaemic condition of the horses hoof has been well established and researched. It has been applied to other clinical problems involving perfusion of the extremities, such as treatment of inability to achieve penile erection and use in treatment of anal fissures. A literature search has produced information on this drug which suggests potential for greater application in clinical podiatry. This includes positive effects in digital perfusion, which holds promise for wound healing and

shows potential for reducing amputations associated with peripheral vascular disease (PVD). This novel therapy has the potential to be useful in cases with borderline vascular supply that require a boost to perfusion to trigger the healing process and/or relieve other symptoms of ischaemia. It has also been found to be of assistance in the management of painful diabetic neuropathy (PND). This finding is of particular interest as an adjunct to treatment for the prevalent and difficult clinical challenge of PND. The literature regarding its use in musculoskeletal applications such as for Achilles tendinopathy will also be covered in this review. Potential issues with this drug including side effects and tolerance will be addressed. Further study of this treatment modality would be beneficial in terms of determining specific indications and limitations of its use, particularly for vascular insufficiency of the feet and healing of foot ulceration.

O29

Ultrasound guided corticosteroid injection for plantar fasciitis: a randomised controlled trial

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Background: Plantar fasciitis is the most commonly reported cause of chronic pain beneath the heel. Management of this condition commonly involves the use of corticosteroid injection in cases where less invasive treatments have failed. However, despite widespread use, only two randomised trials have tested the effect of this treatment in comparison to placebo. These trials currently offer the best available evidence by which to guide clinical practice, though both were limited by methodological issues such as insufficient statistical power. Therefore, the aim of this randomised trial is to compare the effect of ultrasound-guided corticosteroid injection versus placebo for treatment of plantar fasciitis.

Methods: The trial will be conducted at the La Trobe University Podiatry Clinic and will recruit 80 community-dwelling participants. Diagnostic ultrasound will be used to diagnose plantar fasciitis and participants will be required to meet a range of selection criteria. Participants will be randomly allocated to one of two treatment arms: (i) ultrasound-guided injection of the plantar fascia with 1 mL of 4 mg/mL dexamethasone sodium phosphate (experimental group), or (ii) ultrasound-guided injection of the plantar fascia with 1 mL normal saline (control group). Blinding will be applied to participants and the investigator performing procedures, measuring outcomes and analysing data. Primary outcomes will be pain measured by the Foot Health Status Questionnaire and plantar fascia thickness measured by ultrasound at 4, 8 and 12 weeks. All data analyses will be conducted on an intention-to-treat basis.

Results: Data collection for the trial will be finalised in February 2011. Following this, statistical analyses of the trial data will be performed and the findings prepared for presentation.

Conclusions: This will be a randomised trial investigating the effect of dexamethasone injection on pre-specified treatment outcomes in people with plantar fasciitis. Within the parameters of this protocol, the trial findings will be used to make evidence-based recommendations regarding the use of corticosteroid injection for treatment of this condition.

O30

Predictors and persistence of foot problems in older women: a six year prospective study

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Background: Foot problems are common in older people, particularly older women. However, no prospective studies have been undertaken to

determine the incidence of foot problems, or the extent to which foot problems resolve or persist over time. Therefore, the aim of this study was to examine the prevalence and correlates of foot problems in older women over a six year period.

Methods: Women aged 70 to 75 years who participated in the Australian Longitudinal Study on Women's Health completed a postal questionnaire incorporating questions relating to demographics, major medical conditions and health status in 1999 (n=8,059) and 2005 (n=4,745). Key variables explored included self-reported foot problems, major medical conditions and body mass index (BMI).

Results: At baseline, 26% of the sample reported foot problems. At follow-up, 37% remained free of foot problems, 36% had developed a new foot problem, 13% experienced resolution of their foot problems and 14% experienced persistent foot problems. Increase in BMI over the six year follow-up period was significantly associated with the development of new foot problems and the persistence of existing foot problems.

Conclusions: Foot problems are common in older women and are associated with increased BMI. Nearly half of all older women without foot problems will report a new foot problem over a six year period, and in those with existing foot problems, approximately half will resolve and half will persist. Maintaining a healthy bodyweight may play a role in the prevention of foot disorders in older women.

O31

Benchmarking healing times for diabetic foot ulcerations and investigating the influence of peripheral arterial disease and infection

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Background: To calculate benchmark healing times for diabetic foot ulcerations (DFU) seen in a tertiary hospital Podiatry Department, and investigate the influence of peripheral arterial disease (PAD) and infection (soft tissue infection [STI] and osteomyelitis [OM]) on healing times.

Methods: Data was collected prospectively between October 2004 and September 2008 for all patients with diabetes who presented with a DFU. All DFU that healed within the time frame of the study were included. Data was collected for the following variables: presentation date, healing date, gender, location, presence of peripheral neuropathy (PN), presence of PAD, presence of infection (STI or OM), and whether the DFU was reviewed on the Multidisciplinary Foot Ulcer Clinic (MDFUC).

Results: A total of 623 healed DFU were recorded (73% male) and analysed. 67% of DFU were exclusively neuropathic. PAD was diagnosed in 30.2% of DFU. Infection presented in 44% of DFU (31% STI and 13% OM). The median healing time of all DFU was 52 days. The median healing time of DFU complicated by PAD was 57 days compared to 49 days for DFU without PAD (p=0.039). DFU complicated by STI and OM had median healing times of 83 days and 126 days respectively compared to 34 days for DFU without infection (p=0.0001).

Conclusions: This research shifts the focus away from healing rates and outcomes to provide preliminary data for healing times of DFU. The data provides a benchmark for comparison to other tertiary hospitals and health services managing DFU, with an aim to ultimately aid in facilitating optimal clinical outcomes. Importantly, the data from our study emphasises and quantifies the detrimental influence that infection and PAD has on the healing time required for DFU, and ultimately hospital resources.

O32

Lower limb biomechanics during running in individuals with Achilles tendinopathy: a systematic review

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Background: Achilles tendinopathy is common and its aetiology is considered multifactorial. Abnormal biomechanics of the lower limb has been speculated to be a risk factor for Achilles tendinopathy. The aim of this study was to systematically review the existing literature to identify, critique and summarise lower limb biomechanical factors associated with Achilles tendinopathy.

Methods: We searched electronic bibliographic databases (Medline, EMBASE, Current contents, CINAHL and SPORTDiscus) in January 2010. All prospective cohort and retrospective case-control studies that evaluated biomechanical factors (temporospatial parameters, lower limb kinematics, dynamic plantar pressures, kinetics [ground reaction forces and joint moments] and muscle activity) associated with midsubstance Achilles tendinopathy were included. Methodological quality of included studies was evaluated using the Quality Index. To evaluate the magnitude of differences between cases (those with Achilles tendinopathy) and controls (those without Achilles tendinopathy), effect sizes (Cohen's d) were calculated.

Results: Nine studies were identified. Two studies were a prospective cohort study design and seven were case-control studies. The methodological quality of the identified studies was varied, with Quality Index scores ranging from 4 to 15 out of a possible score of 17. All studies analysed running biomechanics. Cases were found to have increased eversion range of motion of the rearfoot, reduced maximum leg abduction, reduced ankle joint dorsiflexion velocity, reduced knee flexion during gait, altered plantar pressures and ground reaction forces as well as reduced peak tibial external rotation moment. Further, cases displayed differences in the timing and amplitude of a number of lower limb muscles. Notably, the onset of tibialis anterior was delayed and the duration of soleus and lateral gastrocnemius was increased. In addition, cases displayed reductions in the amplitude of gluteus medius and rectus femoris.

Conclusions: There are differences in lower limb biomechanics between those with and without Achilles tendinopathy. These findings have implications for the prevention and management of the condition. However, future well-designed studies are required to determine if interventions such as foot orthoses and/or physical therapy targeting identified differences in those with Achilles tendinopathy are effective at preventing and/or treating the condition.

O33

Do foot orthoses change lower limb muscle activity in people with flat-arched feet towards a pattern observed in those with normal-arched feet?

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Background: Various foot orthoses have been shown to alter tibialis anterior and peroneus longus electromyographic (EMG) muscle activity during walking. However, it is unclear whether these changes represent optimisation in muscle function. Therefore, two studies were conducted to determine; (i) whether people with flat-arched feet display altered muscle activity compared to those with normal-arched feet during gait and (ii) whether foot orthoses change muscle activity in people with flat-arched feet towards a pattern observed in those with normal-arched feet.

Methods: A screening protocol that included clinical and radiographic measures was used to recruit participants with normal- and flat-arched feet. Sixty adults aged 18 to 47 years qualified for this study. Of these, 30 had normal-arched feet (15 male and 15 female) and 30 had flat-arched feet (15 male and 15 female). Two different foot orthoses were dispensed to the participants with flat-arched feet: (i) a heat-moulded (modified) foam prefabricated foot orthosis and (ii) a 20-degree inverted-style customised foot orthosis. EMG activity was recorded while walking from tibialis posterior and peroneus longus via in-dwelling wire electrodes, and from tibialis anterior and medial gastrocnemius via surface electrodes.

Results: During the contact phase of gait, the flat-arched group exhibited increased activity of tibialis anterior (19% increase) and decreased activity of peroneus longus (13% decrease). During midstance/propulsion, the flat-arched group exhibited increased activity of tibialis posterior (26% increase) and decreased activity of peroneus longus (14% decrease),

compared with those with normal-arched feet. During the contact phase of gait, tibialis posterior EMG amplitude decreased significantly with the prefabricated orthosis (19% decrease) and the customised orthosis (12% decrease) compared to the shoe only condition ($p < 0.008$). In contrast, during the midstance/propulsive phase, peroneus longus EMG amplitude increased significantly with the prefabricated orthosis compared to the shoe-only and customised orthosis conditions (19% and 14% increase, respectively; $p < 0.030$).

Conclusions: Both foot orthoses had a significant effect on EMG amplitude of tibialis posterior and peroneus longus, however only the modified prefabricated orthosis changed peroneus longus EMG amplitude towards a pattern observed with normal-arched feet. Otherwise, there were few differences found between the modified prefabricated and customised orthoses.

O34

Is there a relationship between foot pain and severity of deformity in hallux valgus?

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Background: Hallux valgus (HV) is a progressive foot deformity involving lateral deviation of the hallux, and a common indication for forefoot surgery. However, the degree of foot pain experienced by individuals with HV is unclear. Recent evidence suggests an association between HV and foot pain; whereas, other studies have found no association. Furthermore, it is unknown whether more severe HV with greater angulation of the hallux is related to more severe foot pain. The aim of this study was to investigate the relationship between foot pain and severity of deformity in healthy adults with HV.

Methods: Sixty healthy volunteers with HV were recruited (7 men, 53 women; mean age 51.5, range 20 to 75 years). Worst and average foot pain over the past month were determined using Visual Analogue Scales (VAS). Severity of HV was measured as the angle between the hallux and first metatarsal (HV angle) on weight-bearing anteroposterior foot x-rays. Other factors investigated included: body mass index, physical activity, foot posture index, foot mobility magnitude, ankle and first metatarsophalangeal joint ranges of motion, and footwear heel height. Preliminary analyses undertaken have been Pearson's correlations ($p < 0.05$). Ongoing analysis will be performed using multiple linear regression modelling to investigate to what extent variation in foot pain may be explained by subject characteristics or structural factors.

Results: Preliminary analysis ($n=30$) has shown no linear correlation between HV angle and foot pain (VAS average pain $r=-0.20$ to 0.08 , $p>0.05$; VAS worst pain $r=-0.29$ to -0.13 , $p>0.05$). There was a low positive correlation found between average foot pain (VAS) and ankle range of motion (right foot $r=0.35$, $p=0.06$; left foot $r=0.44$, $p=0.02$). No other pairs of variables were found to be significantly correlated.

Conclusions: From preliminary analyses, foot pain in individuals with HV does not appear to be determined by the severity of angular deformity. Further analysis will investigate possible combinations of structural factors and subject characteristics that may explain some variation in foot pain related to HV. It is likely that foot pain in individuals with HV is a complex matter influenced by multiple factors that warrant further investigation.

O35

Children's shoe styles and parent decisions to fit shoes with store staff assistance

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Background: A well-fitted shoe is singularly the most consistent footwear attribute recommended in children's footwear guidelines to promote foot

health. Despite recommendations research over the last 70 years continues to report the majority of children wear inappropriately sized shoes. It would be beneficial for the development of consumer appropriate guidelines to know what influences parents when making decisions about the different types of shoes they purchase for their child. The aim of the study was to obtain contemporary information about decisions made by parents to fit their child's shoes and the fitting problems they experience.

Methods: Parents with children aged 4 to 12 years ($n=272$) were recruited in Sydney using a multistage cluster stratified sampling procedure. A self-administered 156 item survey was distributed once via the child's school. Shoe type and fitting practices are described here. Descriptive and Pearson chi square analysis were used to describe the data and detect associations between categorical data. The study received ethics approval from the University of Sydney Human Research Ethics Committee and the NSW Department of Education and was supported by Clarks Australia.

Results: More parents sought professional assistance from store staff to fit their child's school shoes (64%), than physical activity shoes (59%) and casual shoes (44%). A small number of parents estimated shoe size without their child present for school (4%), physical activity (5%) and casual wear (7%). For school shoes, traditional lace-up and Mary-Jane/high-heel shoes were more likely to be fitted with assistance than athletic style shoes ($\chi^2(2) = 8.34$; $p = 0.02$). For both physical activity ($\chi^2(2) = 9.10$; $p = 0.01$) and casual shoes ($\chi^2(2) = 10.20$; $p = 0.006$), sandal style shoes were the least likely to fitted with assistance compared to athletic style shoes. Difficulty finding shoes that fitted their child's foot was reported by 36% of parents. School shoes were more likely to be fitted with assistance when parents found it difficult to find shoes that fitted their child's foot ($\chi^2(2) = 7.63$; $p = 0.02$). The associations between ease of fit and fitting assistance were not significant for physical activity ($\chi^2(2) = 1.84$; $p = 0.40$) or casual shoes ($\chi^2(2) = 0.63$; $p = 0.43$).

Conclusions: Shoe-fitting practices were affected by the shoe style purchased. While parental shoe practices vary, most parents prioritize assisted shoe-fitting for school and physical activity shoes. Among school shoes, athletic style school shoes were the least likely to be fitted with assistance, as were sandals for casual wear. The poor availability in size ranges for athletic and casual shoe styles, may explain why parents did not seek assistance when fitting these shoes styles. However, given prioritizes to encourage physical activity in and out of school, and the importance of shoe comfort for foot health, educational strategies are needed to ensure parents have the skills and resources to monitor shoe fit.

O36

The "Podiatry Diabetes Model"- an example of an organised approach to the podiatric care of people with diabetes in regional Victoria

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Background: To ensure an efficient and consistent publically-funded podiatry service to people with diabetes in the Greater Bendigo region of Victoria the "Podiatry Diabetes Model" of care was developed. The model aims to ensure that people with diabetes are seen by a podiatry service that is most appropriate according to their risk of diabetes-related foot complications. The aim of this study was to determine if people with diabetes were actually seen by the most appropriate podiatry service as indicated by the model.

Methods: A three-month prospective clinical audit of the Podiatry Diabetes Model was undertaken. Primary variables of interest were the podiatry service where the patients were seen and the patients' UT Texas risk classification category. For data analysis, the podiatry services were pooled into "community", "subacute" and "acute" categories. The eight UT Texas risk categories were pooled into "no neuropathy", "neuropathy", "history of diabetes-related pathology" and "active diabetes-related pathology" categories. Three separate chi-squared analyses for each service category were undertaken to compare the expected number of patients seen according to foot-health risk as predicted by the model with what was actually observed.

Results: Five hundred and seventy-six people with diabetes were seen in the three-month period (community: 493; subacute: 67; acute: 16) for 919 contacts (community: 634; subacute: 226; acute: 59). There was significantly more contacts per patient in the subacute and acute services than community service ($F = 79.4$, $p < 0.0005$). There was no significant difference between the proportion of patients expected by the model to be seen by each podiatry service according to risk status with what was actually observed (community: $\chi^2 = 3.3$, $p = 0.4$; subacute: $\chi^2 = 8.0$, $p = 0.05$; acute: $\chi^2 = 6.6$, $p = 0.09$).

Conclusions: People with diabetes seen within the Podiatry Diabetes Model are being seen by the most appropriate podiatry service available according to their risk of future diabetes-related foot morbidity. The model is an example of excellent cross-organisation collaboration and could be implemented in other areas of Australia. Future research will investigate whether the long term implementation of the model will influence future incidence rates of ulceration and amputation in the region.

O37

The relationship between cognitive and emotional representations of peripheral neuropathy and incident diabetes-related foot ulceration

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Background: The common sense model of illness (CSM) has been shown to be a useful model to help understand the psychological influences on diabetes-related behaviour and health outcomes. Using the CSM, the aim of this study was to investigate the relationship between cognitive and emotional representations of peripheral neuropathy and diabetes-related foot ulceration in adults with diabetes.

Methods: One-hundred and twenty-one people with diabetes and peripheral neuropathy were recruited into this one-year prospective cohort study. At baseline, the participants completed two questionnaires—the Patients' Interpretation of Neuropathy questionnaire and a short questionnaire asking about preventative foot-care behaviour. Basic diabetes and demographic information was also collected. Sequential logistic regression was used to investigate the influence of cognitive and emotional representations of peripheral neuropathy as measured by the PIN and the development of incident foot ulceration.

Results: One-hundred and seventeen participants completed the study. The incidence of new foot ulceration was 34.2%. Only two statistically significant independent risk factors for foot ulceration were detected: prior history of foot ulceration (OR=3.1; 95%CI: 1.16-8.18; $p = .024$) and severity of neuropathy (OR=1.1; 95%CI: 1.00-1.15; $p = .047$).

Conclusions: A consistent association between cognitive and emotional representations of peripheral neuropathy and incident foot pathology was not found. If the CSM is to be clinically useful for people with diabetes and peripheral neuropathy the mediational role of preventative foot-care behaviour should be further investigated.

O38

Reduction of peak plantar pressures in patients with peripheral neuropathy: an evaluation of the DH Pressure- Relief™ Shoe

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Background: Off-loading of plantar pressure is a key intervention strategy to prevent the formation of or to heal existing neuropathic plantar ulcers in diabetes. Walking casts (e.g. total contact cast) that reduce plantar pressures are currently considered the gold-standard for

treating such neuropathic ulcers. However, alternative methods for off-loading that are as effective, but cheaper and easier to use are continually being sought. The aim of this study was to evaluate the effectiveness of the DH Pressure- Relief™ Shoe in off-loading high pressure areas in the neuropathic foot in diabetes.

Methods: A repeated measures design was used. Sixteen participants with diabetic peripheral neuropathy were recruited and three footwear conditions were evaluated in a randomised order: a canvas shoe (the control), the participants' own shoe, and the DH shoe. The primary outcome was peak plantar pressure measured using the PedarX® mobile in-shoe system between the 3 footwear conditions.

Results: Data analysis was carried out on 14 out of the 16 participants because two participants could not complete data collection as planned. The mean peak pressure values in KPa (\pm SD) for each condition were: control shoe 315.9 (\pm 140.7), standard shoe 273.0 (\pm 127.1) and DH shoe 155.4 (\pm 89.9). There was a statistically significant difference ($p = 0.001$) in peak plantar pressure between the DH shoe compared to both the control shoe and participants standard shoe. The DH shoe decreased plantar pressures by 51% compared to the control shoe and by 43% compared to standard shoe.

Conclusions: The DH Pressure-Relief Shoe™ reduced plantar pressures significantly more than the other two shoe conditions. The DH Pressure-Relief Shoe™ may be a useful alternative to current off-loading modalities used in the clinical management of diabetic foot ulceration. However, clinical trials are needed to ensure they are useable and safe for patients in everyday activities.

O39

Striving for clinical consensus in the management of Charcot's neuroarthropathy

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The management of an individual with Charcot's Neuroarthropathy can be complex, problematic and extremely labour intensive. In order to achieve desirable clinical outcomes the management of this condition must be timely and multidisciplinary all the while keeping the patient informed of their progression throughout the treatment plan. Of the difficulties faced when implementing management of this patient group, few are more challenging than that of gaining full multidisciplinary support for the treatment plan. In an attempt to standardise the management of Charcot's Neuroarthropathy and to overcome some of the difficulties faced, the Podiatry Department of the John Morris Diabetes Centre conducted a lengthy literature review of diagnoses and management techniques for Charcot's Neuroarthropathy. Out of this review a treatment flowchart was developed along with a central management record to guide treatment choice and to track the patient's progress. These tools now serve not only to promote awareness of this condition when filed in the patient record, they also enable all clinicians involved in the patients care to be aware of the progress of the disease process and management plan. These documents have now been adopted throughout many of the public podiatry services in Tasmania making the collection of larger amounts of data surrounding Charcot's Neuroarthropathy possible, facilitating further credible research and making our treatment approach more uniform.

O40

An evidence-based approach to the development and implementation of a podiatric rheumatology service within the New Zealand health sector

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Foot problems are extremely common in patients with rheumatoid arthritis (RA) and gout. There is ample evidence that foot pain, either alone or as a co-morbidity, contributes significantly to disability. Despite the

high prevalence of foot disease, the problem is often trivialised or underappreciated. The inequity in foot health provision for patients with rheumatic disorders in New Zealand has recently been highlighted. Expertise in dealing with foot problems is often limited among healthcare professionals, and it has been argued that better integration of podiatric services into rheumatology services would be beneficial. The evidence base for dedicated podiatry as part of multidisciplinary foot clinics in diabetes is well established but this has yet to be achieved for rheumatology services. However, the role of the podiatrist in the rheumatology team is becoming recognised as a vital component in the integrated care given to patients by the multidisciplinary team. The goal of the podiatry element of rheumatology care is to reduce foot-related pain, maintain/improve foot function and so mobility, while protecting skin and other tissues from damage. The aim of this presentation is to highlight the major issues related to foot care for patients with arthritis and provide key recommendations that should be implemented to improve access to podiatric services in New Zealand. The presentation will also provide evidence from recent studies conducted by the research team to support the justification of a podiatric rheumatology service.

O41

The impact of introducing an orthopaedic surgeon to an established multi-disciplinary foot ulcer clinic: a retrospective audit

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Background: The Multi-disciplinary Foot Ulcer Clinic (MDFUC) at Royal Perth Hospital (RPH) is an interdisciplinary clinical team that specialises in the management of patients with chronic foot ulceration and/or infection. The MDFUC was established in 2004 and is coordinated through the RPH Podiatry Department. In 2007, an Orthopaedic surgeon with foot and ankle expertise was added to the team. The aim of the audit was to review the impact of surgery on the healing of complex diabetic foot ulceration, to make informed comment on the value of orthopaedic surgery input into the MDFUC.

Methods: A retrospective audit was conducted reviewing all cases that required orthopaedic foot surgery initiated through the MDFUC as a component of their management. Variables including patient demographics, surgery classification, types of procedures, pre and post surgery ulcer duration, complication rates and status one year post surgery were collected.

Results: The audit identified 24 cases of orthopaedic surgery, of which preliminary analysis has been performed on 20 cases due to the availability of accurate data. 85% of the cases were complicated by osteomyelitis. The mean pre-surgical duration of the diabetic foot ulceration was 468 +/- 410 days. Post surgery, the mean healing time for the original ulcer was 61 +/- 44 days in the 19 (95%) cases where complete healing was achieved. All these cases remained healed at the 12 month follow-up. 2 cases superficially re-ulcerated at the original ulcer site within the 12 months but healed again after a short period and at least 2 cases developed superficial transfer lesions.

Conclusion: The findings suggest that orthopaedic surgery is effective in promoting healing in selected cases of chronic and complex foot ulceration through the correction of underlying deformity, muscle imbalance and/or biomechanical anomaly. The benefits of surgery appear to be prolonged. The addition of an Orthopaedic surgeon to the MDFUC has been integral to the success of the clinic and added extra scope to the care available for patients. The results suggest that surgery should be considered much earlier in the management of chronic, non-healing diabetic foot ulceration.

O42

Tarsal tunnel syndrome caused by a flexor digitorum accessorius longus muscle: a case report and review of the literature

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The flexor digitorum accessorius longus (FDAL) is a rare muscular occurrence in the lower extremity. In this case study and review of the literature the cause of tarsal tunnel syndrome by a flexor digitorum accessorius longus is described with emphasis on clinical testing methods, diagnostic imaging and both non-surgical and surgical management. A 52 year old male presented with pain and paraesthesia in his left foot and ankle. Tinel's sign was exhibited clinically as well as severe bilateral pes planus. Inverted style custom foot orthoses failed to reduce the patient's symptoms over a six month period. Magnetic resonance imaging (MRI) confirmed the presence of a FDAL muscle within the tarsal tunnel. The patient was subsequently referred to a podiatric surgeon for decompression and excision of the accessory muscle. Follow up at 18 months revealed resolution of pain and return to normal activities however, some plantar paraesthesia remained. A literature search was conducted across several major scientific databases. Further information was sought with citation tracking, reference checking, reviewing unpublished data and seeking expert opinion. The search yielded sixteen research papers pertaining to the FDAL muscle. Six of these papers described the FDAL as the cause of TTS in the form of case studies and were included in the review. Pain and paraesthesia were described as the pertinent symptoms and indicative of neural pathology, as was a Tinel's sign. MRI was preferred for diagnostic purposes due to the ability to detect space-occupying lesions within the tarsal tunnel. In some cases FDAL was diagnosed intra-operatively. Surgical decompression via excision of the accessory muscle was described with a reportedly high success rate. Practitioners treating the foot and ankle should have a degree of suspicion for the presence of an accessory muscle particularly when interpreting MRI films as part of the diagnostic work-up for TTS.

O43

Choosing shoes: a preliminary study into the challenges facing clinicians in assessing footwear for rheumatoid arthritis patients

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Background: Footwear has been accepted as a therapeutic intervention for the foot affected by rheumatoid arthritis (RA). Evidence relating to the objective assessment of footwear in patients with RA is limited. The aims of this study were to identify current footwear styles, footwear characteristics, and factors that influence footwear choice experienced by patients with RA.

Methods: Eighty patients with RA were recruited from rheumatology clinics during the summer months from clinics based in Auckland, New Zealand. Clinical characteristics of RA, global function, and foot impairment and disability measures were recorded. Current footwear, footwear characteristics and the factors associated with choice of footwear were identified. Suitability of footwear was recorded using pre-determined criteria for assessing footwear type, based on a previous study of foot pain.

Results: The patients had longstanding RA with moderate-to-severe disability and impairment. The foot and ankle assessment demonstrated a low-arch profile with both forefoot and rearfoot structural deformities. Over 50% of shoes worn by patients were open-type footwear. More than 70% of patients' footwear was defined as being poor. Poor footwear characteristics such as heel rigidity and sole hardness were observed. Patients reported comfort (17%) and fit (14%) as important factors in choosing their own footwear. Only five percent (5%) of patients wore therapeutic footwear.

Conclusions: The study found that moderate impairment and limited activity scores, consistent with significant foot disability. Forefoot structural deformities were high, suggesting that patients have problems in finding good footwear that accommodates structural changes in the forefoot and lesser extent in the rearfoot. Difficulties in finding appropriate footwear due to forefoot structural deformities and the consequence wearing of inappropriate footwear can be a major contributing factor to foot impairment. The study also demonstrated

that although fit and comfort were perceived by patients to be important factors in choosing footwear, current footwear choices are frequently inappropriate. Choices regarding footwear may reflect the difficulties patients with RA experience when obtaining footwear that meets their needs. This work has highlighted the need for good footwear and the need to improve both patient and practitioner knowledge of footwear.

O44

Chevron versus scarf osteotomy for 1-2 intermetatarsal reduction in the surgical treatment of hallux valgus: a systematic review and meta-analysis

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Background: Surgical correction for hallux valgus (HV) has been demonstrated to be effective compared with watchful waiting and orthotic therapy, and improves the quality of life of individuals with HV. The severity of the HV deformity generally dictates the type of procedure choice, and it is generally considered that the scarf osteotomy affords a greater reduction of the 1-2 intermetatarsal angle (IMA) than the chevron osteotomy. The objective of this study was to compare the radiographic angular correction of the 1-2 IMA for the chevron versus the scarf osteotomy.

Methods: A systematic review and meta-analysis was conducted. The following databases were searched to identify English language studies evaluating the chevron and scarf osteotomy: Medline, Embase (Ovid), CINAHL (EBSCO Host), the Cochrane Database of Systematic Reviews and Cochrane Central Register of Controlled Clinical Trials. No date restrictions, previous to November 2010, were applied. Additional hand and electronic content searches of orthopaedic and foot-related journals and text books were performed. Randomised controlled trials, and prospective and retrospective cohort studies were included in the analysis. The mean and standard deviation for pre- and post-operative 1-2 IMA for included studies were entered into Review Manager for analysis. The pooled mean difference (in degrees) and 95% confidence intervals (95% CIs) for the 1-2 IMA were compared between categories (i.e. chevron versus scarf osteotomy).

Results: There were 24 studies meeting the inclusion criteria for the chevron osteotomy and 8 studies for the scarf osteotomy, involving a total of 1303 patients. The pooled mean difference and 95% CIs for the chevron and scarf osteotomies were 5.30 ± 0.21 degrees (5.09, 5.51) and 6.21 ± 0.51 degrees (5.70, 6.72), respectively.

Conclusions: The scarf osteotomy produces a marginally greater reduction in the 1-2 IMA compared with the chevron osteotomy. However, the included studies were of moderate to poor methodological quality, somewhat limiting the confidence of this result. In addition, our review did not analyse the post-operative clinical outcomes of these two procedures. There is therefore a need for more well designed prospective cohort and randomized controlled trials to compare the angular correction and clinical outcomes of the chevron and scarf osteotomy.

O45

Development and reliability of an intra-operative first metatarsophalangeal joint cartilage evaluation tool for use in hallux valgus surgery

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Background: There is increasing interest in surgical outcomes of hallux valgus (HV) reconstruction. However, there has been little focus on the

influence of cartilage degeneration that is identified within the first metatarsophalangeal joint (1st MTPJ) at surgery. A reliable evaluation tool to accurately record cartilage erosion within the 1st MTPJ is desirable, and should be part of evidence-based reporting on surgical reconstruction for HV. The objective of this study was to examine the reliability of an intra-operative evaluation tool for assessing cartilage degeneration of the 1st MTPJ in hallux valgus.

Methods: During hallux valgus reconstruction surgery, two examiners documented the location, depth and surface area of cartilage lesions affecting the 1st MTPJ in 20 females aged 17 to 69 years (mean 50.9, SD, 13.5). Depth of cartilage lesions was assessed using the 5-level International Cartilage Repair Society (ICRS) scale and a 3-level scale (normal, partial thickness, full thickness). Inter-examiner reliability of lesion location and depth was assessed using absolute percentage agreement and kappa (κ) statistics, and inter-examiner reliability of lesion surface area was assessed using intra-class correlation coefficients (ICCs) and 95% limits of agreement (LOAs).

Results: For lesion location, percentage agreement ranged from 90 to 100% and κ values ranged from 0.78 to 1.00, reflecting substantial to excellent levels of agreement. For lesion depth using the ICRS and 3-level scale, percentage agreement ranged from 33 to 100% and weighted κ values ranged from 0 to 1.00, reflecting poor to excellent levels of agreement. For lesion surface area, the ICC was 0.98 (95% CI, 0.97 to 0.99) and 95% LOA was 0.74 to 1.41, indicating excellent reliability.

Conclusions: The results of this study demonstrate a generally high degree of reliability between examiners for the intra-operative use of the 1st MTPJ cartilage evaluation tool. The tool may have some value in predicting surgical outcomes associated with hallux valgus.

O46

Partial nail avulsion: habit or evidence based?

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Onychocryptosis is a relatively common condition that can cause significant pain and discomfort. Partial nail avulsion (PNA) with phenolisation is a straightforward procedure performed by podiatrists on a daily basis. The procedure has shown a high rate of efficacy and low recurrence rate, and can be performed on high risk patients with close post-operative monitoring and those with concomitant infection. PNA with phenolisation of the nail matrix is a non-invasive procedure that does not require the use of an operating theatre and can be carried out in the podiatrist's rooms. Pre-operative measures do need to be taken, a local sterile field should be set up and the toe and forefoot should be scrubbed. Once the procedure has been completed healing can be expected in 4-8 weeks. The PNA procedure has been taught to undergraduate podiatrists since the late 1970's and has developed many small variations in how the procedure is carried out. Variations vary from pre-operative management (type of antiseptic used), phenolisation time (reported to be between 1 to 5 minutes), type of post phenol irrigation (saline, isopropyl alcohol or no irrigation) and post-operative dressing regimen. These variations however are usually operator dependant and based on personal experience. Post-operative management of PNA wounds have attracted a lot of interest, with the use of different dressings (providone-iodine impregnated gauze and paraffin gauze) and topical medicaments (manuka honey, intrasite gel) aimed at increasing the healing rate and reducing the rate of infection, but quantitative analysis of the colonisation of the wound bed shows a bacterial count of zero after the use of phenol. The case of the phenolised wound is an interesting one, an acute wound that heals by secondary intention and freely discharges for 2-4 weeks postoperatively. After the application phenol and the destruction of all microbiological matter the post-operative focus should be in nurturing the recolonisation of the nail bed. Wounds that have a high as well as a low bacterial count have been shown to have an effect healing rates, but no studies have investigated the microbiological behaviour of a phenolised PNA wound.

O47

Efficacy of a multifaceted podiatry intervention to improve balance and prevent falls in older people: a randomised trial

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Background: There is growing evidence that foot problems and inappropriate footwear impair balance and increase the risk of falls in older people. These risk factors are potentially amenable by podiatric intervention, although this is yet to be evaluated in a clinical trial. This presentation reports on the first randomised controlled trial of a multifaceted podiatry intervention designed to improve balance and prevent falls in older people.

Methods: We randomly allocated 305 community-dwelling people aged over 65 years with foot pain and an increased risk of falling to a control or intervention group. Both groups received routine podiatry care. The intervention group also received a multifaceted podiatry intervention consisting of: (i) prefabricated insoles customised to accommodate plantar lesions; (ii) footwear advice and assistance with the purchase of new footwear if current footwear was inappropriate; (iii) a home-based exercise program to strengthen foot and ankle muscles; and (iv) a falls prevention education booklet. Primary outcome measures were the number of fallers/multiple fallers and the falls rate, recorded by a falls diary over a 12 month period. Secondary outcome measures assessed six months after baseline included the Short Form 12 (SF-12), the Manchester Foot Pain and Disability Index (MFDPI), the Falls Efficacy Scale International, foot and ankle strength and range of motion (ROM), and balance and functional tests.

Results: There was a significant reduction in falls rate in the intervention group compared to the control group (incidence rate ratio=0.64, 95% CI 0.45 to 0.91, p=0.01) but no significant differences between the groups in the proportion of fallers/multiple fallers. There were also significant improvements in secondary outcome measures of the SF-12 physical subscale, the MFPDI function subscale, and several measures of foot and ankle strength and ROM, balance and functional ability in the intervention group compared to the control group.

Conclusions: In older people with foot pain and an elevated risk of falling, a multifaceted podiatry intervention reduces the rate of falls by 36% and improves several aspects of foot and ankle strength, ROM, balance and functional ability suggesting that podiatry has a valuable role to play in preventing falls in older people.

O48

Are we doing better under pressure? An audit of post surgical wounds managed with negative wound pressure therapy

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Background: Diabetes related foot ulcers (DRFU) frequently require surgical debridement or limb saving, partial foot amputation. The resultant wounds are generally deep and associated with prolonged healing times. Negative pressure wound therapy (NPWT) is increasingly used to facilitate healing of these complex wounds. This retrospective audit provides outcome data on patients with post-surgical wounds managed with NPWT within our High Risk Foot Service (HRFS). There is a paucity of data on clinical outcomes of DRFU treated with this therapy.

Method: Data from patients treated for post-surgical wounds within the HRFS was extracted from our electronic data base. A manual review of the patients records treated with NPWT was conducted to determine wound severity (University of Texas grading system), time to healing (from date of surgery), duration of NPWT and complications including new or recurrence of wounds and the need for further surgical management.

Results: 155 patients with post surgical wounds were managed by the HRFS between September 2006 and November 2010. Many (83%) of these were superficial ulcers (grade 1), the remainder involved tendon and or bone (Grade 2 and 3). Thirty seven patients (37 wounds) were treated with NPWT. Two were superficial (grade 1), 19 were to tendon (grade 2) and 16 were to bone (grade 3). Most (34) were clinically infected at baseline and 13 were ischaemic. Median time to healing (from the date of surgery) was 121 days. Twenty one healed and 5 cases are ongoing. NPWT was used for a median of 30 days. Two required further foot surgery before healing, 14 patients developed new ulcers (unrelated to NPWT), 3 patients who healed required below knee amputation within 2 years and 1 died during the follow-up period.

Conclusion: NPWT is often used in our service for the management of complex post surgical wounds with close to 60% achieving complete wound closure and a low rate of major amputation. While many factors may influence this result, the increasing use of NPWT is supported in this setting. Data collection is ongoing and we plan to compare these outcomes to a historical control group and hope that this sets a benchmark for appropriate use of NPWT.

O49

Children's rearfoot and midfoot motion while walking in school shoes

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Background: Parents, health professionals and shoe manufacturers expect that shoes will not impede a child's normal foot function or motor development. The aim of the current study was to determine the effect of school shoes on the rearfoot and midfoot motion of healthy children while walking.

Methods: Twelve children performed five walking trials at a self selected velocity while barefoot and wearing school shoes (Daytona, Clarks). A 10 camera 200 Hz 3D motion analysis system (EVA-RT5.0, MAC) was used to calculate marker trajectories. Force plate data were collected at 1000 Hz (Kistler™). Retro-reflective markers were attached to the right leg and to the foot/shoe at the navicular, 1st and 5th metatarsal heads and hallux. Rearfoot motion was measured with a wand marker cluster through a window in the shoe. A standing reference trial was used to embed segment axes and thence to calculate motion of the distal segment relative to the proximal segment. Data were normalised to the stance phase which was sub-divided from the anterior/posterior force data as: contact period (initial contact - maximum negative force); midstance (maximum negative force - zero) and propulsion (positive force - toe-off).

Results: Five boys and seven girls participated in the study (mean age 9 years, range 5-13 years). During the contact period shoes decreased midfoot range of motion (ROM) in the frontal plane from 3.4° to 1.7° (p=0.002) and in the transverse plane from 22.0° to 11.6° (p<0.001). No significant difference in ROM occurred during midstance at either the rearfoot or midfoot. During propulsion shoes reduced rearfoot ROM in the frontal plane from 12.0° to 9.6° (p=0.026) and midfoot ROM in the sagittal plane from 19.6° to 10.8° (p<0.001) and in the transverse plane from 10.1° to 4.3° (p<0.001).

Conclusions: Traditional school shoes restrict children's foot motion during walking particularly at the midfoot during the contact period and propulsion phases of gait. The medium and long-term impacts of these changes are the focus of further research. The impact of school shoes on foot motion should be considered when assessing the paediatric patient and evaluating the effect of shoe or in-shoe interventions.

050

Microbiology culture results in high risk foot clinic patients: an audit

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Background: The majority of the clinical work of a high risk foot service is involved in the care of patients with diabetic foot ulcers. Infection is common, with the percentage of patients in a session receiving antibiotics ranging from 50-100%. We conducted an audit of microbiology culture results for our patients over a one-year period.

Methods: Three reviewers extracted all microbiology results for all patients who had a current foot progress chart and who had been attending the high risk foot unit at Liverpool Hospital from the period of 15 September 2009 to 15 September 2010. The results were collated and entered into an Excel[®] spread sheet. Fields included wound location, microbes, colonisation, and antibiotic susceptibility.

Results: The total number of patients fitting the selection criteria was 131. The most common finding was coliform colonisation, in 83 patients (63.4%), followed by staphylococcus aureus, in 57 patients (43.5%), MRSA, in 21 patients (16%), and streptococcus (Group A, B, C, G) in 14 patients (10%). Less common organisms included acinetobacter baumannii, and klebsiella oxytoca.

Conclusions: The high incidence of MRSA in our patient population is of concern, especially as the choice of antibiotics available to treat infections with this organism is slowly becoming reduced. Major areas of lack of knowledge in the care of patients with foot ulceration include the optimal duration of antibiotic treatment, both oral and parenteral, for infected ulcers and osteomyelitis in diabetic patients.

051

The "Toe Walking Tool": a novel method of assessing toe walking children

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Background: Idiopathic toe walking (ITW) can present in children above the age of three, and occurs in the absence of any medically diagnosed conditions. Identification of medical conditions that are associated with toe walking can be complex and a potentially daunting task for those that infrequently assess children. In order to facilitate entry for appropriate toe walking children into an ITW study, a tool was developed and validated.

Methods: A review of literature established key indicators that may be found within the medical history and clinical presentation that identify an underlying condition potentially being responsible for the toe-walking gait. These key indicators were translated into a simple web based program or a paper version of 21 questions. The tool content was validated via a Delphi panel with medical and allied health professionals. It was then tested for reliability with twelve children and 10 allied health professionals.

Results: The content of this tool and its design was determined valid by a Delphi panel process. Minor changes to order and wording were applied. The results of the reliability testing determine the tool to be reliable with a Fleiss Kappa=0.9028; z=29.6091; p<0.0001. This was calculated from 120 individual uses of the tool.

Conclusions: There is a need for appropriate assessment tools for both training new clinicians working with the paediatric population, and for clinicians that infrequently assess children. The Toe Walking Tool is a valid and comprehensive way to assess children who toe walk. This tool will assist in the appropriate referral of children who may have a medical reason for their gait pattern and the identification of children with an ITW gait.

052

Neuromotor control of the triceps surae during running in people with and without Achilles tendinopathy and the immediate effect of foot orthoses

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Background: Achilles tendinopathy (AT) is a common injury among physically active populations. It has been proposed that changes in neuromotor control of the triceps surae may increase differential intratendinous forces and thus be associated with the pain and pathology seen in this condition. However, it is not known if neuromotor differences actually exist between those with and without this condition. Thus the primary purpose of this research was to investigate whether neuromotor control of the triceps surae in distance runners with AT is altered compared to controls (Study 1). The secondary purpose of this research was to investigate the immediate effects of foot orthoses on triceps surae neuromotor control in subjects with AT (Study 2).

Methods: Surface electromyographic measures were taken from the Soleus (Sol), Lateral Gastrocnemius (LG) and Medial Gastrocnemius (MG) of 34 male subjects (15 with AT, 19 controls) while subjects ran over ground at 4 m/sec in a running sandal. Force plate data was acquired to determine heel strike and toe off events. For Study 1, comparisons were made between the relative timing of each of the three muscles for EMG onset and offset, i.e. Sol-LG, Sol-MG and LG-MG. For study 2, the same measures were taken while subjects with AT ran in a prefabricated orthoses.

Results: For study 1, there was a significant difference for Sol and LG offset times in the AT group, compared to the control group (p = 0.02). There were no significant differences for EMG onset times between groups. For study 2, no significant differences were found in the AT group between the footwear only condition and the footwear plus orthoses condition (p > 0.05).

Conclusions: Subjects with AT display altered neuromotor control of the triceps surae compared to controls. Sol offset times were significantly earlier than LG offset times. It is not known whether this is as a result of the pathology or is an aetiological factor in the genesis of AT. Foot orthoses had no immediate effect on the relative timing of the triceps surae. Further research is required to understand the genesis of the neuromotor differences and to determine whether there are any long-term responses to foot orthoses.

053

Development of a diagnostic rule for identifying radiographic osteoarthritis in people with first metatarsophalangeal joint pain

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Background: Diagnosis of osteoarthritis (OA) affecting the first metatarsophalangeal joint (MTPJ) is typically made on the basis of clinical observations such as restricted dorsiflexion range of motion of the first MTPJ, the presence of a dorsal exostosis and secondary complications such as hyperextension of the first interphalangeal joint. However, the ability of these observations to accurately identify the presence of first MTPJ OA has not been examined. Therefore, the aim of this study was to develop a diagnostic rule for the identification of radiographic OA of the first MTPJ in people with first MTPJ pain.

Methods: Symptoms and clinical observations were documented in 181 people with first MTPJ pain, and the presence of OA was confirmed using plain film radiography. Diagnostic test statistics were calculated to assess the ability of symptoms and clinical observations to identify radiographic OA. Multivariate logistic regression was used to develop two diagnostic models: a statistically optimal model and a simplified clinical model.

Results: Multivariate logistic regression identified pain duration greater than 25 months, the presence of a dorsal exostosis, hard-end feel, crepitus and less than 64 degrees of first MTPJ dorsiflexion to be significantly associated with radiographic OA. The statistically optimal model and clinical model performed similarly, with the areas under the receiver operating characteristics curves being 0.87 (95% confidence interval [CI] 0.81 to 0.93) and 0.87 (95% CI 0.80 to 0.93), respectively, and the percentage of cases correctly classified being 86.2 and 85.6, respectively. A cut-off score of ≥ 3 using the clinical model resulted in a sensitivity of 88%, specificity of 71%, accuracy of 84%, positive likelihood ratio of 3.07 and negative likelihood ratio of 0.17.

Conclusions: In people with first MTPJ pain, a model consisting of five clinical observations can accurately identify the presence or absence of radiographic OA. The application of this diagnostic rule may assist clinical decision making and potentially reduce the need for referral for radiographs.

O54

Intra-articular hyaluronan (Synvisc®, hylan G-F 20) for the treatment of first metatarsophalangeal joint osteoarthritis: a randomised, placebo controlled trial

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Background: The objective of this randomised controlled trial (RCT) was to comparatively assess the effectiveness of intra-articular hyaluronan (Synvisc®, hylan G-F 20) against an intra-articular sterile saline placebo for the treatment of radiographically confirmed, symptomatic first metatarsophalangeal joint (MTPJ) osteoarthritis (OA).

Methods: One hundred and fifty one (n=151) participants with symptomatic first MTPJ OA were randomly allocated to receive up to 1 ml intra-articular injection of either Synvisc®, hylan G-F 20 or a sterile saline placebo. Outcomes were evaluated at 1, 3 and 6 months post-injection. Primary outcome measurements included the *foot pain* and *foot function* sub-scales of the Foot Health Status Questionnaire (FHSQ). Secondary outcome measurements were pain at the first MTPJ during walking and rest, self-reported stiffness at the first MTPJ, magnitude of symptom change with allocated treatment, global satisfaction, health-related quality of life (assessed via the Short-Form-36, version two), first MTPJ dorsiflexion range of motion, strength of the hallux plantarflexors, use of pain-relieving medication, concomitant therapies and dynamic plantar pressures.

Results: This RCT was completed in July 2010, with 147 (97%) participants followed up at 1 month, 127 (84%) at 3 months and 135 (89%) at 6 months. Both the placebo and treatment groups displayed improvements at the 1, 3, and 6 month follow-up periods. However, there were no statistically significant differences between the placebo or treatment groups for the primary outcome measures of FHSQ *foot pain* and *footfunction* during any review period. With few exceptions, there were no statistically significant differences in the secondary outcome measurements between the groups.

Conclusions: A single intra-articular injection of Synvisc®, hylan G-F 20 is no more effective than a single intra-articular injection of sterile saline (placebo) in reducing symptoms and improving function in people with symptomatic, radiographically confirmed first MTPJ OA.

POSTER PRESENTATIONS

P1

Establishing and reviewing podiatry service to the haemodialysis ward at Caulfield Hospital

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Journal of Foot and Ankle Research 2011, **4(Suppl 1)**:P1

Background: Podiatry services for patients attending haemodialysis at Caulfield Hospital (CH) began in June 2009 due to emerging evidence indicating people with chronic kidney disease and end stage renal failure are at an increased risk of developing lower limb complications such as ulceration and amputation. Risk factors become more frequent with progression of the disease, some research also suggests 95% of people with diabetes who receive haemodialysis treatment have at least one risk factor for foot ulceration.

Methods: Preliminary patient surveys were undertaken to establish patient interest in receiving podiatry treatment. Prior to receiving treatment all patients underwent an initial podiatry assessment establishing their baseline vascular and neurological status and other information to help determine their level of risk. Following a 12 month pilot further process evaluation data was collected.

Results: An overwhelmingly positive response was received from patients and haemodialysis nursing staff in requesting access to podiatry services. At the time of the initial survey only 43% of haemodialysis patients were accessing podiatry. A haemodialysis podiatry ward round has been established on alternating days and weeks with an 8 weekly review period to ensure easy access for all patients. Treatment is provided at no cost to the patients and takes place during haemodialysis treatment hours; making it more accessible and convenient for patients. Additional funding was not obtained for this service and was redistributed from existing funding streams. A 12 month service review was conducted in July 2010 surveying podiatry staff, haemodialysis nursing staff and patients. The feedback from all parties was positive and encouraging and it was decided the haemodialysis ward round would continue with some minor changes. The survey revealed the percentage of people accessing podiatry services had increased to 73% (from 43%) within one year; 91% of these patients reported receiving podiatry treatment whilst attending haemodialysis at CH. Most recently funding has been procured to implement a limited podiatry service at Sandringham Hospital. The service will include access for patients receiving haemodialysis and will utilise the model previously piloted at CH.

Conclusions: The future aim is to obtain funding for podiatry services for haemodialysis patients across all Alfred Health sites and encourage more patients to access the service by ensuring relevant information and education is provided. Ethics approval has been sought to further investigate the effects of haemodialysis on the foot. The scope of this would include increasing awareness amongst the greater community of foot complications in haemodialysis patients and assist in establishing better access to podiatry services for patients undergoing haemodialysis.

P2

The relationship between body mass and peak and mean plantar pressure

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Journal of Foot and Ankle Research 2011, **4(Suppl 1)**:P2

Background: The correlation between foot and ankle pathologies and plantar pressure variables has previously been documented in the literature. One of the premises underlying this correlation is the role of increasing body mass on the magnitude of forces acting upon the foot in locomotion, such as the normal force measurable with plantar pressure equipment. Previously, only a limited number of studies have investigated this relationship in the form of plantar pressure variables such as peak and

mean pressure in non-pathological adult populations during walking. This study aimed to investigate the effect of increasing body mass added at known intervals on peak and mean plantar pressure variables in healthy adult subjects during walking.

Methods: In this study, 30 asymptomatic adult subjects were recruited. Additional body mass was simulated via the addition of a weighted vest, with three different loading conditions (5, 10 and 15 kg) including a control condition (0 kg). The order of the loading conditions was randomized for each subject. Each subject wore the vest under each loading condition whilst walking down a 10 metre walkway where the outcome variables were measured from 3 steps of the right foot using the mid-gait protocol. The F-Scan in-shoe plantar pressure measurement device (TEKSCAN, Boston, MA, v. 1.6x) was used to collect pressure variables from each subject. The primary outcome variables collected were peak and mean pressure for each of the six plantar regions. A random effects mixed model was used for analysis, including post-hoc pairwise comparisons. Bonferroni adjustments were applied to account for multiple comparison testing.

Results: Body mass was found to be a significant determinant of peak plantar pressure within the heel, metatarsals 2-5 and hallux regions and within all plantar regions for the mean pressure variable ($p < 0.05$). Different plantar regions of the foot displayed varying degrees of sensitivity in regards to peak pressure as a response to increasing body mass. The heel and metatarsal 2-5 regions were sensitive to a 10 kg increase in body mass, followed by the metatarsal 1 and hallux regions which only displayed statistically significant increases in body mass when 15 kg of load was applied ($p < 0.05$). The midfoot and lesser digits did not display any statistically significant differences in peak pressure for all load conditions compared to the control condition. The mean plantar pressure variable displayed similar sensitivity to increasing body mass, with the metatarsal 2-5 region showing significant differences between the 5, 10 and 15 kg loads compared to the control condition ($p < 0.05$). All other plantar areas were less sensitive, requiring 15 kg of additional load to be added before displaying statistically significant differences in mean pressure compared to the control condition.

Conclusions: The results of this study indicate an inconsistent relationship between body mass and both peak and mean plantar pressure variables – one that is dependent upon the plantar region.

P3 Optimising collection of footprint evidence from crime scenes and suspects

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Journal of Foot and Ankle Research 2011, 4(Suppl 1):P3

Analysis of either footprints or footwear impressions which have been recovered from a crime scene is a well known and well accepted part of forensic investigation. When this evidence is obtained by investigating officers, comparative analysis to a suspect's evidence may be undertaken. This can be done either by the detectives or in some cases, podiatrists with experience in forensic analysis. Frequently asked questions of a podiatrist include: "What additional information should be collected from a suspect (for the purposes of comparison), and how should it be collected?" This paper explores the answers to these and related questions based on 20 years of practical experience in the field of crime scene analysis as it relates to podiatry and forensics. Elements of normal and abnormal foot function are explored and used to explain the high degree of variability in wear patterns produced by the interaction of the foot and footwear. Based on this understanding the potential for identifying unique features of the user and correlating this to footwear evidence becomes apparent. Standard protocols adopted by podiatrists allow for more precise, reliable, and valid results to be obtained from their analysis. Complex data sets are now being obtained by investigating officers and, in collaboration with the podiatrist; higher quality conclusions are being achieved. This presentation details the results of investigations which have used standard protocols to collect and analyse footwear and suspects of recent major crimes.

P4

A pilot study comparing superficial wound swab, deep tissue biopsy and fine needle aspiration biopsy in identifying infecting organisms in foot ulcers due to diabetes

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Journal of Foot and Ankle Research 2011, 4(Suppl 1):P4

Background: Current clinical practice widely regards deep tissue biopsy as the gold standard for identification of wound bacterial bio-burden. This study aims to establish whether fine needle aspiration biopsy (FNAB) is as accurate as deep tissue biopsy and therefore offers a more accurate, cheaper and suitable alternative to routinely used superficial swab in diabetic wounds of varying depth and severity.

Methods: A total of 15 infected diabetic foot wounds were sampled and cultured. Three specimens were taken from each wound: superficial swab before debridement, followed by fine needle aspiration biopsy and deep tissue specimen at the end of sharp debridement.

Results: FNAB identified the same significant bacteria found in deep tissue culture in only 5 (33%) wounds missing all or some significant bacterial isolates in 10 (67%) wounds. In 6 (40%) of these wounds FNAB cultures were negative. In comparison swab cultures identified the same significant bacterial isolates found in deep tissue culture in 13 (87%) wounds, missing 1 bacterial isolate in 2 (13%) wounds with no negative cultures recorded.

Conclusions: In this limited sample it would appear that FNAB culture technique is severely inadequate in identifying pathogens in diabetes foot wounds in comparison to superficial swab technique and gold standard deep tissue biopsy. FNAB cultures missed microorganisms in two thirds of wounds and had a high false negative rate.

P5

Footwear in cricket: issues facing podiatrists treating fast bowlers

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Background: The choice of footwear and custom modification of footwear in fast bowling in cricket lacks biomechanical and clinical evidence. This demonstrates that despite professional advice being available, elite fast bowlers continue to wear shoes that may not be appropriate for them. The aim of this study was to investigate the biomechanical effects of three cricket shoes commonly used by fast bowlers and whether footwear modification could play a role in injury.

Methods: Four male cricket fast bowlers were included in the study. A 20 camera VICON Mx system was used to collect three-dimensional kinematic data. A four segment marker set was used to track and model the lower limb. Four force platforms (Type 9287 BA, Kistler) were positioned at both back and front foot strike to capture kinetic data. Participants' perceptions of footwear were measured using a VAS. Friedman two-way ANOVA with post hoc pairwise comparison was used to analyse the differences between shoes. Linear regression analysis was used to correlate predictive outcome measures.

Results: The custom modified cross-trainer (ASICS 490tr) demonstrated the highest participant perception footwear score (mean 9/10 VAS). The conventional cricket shoes (ASICS 170no) demonstrated a significant reduction in front foot lateral shear force ($P = 0.038$) and a significant decrease in front knee joint external rotation moment ($P = 0.022$) relative to the custom modified shoe (ASICS 490TR). Exploratory regression analysis identified that front foot peak lateral shear force was significantly correlated ($R^2 = 0.75$, $P < 0.001$) to sagittal plane knee joint angle at initial contact. Sagittal plane knee joint angle at initial contact was also significantly correlated ($R^2 = 0.73$, $P < 0.001$) to front foot loading rate.

Conclusions: The findings of this research demonstrate that custom modified cricket shoes increase lateral shear force and knee external rotation moment at the front leg. However, the relationship between these findings and injury remain unquantified. Further research must identify the role of footwear in the mechanism of lower limb injury in fast bowlers and what characteristics of footwear correlate to improved footwear VAS scores in regards to comfort, support and performance.

P6

The effect of heel inserts and foot orthoses in older people with plantar heel pain

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Background: Plantar heel pain is one of the most common musculoskeletal conditions affecting the foot and it is commonly experienced by older adults. Contoured foot orthoses and some heel inserts have been found to be effective for plantar heel pain, however the mechanism by which they achieve their effects is largely unknown. The aim of this study was to investigate the effects of foot orthoses and heel inserts on plantar pressures in older adults with plantar heel pain.

Methods: Thirty-six adults aged over 65 years with at least 4 weeks duration of plantar heel pain participated in the study. Using the in-shoe Pedar[®] system, plantar pressure data was recorded while participants walked along an 8 metre walkway wearing a standardised shoe and 4 different shoe inserts. The shoe inserts consisted of a silicon heel cup, a soft foam heel pad, a heel lift and a prefabricated foot orthosis. Data were collected for the heel, midfoot and forefoot.

Results: Statistically significant attenuation of heel peak plantar pressures was provided by 3 of the 4 shoe inserts. The greatest reduction was achieved by the prefabricated foot orthosis, which provided a fivefold reduction compared to the next most effective insert. The contoured nature of the prefabricated foot orthosis allowed for an increase in midfoot contact area, resulting in a greater redistribution of force. The prefabricated foot orthosis was also the only shoe insert that did not increase forefoot plantar pressures.

Conclusions: These findings indicate that the prefabricated foot orthosis may be the most appropriate insert to use when a reduction in vertical loading of the heel is required.

P7

Low frequency ultrasonic debridement : a new tool in our armoury?

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Low Frequency Ultrasound Debridement (LFUD) provided by the Sonoca 185 is a new method of debriding wounds that is less traumatic, less painful, and can achieve faster healing rates (mean 2.5 times faster in prospective randomised trials vs. theatre sharps). It is bactericidal and enables many debridement cases to be performed by a podiatrist or wound consultant in a less resource intensive setting (e.g. bed-side or outpatient clinic) than by a surgeon in theatre. Essentially the Sonoca 185 is a "high technology knife" that has numerous advantages: safety, efficacy, resource utilisation, cost savings, faster healing and new capabilities over existing practice. The vibrating handpiece creates an ultrasound wave delivered to the wound in a saline medium that in turn creates two effects close to the wound surface: (i) acoustic streaming (fluid motion at the boundary of the effect) and (ii) cavitation (imploding "gaps" in the fluid that create micro-shockwaves). In turn the two effects of *cavitation* and *acoustic streaming* result in three clinical effects (i) debridement, (ii) wound healing stimulatory effects, (iii) bactericidal effects. It is these three clinical effects of (i) atraumatic selective tissue debridement, (ii) wound stimulatory effects and (iii) antibacterial activity that create the clinical results. LFUD therapy using the Sonoca 185 has been implemented at Monash Medical Centre by the Podiatry Department and Wound Clinical Nurse Consultant as part of a 4-site Department of Health trial across Victoria. This presentation is intended to familiarise you with this treatment modality by presenting a brief literature review and providing case presentations to show the benefits of adding this tool to your wound care armoury. It will also provide a brief overview of the trial, how it was funded under the Victorian Policy Advisory Committee on Clinical Practice and Technology (VPACT) and the supports that you as clinicians must have in place should you wish to progress down this path as a funding option for future services.

P8

The effect of sports shoe design on lower limb function in a neutral foot type

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Journal of Foot and Ankle Research 2011, **4(Suppl 1)**:P8

Background: Generalised excessive or prolonged foot pronation has been implemented in numerous functional changes to the lower limb resulting in overuse injuries affecting the lower back hip, knee, lower leg, ankle and foot. Motion control components incorporated in midsole of shoes have been based on biomechanical reasoning which assumes excessive motion can be controlled via mechanisms of restraint however this has not been clearly demonstrated in the literature. The aim of this project was to determine the effect of dual density midsoles and neutral midsoles compared with a barefoot condition on the rearfoot kinematics and kinetics in walking gait.

Methods: Sixteen participants with a Foot Posture Index of 0 to +5 indicating a normal foot type were recruited for this study. Each participant performed walking trials in barefoot, neutral shoe and dual density shoe conditions. A nine-camera, three-dimensional motion analysis system was used to measure frontal plane rearfoot motion and tibial rotation for each condition during the stance phase of gait. Frontal plane rearfoot moments were calculated for each condition.

Results: There was no significant difference in peak rearfoot frontal plane motion or peak tibial rotation between the barefoot and shoes conditions. The dual density shoe demonstrated a trend towards reduced maximum eversion compared with the barefoot condition ($p=0.06$). There was a significant increase in peak inversion moment between the barefoot condition and the dual density shoe in walking and running gait ($p<0.05$). No significant difference in peak rearfoot eversion or peak inversion moment was found between footwear conditions however the neutral shoe was associated with a non-significant increase in peak inversion moment. Time series data demonstrated earlier onset and longer duration of inversion moment in both walking and running gait in the barefoot condition.

Conclusion: The results of this study indicate that dual density and neutral sports shoes do not have a statistically significant effect on kinematics of the tibia or rearfoot, however there is evidence to suggest a dual density shoe may reduce peak rearfoot eversion. The reduction in inversion moment associated with both types of footwear suggests there may be less demand on anti-pronatory muscles associated with footwear use.

P9

Development, implementation and evaluation of a podiatry led "high risk foot" student clinic at the Queensland University of Technology

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Background: Diabetic foot complications are acknowledged as the leading cause of amputation and diabetes-related hospitalisation. Podiatry-led multi-disciplinary clinics are recognised as important strategies to improve diabetic foot outcomes. Data suggests diabetic foot complications are increasing at a faster rate than diabetes is being diagnosed. A reliable, competent workforce is urgently required to adequately manage patients with diabetes foot complications. Clinical training is known to have a beneficial impact on diabetic foot ulcer outcomes. As the basis for podiatry clinical training occurs at the undergraduate level in Australia, the development of students equipped with best practice skills to manage the growing population of diabetic foot complications is essential. The aim of this paper is to develop, implement and evaluate a student led "high risk foot" clinic and evaluate its impact on undergraduate learning and diabetic foot outcomes.

Methods: In January 2011 a designated Queensland University of Technology (QUT)/ Queensland Health (QH) "high risk foot" podiatry led student clinic will commence on the QUT campus with support from the QUT/QH clinical educator and other senior podiatrists. To complement the student clinical experience, placements in QH "high risk" foot services and exposure to simulation training in high risk foot management will be fostered. Primary evaluation will be undertaken quarterly and involve addressing satisfaction and clinical competencies. Surveys will be obtained from students, clinical supervisors and placement supervisors. Further evaluation of students' diabetic foot clinical indicators and patient outcomes will also be evaluated.

Results: The presentation will review the initial planning and implementation of the "high risk foot" student clinic at QUT. The first three month evaluation will be presented at the conference.

Conclusions: The explosion of diabetic foot complications requires a well skilled workforce. Undergraduate education remains at the core of podiatry learning in Australia. The development of student "high risk foot" clinics may be an innovative and effective strategy to meet the needs of Australia's diabetic foot complications. It is envisaged two years worth of data will be analysed and presented to the 2013 Australasian Podiatry Conference.

P10

Patient satisfaction survey of a newly established footwear bank in a rehabilitation hospital

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Journal of Foot and Ankle Research 2011, **4(Suppl 1):P10**

Background: The Peter James Centre (PJC) is the main rehabilitation hospital in Eastern Health. It provides a comprehensive inpatient and community rehabilitation programme. A Footwear Bank was established by the Podiatry Department in 2009 following an audit in 2007 that found 30% of the patients were not wearing suitable shoes to their therapy. The problem of finding suitable footwear had been made more difficult because three of the local shoe shops closed down. The Footwear Bank stocks several types of shoes, all with Velcro straps. The three objectives were to assess patient satisfaction regarding the service of the Footwear Bank, the quality of the footwear and whether the footwear was still being worn after discharge from PJC.

Methods: Patients who had purchased footwear were contacted by telephone for a five question survey. Their responses were collated and analysed in an Excel spreadsheet. The results were separated into groups depending on the shoe, to determine if there were any issues associated with a particular shoe.

Results: Twenty-eight of the fifty-five patients who had purchased footwear were able to be contacted for the questionnaire. Of these, 22 (79%) considered the shoes to be successful; 5 (18%) considered them somewhat successful; 1 (3%) did not consider them successful, though still wore them some of the time. Eighteen (64%) did not have any troubles with the shoes. Twenty-six (93%) are currently still wearing the shoes; 10 of the 28 (36%) wore the shoes all the time; 6 (21%) wore them most of the time; 10 (36%) wore them some of the time; 2 (7%) never wore them. Twenty-six of the 28 (93%) patients were happy with the service.

Conclusion: The Footwear Bank was established in response to patients' needs and aimed to improve health. While this survey is small in size and does have limitations, the responses overall were positive and indicate that it has been successful. There were no reports of shoes wearing out or physical faults developing from wear and tear, indicating that the shoes are of good quality.

P11

Medical grade footwear: does it prevent ulcer recurrence? An Australian perspective

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Journal of Foot and Ankle Research 2011, **4(Suppl 1):P11**

Medical grade footwear is frequently used in the prevention and treatment of ulceration in the high risk foot. Many factors can contribute to the

breakdown of tissue in the foot which leads to ulceration. Foot deformity, reduced joint mobility, mechanical stress and strain, peripheral neuropathy, vascular disease and increased pressure are common factors. The right footwear can aid in reducing the effects of these factors and assist in prevention of tissue breakdown. The St Vincent's (Melbourne) Podiatry Department introduced an in house footwear range 18 months ago. This study is to determine the effect this range of extra depth and width footwear has had on patient's foot health. The St Vincent's Podiatry Department is conducting a retrospective study on 40 high risk patients over a 12 month period in an acute hospital setting. All patients have been prescribed medical grade footwear. Patients who were determined high risk are assigned a risk classification 0 (low risk) – 3 (high risk). The aim of this study was to identify those patients who had a poor outcome such as further ulceration or amputation since being issued with medical grade footwear within this time frame. From this retrospective study we hope to be able to conclude that therapeutic footwear can assist in prevention of foot ulcers if fitted correctly.

P12

Bullosis diabeticorum: a treatment conundrum

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Bullosis diabeticorum is an infrequent but significant complication of diabetes Mellitus most commonly affecting the hands and feet. These rapidly developing bullous lesions mostly occur in patients with long standing diabetes and neuropathy. The pathophysiology of this condition remains unknown. Despite reasonably low rates of occurrence this complication potentially has significant and serious ramifications for foot health and creates a treatment conundrum. This case study demonstrates the serious nature of seemingly innocuous presentations in management of the diabetic foot. A 76-year-old man presents to the high-risk foot clinic for treatment of a suspected Charcot foot. He has a complex medical history, which includes Type 2 diabetes, hypertension, congestive cardiac failure, hypercholesterolemia, and Gastro-esophageal reflux disease. The patient undergoes various testing to aid in diagnosing a Charcot foot, such as skin temperature testing, X-ray and bone scans. Fortunately he was not diagnosed with a Charcot foot. During a routine follow-up consult he presents with clear, serous filled blisters which have spontaneously appeared. They are in non weight-bearing areas, and the patient does not recall any trauma to the area. The blisters appear consistent with bullosis diabeticorum. There are no set criteria for appropriate treatment of blistering in these cases. Treatment options were to either leave blisters intact or de-roof them, and their treatment raises many questions. Intact blisters were left intact to maintain a sterile field; broken blisters were de-roofed to prevent infection as per normal protocol for any form of blister management. The healing outcomes were compared, with no significant difference noted. However, after healing was achieved, the patient returned to the clinic, weeks later, with another episode of blistering. The patient recalled a similar history to the first episode, with no traumatic injury to the site, and the blisters occurring overnight. The same treatment protocol was followed. However, on this occasion, the blisters did not heal as successfully, and the patient developed osteomyelitis, and subsequently suffered multiple digital amputations as a result. This case demonstrates that successful wound care can be difficult on a patient with diabetes and associated complications, such as neuropathy, peripheral vascular disease, and an increased susceptibility to infection.

P13

'Paging Podiatry!': an audit of acute inpatient podiatry referrals

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Journal of Foot and Ankle Research 2011, **4(Suppl 1):P13**

Background: In 2010, the Box Hill Hospital podiatry department increased staffing levels from 0.6 to 1.6 EFT. Historically a limited High Risk Foot

outpatient service, this increase meant there was more time available to build the much needed inpatient service. Promotion of the new service has resulted in a substantial increase in podiatry referrals from the acute wards. The Podiatry Department has also established close links with the Vascular Surgery Department and is a part of their Outpatient Clinic. Once received, the podiatry referrals are routinely triaged into prioritisation categories, according to the severity of the described complaint and any reported co-morbidities. Category 1 and 2 referrals essentially revolve around active foot wounds and complications that require an immediate podiatry response. Category 3 and 4 referrals are less medically urgent and not seen as a priority to the service.

Method: All inpatient referrals received from January until October 2010 were recorded on an excel spreadsheet. Included for analysis was referring unit and ward, and the triaged prioritisation category.

Results: A total of 263 referrals were received in this period. The greatest number of referrals came from the Medical and Vascular Units: General Medical B 16.7%; General Medical A 14.8%; Rapid Assessment Medical Unit (RAMU) 14.4%; and Vascular 14.1%. Of these four top referring units, the Vascular Unit had the greatest number of appropriate referrals with 91.9% being either a Category 1 or 2. General Medical A had 44.74%, General Medical B 52.27% and RAMU 47.37%.

Conclusion: The Vascular Unit had the most number of Category 1 and 2 referrals. This is most likely due to the increased number of patients with high-risk feet under this unit and their understanding of podiatry's role with the High Risk Foot. The Medical Units referred the most to podiatry, however approximately half of the referrals received were classified as non-urgent and not required to be seen by the podiatrist if time did not permit.

P14

Footcare in the dust...providing podiatry across the Kimberley

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The Kimberley is a region in the north of WA which covers 423 517 square km's (approximately twice the size of Victoria and three times that of England!). Although the Kimberley is a large geographical area the population is estimated at only 38 000 people who live in many remote locations right across the region. Thus providing reasonable healthcare services in this area often requires clients and care providers to travel long distances. Two of the main contributors to morbidity and mortality in the region are type II diabetes, and chronic kidney disease. Because of the high rate of foot complications associated with these disorders there are many people who require podiatric care, however, podiatric services in the Kimberley are limited and only three podiatrists cover this vast area. The podiatry team work out of many locations and with a variety of services to provide clinical podiatric care. The podiatrists also offer staff in-service and up-skilling, as well as community group education sessions on a range of topics and conditions at the many locations that they visit. The podiatrists travel to over 15 remote communities and five towns, to provide services and the tyranny of distance means that they often drive for long hours to provide these services. All equipment needed must be taken with them as there is no podiatry clinics already established. The focus of the service is on indigenous clients with chronic disease such as diabetes, and due to the limitations of the service, clients must meet an eligibility criteria. Over 2,600 occasions of service were provided in 2009 with 64% of clients being indigenous. The podiatrists are mainly involved with the assessment and management of foot problems related to chronic disease such as diabetes. The full range of podiatric care is provided, including wound management, general foot care, biomechanical assessment, minor nail surgery and the provision of footwear via Community Aids and Equipment Program or via donated footwear.

P15

Unique provision of allied health services to remote renal patient care

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End stage renal failure (ESRF) occurs at a far greater rate in the Kimberley than the national average, almost trebling in the past ten years. Many people affected are Indigenous Australians. The Kimberley Satellite Dialysis Centre (KSDC), the first of its kind in Australia, is managed by an Aboriginal Community Controlled Health Service (ACCHS). Operating since October 2002, it is located over 2 000 kilometers from the nearest tertiary support centre. Ten haemodialysis machines and beds, cater for 42 clients with ESRF, and provide respite care to patients undergoing home haemodialysis, to avoid the long journey to Perth. Staff include Registered Nurses (RN's), Aboriginal Health Workers (AHW's), administrative workers, a social worker, medical officer, and drivers to assist in transportation. Many of these employees are Aboriginal people, and therefore improve the cultural appropriateness of the service provided. The Dieticians Association of Australia (DAA) recommend the gold standard of care for patients with chronic kidney disease include the services of a dietician. Renal-based nutrition advice was originally provided in 2006 for dialysis patients, however, in 2009 services were increased and now incorporate regular clinical dietetic services. Clients receive thorough assessments to identify and manage malnutrition, uncontrolled co-morbidities such as diabetes, mineral and bone disorders and electrolyte disturbances. Chronic kidney disease also increases the risk of developing foot complications, including ulceration and amputation. Risk factors are often exacerbated by a concomitant diagnosis of diabetes mellitus, and increase with progression of kidney disease. In 2006 a podiatry service began providing a monthly service to all patients undergoing treatment at the centre. Podiatric care in this setting focuses on assessment of risk level, patient education to promote healthy foot care practices, routine nail and skin care to prevent tissue damage, and wound care treatment, assessment and advice, where required. The podiatrist and the dietician work closely to ensure optimal care for patients, for instance those with chronic wounds. Multiple impediments to wound healing may exist, including inadequate nutrition and biomechanical abnormality, as well as working together on weight loss regimes for patients, enhancing mobility and potential for exercise, and providing dietary advice to reduce weight. Both clinicians work closely with the AHW's RN's, Physician and social worker to ensure continuation of care and adequate support is provided to the patient, depending on their particular need.

P16

A comparison of social attitudes, professional and institutional identities and acculturative stress between podiatry and other health professional students

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Background: In multicultural societies, such as Australia, it is important for health professional students to possess skills to interact positively with people from a range of cultures. This study describes first-year podiatry students' social attitudes, professional and institutional identities and acculturative stress; and compares these with other health professional students in the school.

Methods: Thirty-three out of forty-six enrolled first-year podiatry students completed surveys at a large, culturally diverse university in Sydney, Australia. Demographic data and standardised measures of English language acculturation, acculturative stress, universe diverse orientation and professional and institutional identities were collected. Surveys were also administered to first-year physiotherapy, occupational therapy, nursing and medical students at the same university. Data were entered into and analysed in SPSS version 18. Descriptive statistics and Kruskal-Wallis tests were used to describe and compare the student cohorts.

Results: Seventy-three percent of first-year podiatry students were born in Australia although 36% of these students speak a language other than English at home. Podiatry was the first course preference for 73% of students, and 34% of the cohort reported having a close friend in the same course. 64% were in paid employment at the time of the study, and of these 71% worked in a non-health-related area.

Conclusions: Trends were identified which differentiated the health professions. When compared with other health professional students, podiatry students had relatively low levels of acculturative stress and moderate levels of professional and institutional identity. This suggests that first-year podiatry students (after 12 weeks of study) have appropriate attitudes that will facilitate the development of cultural competence with further study. The data to date has shown similar trends for physiotherapy and occupational therapy students in the School of Biomedical and Health Sciences.

P17

Diabetes coordinated care: a multidisciplinary approach

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The Inner South Community Health Service diabetes working group was convened in 2001 to improve the management of diabetes and develop a clear model of care for Inner South Community Health Service clients with diabetes. Early initiatives included developing a screening tool, a resource folder, staff training and a short term project to complete a needs analysis and propose a model of care. In 2007 the Inner South Community Health Service diabetes coordinated care model was implemented. This is a comprehensive model that describes the client journey and supporting processes from initial identification through to discharge. Membership of the diabetes working group has included podiatrists, dietitians and nurses. Workers not usually associated with diabetes care have also participated, including: intake worker, family counsellor, mental health worker, physiotherapists, case managers, and occupational therapist. All members received external training to up skill their diabetes knowledge. Mandatory training by this multidisciplinary group was subsequently provided to all staff. The diabetes working group has been the driving force behind the development, evaluation and refinement of the diabetes coordinated care model. The model consists of an initial questionnaire for all new clients completed by the intake worker. If clients express an interest in diabetes, then referral for an assessment is made to the team. The team incorporates any of the working group members and other interested staff, including podiatrists not on the working group. From the assessment clients are offered diabetes information pack, referred to appropriate allied health staff, diabetes educator, diabetes education sessions and diabetes support group. The model has also involved liaison with other external health professionals including general practitioners. Annual follow up is completed by a member of the assessment team. The model has built staff capacity around diabetes, increased resources and services within Inner South Community Health Service and evaluation of the program indicates that there is an increased the capacity of clients to manage their diabetes.

P18

Podiatry in continence

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Continence has been implicated as a contributing factor in falls related injury. In aged care rehabilitation, continence was identified by podiatry as an issue in regards to footwear selection and was an opportunity to improve falls prevention education and improved quality of life for the patient. The key elements of this education focused on the importance of slip-resistance in footwear and washability. Kingston Centre is an aged care rehabilitation service that has an existing podiatry lead footwear prescription service, where patients can purchase footwear with optimal features for a reduced cost. Most of the footwear is machine-washable and several have an outsole configuration that actively grips the floor in stance, which is advantageous on a wet surface. An education package was developed for continence nurses to improve knowledge of footwear, and foot care issues and promote referral to podiatry. Up-skilling continence nurses in the

importance of footwear selection, footwear laundering as well as general foot care, has improved awareness of the relationship between appropriate footwear, falls prevention and continence. Anecdotally, there has been a reduction in falls in relation to continence issues. This will be further investigated in future. Of particular note is that the delivery of educative in-services and the majority of footwear prescription and fitting is performed by a skilled podiatry allied health assistant. The podiatrist was in engaged in the development but has a now assumed a smaller consultative role. Engaging a podiatry allied health assistant in this way has expanded the service while still allowing the professional staff to focus high risk patients. It also has improved quality of life implications for a population that would not have been seen by podiatry.

P19

Special Olympics IX National Games, Healthy Athletes Program: 'Fit Feet'

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The Special Olympics IX National Games were held in Adelaide, South Australia in April 2010. Podiatrists and podiatry students were invited to participate in the healthy athletes program to assess the feet of athletes with intellectual disability. The World Health Organisation has found that people with an intellectual disability form the largest disability population in the world. Special Olympics (SO) is an international not-for-profit organisation. Globally, SO now supports 3.1 million people in 220 countries. Each year there are 30,000 SO competitions throughout the world. Affiliated with the International Olympic Committee, SO is held in the manner of all Olympic games. There are over 500,000 Australians living with an intellectual disability. Special Olympics Australia supports around 4000 athletes in over 250 sports clubs across metropolitan and rural Australia. SO Australia offers fourteen official national sports: alpine skiing, aquatics, athletics, basketball, bocce, cricket, figure skating, football (soccer), golf, gymnastics, sailing, softball, tennis and tenpin bowling. People with intellectual disability are often overrepresented in areas of preventable health problems, SO provides invaluable opportunity for identifying the frequent health care needs. Podiatry is an essential and core element of any sports and wider mobility issues. Approximately 850 participating athletes registered for the National Games in Adelaide. 'Fit Feet' managed to see over 400 athletes; notable as other programs have seen 10% of athletes. Screening of athletes investigated: foot and ankle problems, footwear adequacy. Referral and education were provided as required. In addition to podiatry, the athletes were also availed dental, audiology and otometry health screenings. The Australian Podiatry Association (SA), Special Olympics Australia and the University of South Australia cooperated to provide the screening program for the SO athletes. The University of South Australia acknowledged this project with a commendation at the 2010 Chancellor's awards for community engagement. The next SO National Games will be held in Melbourne in 2014, where podiatrists and students could have the exciting and rewarding opportunity to participate in the healthy athletes program. The Special Olympics athletes' oath is: 'Let me win. But if I cannot win, let me brave in the attempt.'

P20

Clinical measures of paediatric foot posture: a critical review

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Background: The paediatric flat foot is a common concern and has long been regarded as a problem, and feared to be potentially disabling. Definition of what exactly constitutes a flat foot remains surprisingly debatable, given its common presentation. Estimates of flat foot prevalence in children have been influenced by the varied the methods of assessment

used to assess the foot posture, and the subsequent criteria employed to delineate feet as flat versus not flat. The aim of this literature review was therefore to evaluate the techniques of foot posture assessment in children and the reported reliability and validity of these measures.

Method: A systematic search of electronic databases including Medline (1966-present), CINAHL, SportDiscus, Embase, Scopus and Pedro occurred between 02/01/10 and 14/08/10. Eligible articles were selected according to pre-determined criteria. Methodological quality was evaluated by use of the Quality Index as described by Downs & Black, followed by critical analysis according to outcome variables.

Results: The most widely reported measures of paediatric foot posture were footprints and measures of the heel angle and arch height. The current evidence suggests that the reliability of all measures of paediatric foot posture is highly variable and mostly poor to moderate. The only measures on which validity has been explored are navicular height and footprints.

Conclusion: Whilst no definitive conclusions can currently be drawn from the existing evidence, the trend from the current literature indicates that static paediatric foot posture may be best-assessed using RCSP, NH or FPI-6. However the relationship between static measures and pain, static measures and gait function remain largely unsubstantiated in children. The direction of future research is to establish a universal method of assessment of paediatric foot posture, and the subsequent relevance of foot posture to pain and function across age groups. Continuation of research in this field will enable targeting of design parameters towards variables that are supported by evidence, and which may directly advance clinical decision-making.

P21

Pain, disability and impairment associated with podiatric problems in patients with acute gout

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Background: Gout is on the increase worldwide and is the most common form of inflammatory arthritis affecting men. Gout is of particular significance to New Zealand, affecting approximately 15% of Maori and Pacific men in South Auckland, thus it has been dubbed the 'gout capital of the world'. Gout most frequently affects the foot, with initial attack affecting in the first metatarsophalangeal joint (1st MPJ) in 50% of patients. Involvement of the first 1st MPJ eventually occurs in 90% of individuals with gout. Despite the predilection of gout to the foot, the impact of gout on foot function is not well understood. A recent study investigating patients with chronic gout found the foot to be a rigid, high-arched with limited range of motion at the major joints of the foot. An increased threshold of pain, disability and a decrease in function was also reported. These changes associated with chronic gout may contribute to further progression of pain, disability and impairment. The impact of acute gout on musculoskeletal function has not been examined in a detailed or objective manner. The aim of the current study is to assess the impact of acute gout on foot pain, function/impairment and disability.

Methods: An observational follow-up design is currently being used to assess the impact of acute gout, with the first study visit occurring when a patient is having an acute flare and the second study occurring during the intermittent/chronic period. Patients are recruited from both primary and secondary care settings. Patient specific outcome measures assess pain, function/impairment and disability. Data obtained from initial visit and 6 weeks after first flare sits will help to determine the impact of acute gout and also make comparisons between acute and chronic gout.

Results: Data collection to date has captured 13 patients (mean age: 50.3 years, mean gout duration: 13.3 years) during an acute flare. A further 5 patients have declined to be included into the study. Findings so far indicate that acute gout flares are characterised by increased pain, disability and impairment compared to periods of intermittent gout. Difficulties in

footwear selection are a recurring theme with acute gout patients. Problems with footwear selection appear to be related to foot dimensions exceeding those of footwear available to this patient group.

Conclusions: In terms of podiatric intervention and management plans for gout patients, it appears that little can be done during acute flares due to excruciating levels of pain apart from pharmacological interventions. However, interventions relating to footwear and improving foot function may be beneficial during the stages of intermittent/chronic gout. The presentation will focus on issues of patient recruitment in culturally sensitive groups and will describe the current trends of pain, disability, function and impairment.

P22

What causes wound pain?

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Chronic leg wounds have a considerable impact on quality of life. It has been reported that over 70% of patients experience pain associated with their wounds which can range from moderate to severe. Wound pain and intensity is highly variable, it is not an accurate predictor to make clinical assumptions that specific wound types or wound size will define the type of pain the patient is experiencing. Pain intensity can be stable over time, vary day-to-day, and may increase. Wound pain is an indicator of ineffective wound management, the underlying causal pathology has not been identified nor treated or infection is present. Ineffective wound pain management can result in delayed healing and lack of compliance by the patient. Wound pain can be caused by skin damage, nerve damage, blood vessel injury, infection and ischaemia. It can lead to hypoxia which impairs wound healing and increase infection rates. As tissue oxygen decreases, there is a decrease in the production of leucocytes which provides opportunity for bacteria to colonise the wound thus leading to infection. Nerve damage is constantly occurring in the wound, due to the biochemical processes occurring in the wound and external stimuli such as wound debridement, cleansing or dressing changes. It is normally the underlying pathology or aetiology of chronic wounds which dictates the sort of pain that the patient may experience. In order to provide appropriate and effective treatment for addressing wound pain it is necessary to understand the aetiology of the wound, treat the underlying cause and eliminate the noxious stimuli. This presentation will provide an overview of common leg wound aetiologies and related pain symptoms.

P23

Don't walk on by: an innovative high risk foot clinic model

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Non-attendance at scheduled appointments is one of the most pressing issues in chronic illness management. Non-attendance is often influenced by personal and clinical factors and issues pertaining to the nature and operations of the clinic (the way health services are structured, organized and delivered affect access and satisfaction with services that in turn affect patients' ability and motivation to attend chronic disease clinics). Accessibility can be improved through flexible hours of operation, effective engagement and alternative ways of providing education and delivering services. A "drop-in" clinic operates at the Springvale site of Southern Health's Greater Dandenong Community Health Service. It provides evidence based prevention and management of diabetes related foot complications including: (i) prevention of foot ulcers through education, early screening and case management; (ii) early intervention of ulcers to optimise healing, prevent infections and hospital admissions; (iii) links with Southern Health's High Risk Foot Clinic and other ambulatory clinics; (iv) management planning for foot complications that are not due to ulcer, soft tissue or osseous complaint. The clinic's scope of practice is confined to high risk foot: foot wounds, diabetic assessment, complicated foot complaints, psycho-social

foot complaints, foot-wear and foot-gear assessment. Living Well, the broader program within which the clinic operates, provides support to assist clients experiencing homelessness (primary, secondary or tertiary) to manage diabetes, musculoskeletal or respiratory conditions and cardiovascular disease. Typically, clients experience a combination of mental illness, intellectual disability, acquired brain injury, chronic physical health problems, behavioural difficulties and drug and/or alcohol use. Clients are engaged via assertive outreach activities, in-reach into pension-level supported residential services, discharged from acute services (including acute-based high risk foot clinics) or are existing clients of Living Well. An inter-disciplinary approach with diabetes nurse, key worker (care coordinator) and dietician ensures that needs "beyond the foot" can be addressed. A Community Health Nurse from Royal District Nursing Homeless Person's Program is also contracted to provide services to the program's clients. Clients are supported to attend health appointments and access foot-wear and other items (for example, medications) which are integral to the client's wellbeing.

P24

Foot related impairments and disability in juvenile idiopathic arthritis persist despite modern day treatment paradigms

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Background: Foot problems such as synovitis, growth disturbance and deformity are considered common in juvenile idiopathic arthritis (JIA) and have been previously reported in over 90% of cases. The medical management of JIA appears to have improved recently however little is known about the impact of new regimes on localised joints such as in the foot. This pilot study aimed to investigate the prevalence of foot related impairments and disability, and survey the medical and podiatric management of patients in a cohort of UK children with JIA.

Methods: This study was a tertiary care based cross-sectional survey. Thirty consecutive JIA patients with a history of foot and ankle arthritis completed the juvenile arthritis foot disability index questionnaire (JAFI) (0-4 for each domain), child health assessment questionnaire (CHAQ) (0-3), and pain visual analogue scale (VAS) (0-100 mm). Foot deformity score (0-38), active and limited joint counts (0-77) and walking speed (m/s) were measured also recorded. Foot care provision over the previous 12 months was determined from the medical records in 23/30 participants. Results were analysed using simple descriptive statistics and expressed as median (range).

Results: Children received biologic agents in 35%, DMARDs in 65%, and 90% of participants had received multiple intra-articular cortico-steroid injections. Median (range) values for foot disease outcomes were JAFI impairment = 1 (0-3), JAFI activity limitation = 1 (0-4) JAFI participation restriction 1 (0-3), CHAQ = 0.38 (0-2), VAS pain = 22 (0-79), foot deformity = 6 (0-20), active joints = 0 (0-7), limited joints (0-31), walking speed = 1.09 (0.84-1.38). The JAFI scores represent mild foot related impairment and disability. Gait defects, deformity or abnormal foot posture, and/or active foot disease were the main reasons for referral. 43% of children received specialist podiatry care comprising footwear advice, orthotic therapy, and silicone digital appliances together with intrinsic muscle strengthening exercises.

Conclusions: Despite DMARD/biologic regimes and specialist podiatry, foot related impairment and disability persists in JIA children. Foot care appears to be in line with current recommendations. Further study is required to determine the long-term consequences of these changes found during childhood in the foot.

P25

A novel method for eliciting foot care preferences in juvenile idiopathic arthritis: a discrete choice experiment

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Background: The management of foot problems in JIA is complex and requires a multidisciplinary health professional input. However little is known about patients' and parents' preferences for attributes of foot care. Incorporating individuals' preferences into future foot-care provision may improve satisfaction, treatment adherence, and thus clinical efficacy. The aim of this study was to compare the relative importance of foot care attributes to parents of children/adolescents with JIA using an established stated preference method, a discrete choice experiment (DCE).

Methods: A DCE questionnaire consisting of 18 paired hypothetical clinical scenarios was developed using qualitative methods and designed according to published design efficiency criteria. The attributes explored were: levels of pain (pain); mobility; ability to perform activities of daily living (ADL); waiting time for initial consultation (wait); referral route (route); and ability to wear desired footwear (footwear). 'Cost to self' (cost) was included as an attribute to estimate parents' valuations of each alternative attribute, known as their willingness-to-pay (WTP). The DCE was self-completed by parents (n=40) of children/adolescents with JIA and disease-related foot problems. Data were analysed using a conditional logit regression model.

Results: Each attribute's regression coefficients (β) were statistically significant ($p < 0.01$) except cost ($\beta = 0.002$, $p = 0.118$), suggesting that all attributes, except cost, had an impact on parents' preferences. The magnitudes of the coefficients indicate that the order of importance (that is strength of preference) for each attribute was: ADL ($\beta = 1.65$), pain ($\beta = 1.20$), mobility ($\beta = 1.12$), footwear ($\beta = 1.05$), route ($\beta = 0.53$) and wait ($\beta = -0.05$). The sign of the β values suggests that parents preferred: a reduction in pain, improvements in mobility, the ability to perform ADL, and the ability to wear desired footwear; referral to a multi-disciplinary foot-care programme; and reduced waiting time. The insignificance of the cost attribute means that WTP values could not be estimated.

Conclusions: In terms of foot care service provision for children with JIA, parents appear to prefer improvements in health outcomes over non-health outcomes and service process attributes. An interesting finding of this study, relative to other DCE studies, is that cost does not appear to impact on parents' preferences, suggesting that parents are comfortable paying to improve their child's health.

P26

The self versus proxy report conundrum in juvenile idiopathic arthritis: implications for a cost-effectiveness analysis of integrated podiatry care

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Background: JIA is associated with impaired health-related quality of life (HRQoL). Proxy reporting of health outcomes such as HRQoL is often required in the paediatric setting. However there is uncertainty regarding whether self- or proxy- reported HRQoL should be used in health economic analyses, as perceptions of well-being may differ between parent and child. The aim of this study was to estimate levels of agreement and association between self- and proxy-reported HRQoL in JIA.

Methods: The EQ5D is a generic measure of HRQoL commonly used in economic evaluations. It has 2 components; 1) EQ5D profile comprises of 5 domains; mobility, self-care, usual activities, pain, and anxiety (scored as severe, moderate, or no problems); and 2) a 100 mm visual-analogue-scale (VAS). EQ5D profiles were used to calculate a weighted utility index (worst health = -0.59, best health = 1) based on a tariff derived from a UK population sample. The EQ5D was self- and proxy-completed independently by JIA

patient-parent/guardian pairs in the paediatric rheumatology multi-disciplinary foot clinic (n=40). Agreement for the EQ5D profile items was estimated using Cohen's linear-weighted kappa (κ_w) (>0.4=moderate agreement) and 95% confidence intervals. Agreement for the utility index and VAS was estimated using the intraclass correlation coefficient (ICC) ($\geq 0.4-0.75$ =fair to good agreement) with 95% confidence intervals. Consistency was estimated using Kendall's Tau (τ) and Pearson's correlation coefficient (r) ($\geq 0.4-0.6$ =moderate-strong consistency).

Results: Self- versus proxy- agreement was moderate for self-care ($\kappa_w=0.44$) and usual activities ($\kappa_w=0.44$), but less than moderate for mobility ($\kappa_w=0.29$), pain ($\kappa_w=0.29$), and anxiety ($\kappa_w=0.20$). There was good agreement for EQ5D VAS (ICC=0.59), but poor agreement for the utility index (ICC=0.23). The consistency of HRQoL reporting was moderate for self-care ($\tau=0.47$) and usual activities ($\tau=0.44$), but weak for mobility ($\tau=0.31$), pain ($\tau=0.33$), and anxiety ($\tau=0.23$). Consistency was good for EQ5D VAS (r =0.59) but weak for utility index ($\tau=0.28$).

Conclusions: The levels of agreement and association between patients with JIA and parent-proxies are at best moderate for all EQ5D measures. This has important implications for cost-utility analyses using QALYs derived from the EQ5D utility index. Further research is required to determine feasibility of using self- and proxy reported outcomes in cost-effectiveness analyses of podiatric interventions.

P27

Across the ditch: the collective diabetic foot assessment

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Background: The prevalence of diabetes (DM) and its associated manifestations is higher in New Zealand Māori than New Zealand Europeans. There is no current evidence regarding podiatric clinical characteristics of Maori with diabetes. This presentation highlights findings from a group of Maori with diabetes that have foot pathology as determined by a national generic general practice review.

Methods: Fifty three patients with diabetes were recruited from two Māori Primary Health Organisations. Podiatric specific characteristics, patient demographics and general medical conditions were recorded.

Results: Fifty three (n=53) Māori patients were recruited for this study with a median age of 54 years (IQR: 45.5 – 61.5 years). We found that Māori had a median duration of diabetes for 15 years, were obese (median body mass index 35.7) with sub-optimal glycaemic control (HbA1c >8% 42%). Podiatric specific characteristics revealed good arterial flow (IQR: Right ankle-brachial index dorsalis pedis 1.1) and a median neuropathy score of 2 (IQR 0, 4). Half the cohort displayed restriction in movement of the right ankle joint (n= 31) and first metatarsophalangeal joints (n=29). Foot education was favourable with positive benefits such as daily foot inspection (n=52). Using a modified classification tool which targets the risk factors collectively, thirty two (60%) patients were identified as requiring regular podiatry management.

Conclusions: A standardised evidence-based screening and assessment tool could be widely applied by primary care health podiatrists in the detection of imminent diabetes-related foot pathology and to support disease management. This collective assessment would be of particular benefit to communities, including Maori; where the incidence of diabetes and its complications is higher.

P28

Heel raises versus prefabricated orthoses in the treatment of posterior heel pain associated with calcaneal apophysitis (Sever's disease): study protocol for a randomised controlled trial

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Background: Posterior Heel pain can present in children of 8 to 14 years, associated with or clinically diagnosed as Sever's disease, or calcaneal apophysitis. Presently, there are no comparative randomised studies evaluating treatment options for posterior heel pain in children with the clinical diagnosis of calcaneal apophysitis or Sever's disease. This study seeks to compare the clinical efficacy of some currently employed treatment options for the relief of disability and pain associated with posterior heel pain in children.

Method: Design: Factorial 2 × 2 randomised controlled trial with monthly follow-up for 3 months. Participants: Children with clinically diagnosed posterior heel pain possibly associated with calcaneal apophysitis/Sever's disease (n = 124). Interventions: Treatment factor 1 will be two types of shoe orthoses: a heel raise or prefabricated orthoses. Both of these interventions are widely available, mutually exclusive treatment approaches that are relatively low in cost. Treatment factor 2 will be a footwear prescription/replacement intervention involving a shoe with a firm heel counter, dual density EVA midsole and rear foot control. The alternate condition in this factor is no footwear prescription/replacement, with the participant wearing their current footwear. Assessment: Foot Posture Index and Lunge Test (Inclinometer testing). Outcomes: Oxford Foot and Ankle Questionnaire and the Faces pain scale.

Discussion: This will be a randomised trial to compare the efficacy of various treatment options for posterior heel pain in children that may be associated with calcaneal apophysitis also known as Sever's disease.

P29

The implementation of the paediatric footwear program at community health level

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Background: Children spend around 30 hours a week in their school shoes - that's in excess of 15,000 hours during their school years. Correctly fitted shoes help reduce the risk of injury, improve comfort and assist in gross motor development and participation. Recent research indicates that foot deformities in children who wear incorrectly fitting footwear are increased, following the closure of a local shoe store and parents relating to podiatry staff of the financial difficulties of providing appropriate footwear, the podiatrist developed a quality project. The aim of the project was to provide cost effective and safe footwear for children that attend the services of Greater Dandenong and Cardinia Casey Community Health.

Methods: 200 local school children were assessed and 80 were determined to be wearing inappropriate fitting footwear. Bata footwear based in Mornington was approached and agreed to support the footwear program in the provision of footwear at a reduced cost for community health clients.

Results/conclusions: The paediatric footwear program in the first 4 months has fitted over 120 children, with a follow-up qualitative survey to be conducted over the following months. Parents have welcomed this service and have regularly reported learning more about correctly fitting shoes and this service provision a welcome financial relief during hardship.

P30

A retrospective audit of active Charcot neuroarthropathy in a tertiary hospital podiatry department

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Background: Charcot Neuroarthropathy (CN) is a major foot complication of diabetes which may lead to debilitating foot deformity, recurrent

ulceration and lower limb amputation. Podiatrists play a key role along the continuum of the disease from diagnosis to treatment to long-term follow-up and monitoring. The aim of this clinical audit was to gather data on patients managed with active CN in a tertiary hospital podiatry department.

Methods: Thirty cases (26 patients) were diagnosed with active CN during the four-year period January 2005 to December 2008, and managed through the Royal Perth Hospital Podiatry Department. Data was retrospectively collected from their medical records including demographics, diabetes parameters, CN treatment and outcomes at twelve months.

Results: Seventy three percent of cases were male. Average age 55 ± 8.6 years. Sixty percent had Type 2 insulin-requiring diabetes. Diabetes duration greater than 10 years in 83.3% cases. Diabetes control was poor (HbA1c 9 ± 1.9%). The most common locations of CN were the tarsometatarsal joints and midfoot. Seventeen percent of cases were re-activated CN. Although 40% of cases were accurately diagnosed within 4 weeks, 33% took over 2 months. Overall CN management time was 44.7 ± 25.3 weeks. Of cases (67%) which went into a total contact cast (TCC), the overall management time was 39.3 ± 29.6 weeks versus 57.5 ± 33.6 weeks for those patients who never received TCC as part of their management. Forty seven percent developed a foot ulcer within 12 months following stabilisation of their CN, and one case went on to trans-tibial amputation.

Conclusions: These results provide an estimate for patients and practitioners as to the overall treatment time of active CN. Our findings suggest that management of CN can be prolonged, but overall treatment is reduced through the use of TCC. Despite increased awareness and education, disparity still exists for rapid diagnosis of CN. Patients are at risk of CN related foot ulceration despite close monitoring in a tertiary hospital, however, are at a relatively low risk of amputation on the short-term. The audit highlights CN is a potentially recurrent condition and patients require lifelong care and monitoring.

P31

Does the use of store-and-forward telehealth systems improve outcomes for clinicians managing diabetic foot ulcers? A pilot study

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Background: Diabetic foot ulcers are one of the most hospitalised diabetes complications and contribute too many leg amputations. Trained diabetic foot teams and specialists managing diabetic foot ulcers have demonstrated reductions in amputations and hospitalisation by up to 90%. Few such teams exist in Australia. Thus, access is limited for all geographical populations and may somewhat explain the high rates of hospitalisation. This pilot study aims to analyse if local clinicians managing diabetic foot complications report improved access to diabetic foot specialists and outcomes with the introduction of a telehealth store-and-forward system.

Method: A store-and-forward telehealth system was implemented in six different Queensland locations between August 2009 and February 2010. Sites were offered ad hoc and/or fortnightly telehealth access to a diabetic foot speciality service. A survey was sent 6 months following commencement of the trial to the 14 eligible clinicians involved in the trial to gauge clinical perception of the telehealth system.

Results: Eight participants returned the surveys. The majority of responding clinicians reported that the telehealth system was easy to use (100%), improved their access to diabetic foot speciality services (75%),

improved upskilling of local diabetes service staff (100%), and improved patient outcomes (100%).

Conclusion: This pilot study suggests that clinician's found the use of a telehealth store-and-forward system very useful in improving access to speciality services, clinical skills and patient outcomes. This study supports the recommendation that telehealth systems should be made available for diabetic foot ulcer management.

P32

A systematic review and meta-analysis of conservative management of Achilles tendinopathy

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Background: This systematic review and meta-analysis was conducted to provide a clear guide for the best evidence based approach to conservatively manage Achilles tendinopathy. A recent systematic review provided a descriptive summary of the evidence with the absence of a quality assessment of the study methodologies.

Methods: A systematic literature search was conducted to identify randomised, controlled studies using pain or function outcome measures which were published in English. Quality assessments were performed using the Modified PEDro rating scale. Standardised mean differences for each intervention and pooled data were calculated using Review Manager software.

Results: The search strategy yielded 22 studies whose methodological quality rated between 2 and 12 out of 14 on a Modified PEDro rating scale. Studies were grouped by their primary intervention (eccentric exercise, shock wave therapy, ultrasound, night splints and other conservative management options). Follow up times were predominantly within three months. A meta-analysis was able to be performed for two intervention comparisons; shock wave therapy (SWT) versus eccentric exercise (EE) and laser therapy versus a sham laser therapy, where both groups received an EE program. The pooled data found a moderate significant effect favouring SWT and small significant effect favouring laser therapy. Of the eleven studies evaluating EE, six reported that EE had superior results to the control intervention.

Conclusions: This systematic review emphasises the need for a consistent use of valid and reliable outcome measures, larger subject numbers and longer follow-up times to build a larger body of high quality evidence and a greater opportunity to perform meta-analyses using studies that examine conservative interventions for Achilles tendinopathy. The current evidence supports the use of EE, SWT and laser therapy for the management of Achilles tendinopathy.

P33

Hunter New England Area Health Service pilot telehealth high risk foot clinic: connecting Tamworth and Newcastle

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Background: Clients across Hunter New England Area Health Service (HNEAHS) with complex diabetes foot complications traditionally had to travel to Newcastle to access multidisciplinary high risk foot services; with some travelling up to five hours each way to attend the High Risk Foot

Clinic in Newcastle. Ideally rural clients should be able to access multidisciplinary high risk foot services close to their home.

Methods: A six-month pilot Telehealth High Risk Foot Clinic was established between Newcastle and Tamworth, with clinicians in Newcastle providing Telehealth multidisciplinary input for clients attending the Tamworth Podiatry Clinic.

Results: Over the six month pilot phase (February – August 2010) a total of eight clients were seen through the HNEAHS Telehealth High Risk Foot Clinic; seven presented with foot wounds and one presented with an acute Charcot Neuroarthropathy. Two clients (25%) refused gold standard treatment; one was subsequently discharged from the High Risk Foot Clinic and the other did not return for follow-up treatment. Of the remaining six clients, four (75%) achieved successful resolution of their presenting complaint. Clients surveyed in the evaluation phase indicated that they would prefer to attend the Telehealth clinic at Tamworth as it is closer to home, meaning less travel time and expense as well as reducing the impact on their work and/or family commitments. None of the clients felt unsatisfied in any way about the Telehealth model and all felt very satisfied by the impact that the clinic made on their quality of life. A cost analysis of the pilot model showed that this type of service is of cost benefit and has the potential to prevent lower limb amputations in high risk clients residing in rural areas.

Conclusions: The pilot clinic resulted in many positive benefits to high risk foot clients living in rural areas. Good clinical outcomes were achieved, the client's quality of life was improved and cost benefits were attained. Also of note, were the strong relationships that were formed between Newcastle and Tamworth; resulting in rural clinicians being empowered with knowledge of the management of the high risk foot.

P34

A step in the right direction: the evidence for treating of tinea pedis and onychomycosis in people with diabetes

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Background: Effective treatment of tinea pedis and onychomycosis is crucial for patients with diabetes as these infections may lead to foot ulcers and eventual lower limb amputation. Although numerous studies have assessed the effectiveness of antifungal drug and treatment regimens, most exclude patients with diabetes and examine otherwise healthy individuals. While these studies are useful, results cannot necessarily be extrapolated to patients with diabetes. The purpose of this study was to therefore identify the best evidence-based treatment options for tinea pedis or onychomycosis in people with diabetes.

Methods: The question for this systemic review was what evidence is there for antifungal treatment interventions for adults with tinea pedis and/or onychomycosis in people with diabetes. A systematic literature search of four electronic databases (Scopus, EbscoHost, Ovid, Web of Science) was undertaken using the search terms "onychomycosis" or "tinea pedis" or "athlete's foot" or "tinea unguium" and "diab*" and "treat*" (15/10/10). No language or date restrictions were set. Studies that examined the efficacy and/or safety of treatment options for people with diabetes were included in this study.

Results: Preliminary results of this study indicate a scarcity of studies specifically investigating antifungal treatments of tinea pedis and onychomycosis in patients with diabetes. Of the seven studies identified to date, all examined the efficacy and/or safety of antifungal agents for the treatment of onychomycosis. Of the antifungal agents assessed, topical ciclopirox nail lacquer, oral terbinafine and oral itraconazole were found both safe and effective for treatment. To date, no studies investigating the treatment for tinea pedis have been identified. Although suggestions that combination drug therapy and physical debridement are effective treatment strategies, studies to confirm these suggestions have never been conducted.

Conclusions: The results of this study indicate further research is needed to determine the best evidence-based treatment options for tinea pedis and onychomycosis in patients with diabetes. Areas for future research include studies that investigate the treatment for tinea pedis, the

effectiveness of other antifungal drugs and dosing regimens, combination drug therapy and physical debridement. Such research may identify more effective treatment options that may reduce the incidence of diabetic foot ulcers and associated complications.

P35

Case study of treatment of metatarsus adductus with Jones boot modification and convenient photocopy technology for monitoring progress

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A 13 month old female child attended the CSU Allied Health Clinic student training podiatry service for assessment and treatment of her pronounced bilateral metatarsus adductus. Her deformity was mobile and a grade 4 on the right foot and grade 3 on the left using Bleck's classification scale. On presentation, each foot was able to be corrected to a straight lateral border with moderate hand pressure. As such she was assessed as suitable for Jones boot modification therapy. Her foot alignment was captured by standing her on the office photocopier with support from held hands. Manipulations and Jones boot modifications were carried out. She wore the boots for most daily activities and 2 pairs were used to accommodate her foot growth over this period. She was reviewed monthly and progressed to almost complete resolution over the period of 1 year. Her foot alignment was monitored at monthly reviews with the photocopier method. This method provides excellent snapshots of functional alignment and was highly convenient for the practitioners. The child was very compliant with this "game" and this was in contrast to attempts at X-ray, which was not procurable due to her noncompliance. A series of progressive photocopies with excellent black/white contrast outline the borders of both feet and illustrate the progress of this case. The Jones Boot modification technique is also illustrated with photographs in this poster presentation.

P36

Glyceryl trinitrate patch therapy is associated with healing of arterial ulceration and improvement in toe pressure measurements: a case study and discussion of aspects of this novel treatment modality

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A case study of one frail elderly client with indolent arterial ulceration was conducted, with glyceryl trinitrate (GTN) patch therapy appearing to have a positive role in the healing outcome and improved vascular status as measured by photoplethysmography (PPG) toe pressure measurements. The history and pharmacological action of this novel mode of therapy are briefly presented. The presentation of chilblains (erythema pernio) and arterial ulceration are discussed in the context of this case. Loss of sensitivity to cold perception, related to age, arterial insufficiency and other factors are considered. Current research using this medication for other applications suggests that GTN patch therapy should have a positive role in healing arterial ulceration associated with peripheral vascular disease (PVD). Positive outcomes with painful diabetic neuropathy have also been found with this therapy and its use warrants further investigation. A review of the literature on the use of GTN therapy for digits is briefly summarised. Important to clinical treatment of aged people with reduced vascular supply are decreased sensory functions of pain, protective sensation and temperature sensation. Further research on the effects of GTN therapy for wound healing should aim to control for seasonal climate and environmental temperature changes, as well as other factors that influence wound healing such as wound care, wound dressings and nutrition.

P37

Patient awareness of loss of protective sensation in the diabetic foot: an opportunity for risk reduction?

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Background: Peripheral sensory neuropathy is a common complication in diabetes. Neuropathy is the single most powerful risk factor for diabetic foot amputation. Often foot care efforts are thwarted by the phenomenon of inadvertent injury, from events which may appear to the clinician as chronic and ignorant self-neglect on the part of neuropathic clients. This study aimed to determine the proportion of a study population of people with diabetes and peripheral neuropathy who were simultaneously unaware of this sensory loss.

Method: Thirty-two (32) people with symptoms of diabetic neuropathy were tested. Subjects aligned themselves with one of two groups. Group 1 consisted of those who predicted that their protective sensation was intact, by indicating that they expected to be able to feel if a blister was forming on their foot, and Group 2 comprised those who expected not to be able to feel if a blister was occurring. The presence or absence of protective sensation was determined by testing with the 5.07 (10 gram) Semmes Weinstein monofilament.

Results: Seventy-eight percent (78%) of the study population (25 of 32 subjects) assumed that their protective sensation was intact, however only twenty-five percent (25%) of these (8 subjects) were correct in this assumption according to the test criteria. Fifty-three percent (53%) of the total study population (17 of 32 subjects) demonstrated a lack of protective sensation and a concomitant lack of awareness of this loss.

Conclusion: This lack of awareness, even amongst clients previously assessed and educated in regard to their loss of protective pedal sensation, suggests an opportunity for more effective diabetes education programs to counter an important and potentially modifiable risk factor in diabetic foot ulceration and amputation. It is a fundamental concept for this "at risk" group to grasp in order for them to be able to best understand and manage their potential for inadvertent and unnoticed injury, and thereby to empower them to be more effective in their efforts to self care for their neuropathic feet.

P38

A new model of care for basic foot care in residential services

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Background: The Podiatry Department at Peninsula Health services clients in acute, subacute and community, in addition to 98 residential care beds. Podiatrists were concerned about the clinical risk of providing basic toenail cutting which impacted on their ability to provide more frequent, essential treatment to residents who were at higher risk of falls, ulcers and amputations. Residents, their relatives and nursing staff had complained that residents were not receiving a frequent podiatry service. Analysis of these complaints identified that the issue was not access to a podiatry service but, in fact, access to regular basic foot care and toenail-cutting.

Methods: Key stakeholders met and were engaged to address foot care issues in residential care at Peninsula Health. Issues raised by podiatrists were skills not being utilised, inability to meet demand, inappropriately prioritised referrals, not engaged in the residential team and occupation health and safety issues. Issues raised by nurses were unclear referral pathway, uncertainty about when residents would be seen, feeling pressured to refer to podiatry by residents' relatives. Discussions were held to determine how these issues could be addressed without requiring any further significant financial resources.

Results: A new model of basic foot care was designed and implemented. A document and competency education program was developed to

guide residential care nurses to deliver basic foot care. Basic foot care is defined as "the attention given to normal toe nails and skin surfaces of the foot, including cleaning and drying of feet, cutting of healthy toe nails, filing of healthy and thick toe nails, application of moisturisers, footwear inspection and appropriate referral to podiatry as indicated." This new model of care is expected to better utilise podiatry skills and will generate 240 occasions of podiatry service per year, compared to 310 occasions per year in the old model.

Conclusions: The new model of care is currently being evaluated. Many components of basic foot care were already being provided to our residents - this has formalised the process and has added lower-risk nail cutting and filing to the residential nursing skill set.

P39

If you thought you were good with a scalpel, you should try this

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In 2010 Peninsula Health was one of four Victorian health services provided with a Department of Health New Technology Grant worth \$100,000. The grant funded the implementation and evaluation of the use of Low Frequency Ultrasonic Debridement (LFUD) in wound healing. The LFUD device, Sonoca, has been developed for use on diabetic foot ulcers, pressure ulcers, venous leg ulcers and dehisced wounds. A report by the Department of Health and Aging (2007) acknowledged that current evidence indicates that the use of LFUD promotes significantly enhanced wound healing compared to using conventional wound dressing with antiseptic agents. It will be some time before we have the data available to evaluate healing rates with the use of LFUD. In the interim, we have been able to impress all parties involved in wound management with the improved quality of our debridement and wound bed preparation. LFUD provides all the benefits of conventional debridement in addition to: returning the wound to the acute phase by vasodilation; stimulating fibroblasts, macrophages and endothelial cells; and breaking down biofilm. There is also evidence of LFUD promoting faster wound healing, reducing pain on debridement and having antimicrobial effects. The use of LFUD is time-consuming and expensive compared with conservative sharps debridement. However, LFUD is quick and inexpensive compared with theatre debridement or amputation. I believe this technology will be an indispensable part of the podiatrist's tool kit in years to come.

P40

Diagnostic imaging for chronic plantar heel pain: a systematic review and meta-analysis

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Background: Chronic plantar heel pain (CPHP) is a generalised term used to describe a range of undifferentiated conditions affecting the plantar heel. Plantar fasciitis is reported as the most common cause and the terms are frequently used interchangeably in the literature. Diagnostic imaging has been used by many researchers and practitioners to investigate the involvement of specific anatomical structures in CPHP. These observations help to explain the underlying pathology of the disorder, and are of benefit in forming an accurate diagnosis and targeted treatment plan. The purpose of this systematic review was to investigate the diagnostic imaging features associated with CPHP, and evaluate study findings by meta-analysis where appropriate.

Methods: Bibliographic databases including Medline, Embase, CINAHL, SportDiscus and The Cochrane Library were searched electronically on March 25, 2009. Eligible articles were required to report imaging findings

in participants with CPHP unrelated to inflammatory arthritis, and to compare these findings with a control group. Methodological quality was evaluated by use of the Quality Index as described by Downs and Black. Meta-analysis of study data was conducted where appropriate.

Results: Plantar fascia thickness as measured by ultrasonography was the most widely reported imaging feature. Meta-analysis revealed that the plantar fascia of CPHP participants was 2.16 mm thicker than control participants (95% CI = 1.60 to 2.71 mm, $P < 0.001$) and that CPHP participants were more likely to have plantar fascia thickness values greater than 4.0 mm (OR = 105.11, 95% CI = 3.09 to 3577.28, $P = 0.01$). CPHP participants were also more likely to show radiographic evidence of subcalcaneal spur than control participants (OR = 8.52, 95% CI = 4.08 to 17.77, $P < 0.001$).

Conclusions: This systematic review has identified 23 studies investigating the diagnostic imaging appearance of the plantar fascia and inferior calcaneum in people with CPHP. Analysis of these studies found that people with CPHP are likely to have a thickened plantar fascia with associated fluid collection, and that thickness values >4.0 mm are diagnostic of plantar fasciitis. Additionally, subcalcaneal spur formation is strongly associated with pain beneath the heel.

P41

Low frequency ultrasonic debridement: a clinical experience

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Low Frequency Ultrasonic Debridement (LFUD) provided by the Sonoca 185 is a new method of debriding wounds that is less traumatic, less painful and can achieve faster healing rates. It is bactericidal and enables many debridement treatments to be undertaken by a podiatrist or wound consultant in their smaller clinical setting. Due to the many properties of LFUD the clinical indications for use are vast including but not limited to chronic ulcers, diabetes foot ulcers, leg ulcers, pressure ulcers, infected ulcers and dehiscent wounds. As with all treatment methods there are some contraindications to use of LFUD treatment which include but not limited to those patients with vascular abnormalities, those patients with haemorrhagic conditions, over exposed malignancies and tissue previously treated with radiation, deep x-ray or irradiation. This technology is new within Victoria and to the departments of podiatry and wound care specialists. Being so, all staff directly involved with the daily clinical use of LFUD for wound management were up skilled and had to pass competencies to use the treatment modality. In addition, clinical pathways and protocols were developed in order to ensure best patient care was practised. This presentation will give an overview of the process involved in using LFUD including (i) patient selection, (ii) clinical set up, and (iii) considerations during treatment. By discussing and evaluating clinical case studies on the use of LFUD I will further demonstrate its benefits in wounds healing and provide my opinion and experience on the ease of using this effective debriding agent.

P42

Predictors of successful treatment in patients receiving intra-articular injections of hylan G-F 20 or saline for painful first MTPJ OA

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Background: We recently conducted a placebo controlled clinical trial investigating the efficacy of Synvisc® (hylan G-F 20) for first metatarsophalangeal joint (MTPJ) osteoarthritis (OA). The aim of the current study was to devise a clinical prediction rule to identify those people with first MTPJ OA that are more likely to benefit from intra-articular injections (of hylan G-F 20 or saline).

Methods: One hundred and fifty one participants with first MTPJ OA received an intra-articular injection of 1 ml hylan G-F 20 or saline. Potential predictors included intervention group, demographics, height weight, BMI, symptom duration and severity, the Foot Health Status Questionnaire (FHSQ), first MTPJ dorsiflexion range of motion and radiographic OA severity (osteophytes and joint space narrowing as individual features in either the dorsal and lateral view, or as a combination, where scores of 2 for any feature in any view was considered 'definite' OA). The primary measure was a 15-point change in symptoms scale (range -7- 'a very great deal worse' to +7 - 'a very great deal better') at 12-weeks, dichotomised with scores of 3 defined as treatment success. Predictor variables were initially analysed with univariate analyses. Significant variables were then entered into a backward stepwise multivariate logistic regression.

Results: At 12-weeks, 63 (42%) participants reported treatment success. Predictors of treatment success identified by univariate analyses were increased FHSQ foot function (mean difference 7.23, $p=0.027$), absence of definite radiographic OA (OR=2.49, $p=0.017$) and a score of 1 or less for osteophytes on the lateral radiographic view (OR=2.10, $p=0.028$). After multivariate logistic regression analysis, only FHSQ foot function (B=0.02, $p=0.027$, OR=1.02) and the absence of definite radiographic OA at the first MTPJ (B=-0.906, $p=0.017$, OR=2.47) remained significant. The pre-test success rate of 42% increased to 57% at 12-weeks if the participant did not exhibit definite radiographic first MTPJ OA (positive likelihood ratio 1.86 (95% CI 1.11 to 3.13)).

Conclusions: This study identified few factors that could predict treatment success of intra-articular injections of hylan G-F 20 or saline for first MTPJ OA. Patients that do not display definite radiographic first MTPJ OA are more likely to report success of this treatment.

P43

Flat-arched feet display altered foot kinematics compared to normal-arched feet during walking

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Background: Foot posture is thought to influence predisposition to overuse injuries of the lower limb. Although the mechanisms underlying this proposed relationship are unclear, it is thought that altered foot kinematics may play a role. Therefore, this study was designed to investigate differences in foot motion between people with normal and flat-arched feet using the Oxford Foot Model (OFM).

Methods: Nineteen participants with normal- and flat-arched feet were recruited for this study (10 with normal and 9 with flat-arched feet). A foot screening protocol comprising measurements from weightbearing antero-posterior and lateral foot radiographs were used to classify foot posture. Tri-planar motion of the tibia, rearfoot and forefoot during barefoot walking were recorded from 10 cameras and evaluated using a three-dimensional motion analysis system incorporating a multi-segment foot model (OFM).

Results: During midstance phase, participants with flat-arched feet demonstrated greater forefoot abduction ($-12.9^\circ \pm 6.9^\circ$ vs $-1.8^\circ \pm 6.3^\circ$; $p = 0.002$), rearfoot internal rotation ($10.6^\circ \pm 7.5^\circ$ vs $-0.2^\circ \pm 9.9^\circ$; $p = 0.018$) and a trend towards increased rearfoot eversion ($-5.8^\circ \pm 4.4^\circ$ vs $-2.5^\circ \pm 2.6^\circ$; $p = 0.06$), compared to those with normal-arched feet. During late stance, participants with flat-arched feet demonstrated greater peak forefoot plantarflexion ($-13.7^\circ \pm 5.6^\circ$ vs $-6.5^\circ \pm 3.7^\circ$; $p = 0.004$) and decreased peak forefoot adduction ($-7.0^\circ \pm 9.2^\circ$ vs $5.6^\circ \pm 7.3^\circ$; $p = 0.004$) compared to those with normal-arched feet.

Conclusions: The findings of this study indicate that there are significant differences in sagittal and transverse plane movement of the forefoot and the transverse plane movement of the rearfoot between participants with normal- and flat-arched feet. These findings support the notion that those with flat-arched feet demonstrate altered motion associated with greater pronation during gait; factors that may increase the risk of overuse injury.

P44

The foot-related clinical characteristics of people with diabetes in an Australian regional setting

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Background: The podiatrists of the regional Victorian health organisations Bendigo Health (BH) and Bendigo Community Health Services (BCHS) recently evaluated a collaborative podiatric model of care. This paper describes the clinical and demographic characteristics of the patients seen within this model over a three-month period.

Methods: A three-month prospective clinical audit of the podiatry services involved in the podiatric model of care was undertaken. Basic demographic variables were recorded in addition to the UT risk classification at baseline and incidence of ulceration. Statistical analysis was undertaken to explore the differences in the demographic variables with respect to both risk category at baseline and incidence of ulceration.

Results: 576 patients were seen during the three-month period. Mean age was 71.3 ± 11.6 years, with males accounting for 53.3% of the cohort. The majority (95.8%) of the sample had type 2 diabetes and the mean duration of diabetes was 12.08 ± 10.0 years. At baseline, 51.4% of the cohort was classified as having "no neuropathy" and 10.6% classified as having an "active pathology". Those at higher risk of future foot pathology at baseline were younger ($F=11.9$, $p<0.0005$) and had a longer duration of diabetes ($F=31.7$, $p<0.0005$). Males were associated with higher risk ($\chi^2=40.3$, $p<0.0005$). Thirty-six (6.3%) people developed incident diabetes-related foot ulceration. Those that developed ulceration were younger ($t=3.5$, $p=0.001$) and had a longer duration of diabetes ($t=-3.3$, $p=0.002$). The proportion of people with type 1 diabetes who developed incident ulceration was higher than for people with type 2 diabetes ($\chi^2=9.1$, $p=0.003$).

Conclusions: The foot health of this large cohort ranges across the entire spectrum of diabetes-related foot complications. There are consistencies with other relevant populations with respect to age, gender, diabetes type and the proportion of males and adults with type 1 diabetes at higher risk of future foot pathology. Although it is unusual to see those at higher risk of problems being a younger age, this may be offset by a longer duration of diabetes. The three-month incidence of ulceration was high, reflecting the clinical nature of the cohort.

P45

In step with strep

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A 47 year old man urgently presented to the outpatient High Risk Foot Clinic with an ulcerated right 5th toe which had been present for two days and was deteriorating rapidly. On presentation, he had a wound measuring 40mm in diameter, at the base of the right fifth digit with cellulitis extending to the right knee. Swabs isolated growth of Group B Streptococcus and Staphylococcus Aureus organisms. X-rays were inconclusive for osteomyelitis. His medical history included Type 2 Diabetes Mellitus, hypertension, bilateral peripheral neuropathy and a history of neuropathic ulceration of the left foot. He was admitted to Campbelltown Hospital for IV antibiotic therapy, wound management and further investigations. On day two, the wound was debrided at the bedside and a bone scan was inconclusive for osteomyelitis. The cellulitis improved rapidly and retreated from the knee to the foot. On day four, a MRI showed inflammatory soft tissue changes without

abscess formation, bone or joint involvement. He continued to improve clinically. A PICC line was inserted for ambulatory administration of IV cephazolin via Baxter infuser and he was discharged from hospital on day six. The patient was reviewed twice weekly by the podiatry, medical and nursing team from the High Risk Foot Clinic and Macarthur Ambulatory Care Service. During this time he had regular wound debridement and dressings, and 3 weeks of IV antibiotic therapy. He was then switched to 2 weeks of oral keflex. The patient returned to work 21 days from presentation and the wound completely healed 28 days from initial presentation.

P46

Implementing the Indigenous Diabetic Foot Project in the lower gulf of Australia

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Journal of Foot and Ankle Research 2011, **4**(Suppl 1):P46

North and West Queensland Primary Health Care (NWQPHC) is a division of general practice which provides allied health services to rural and remote north-west Queensland. The area covered by this organisation spans 770 000km² and has a resident population of approximately 114 000 people. Podiatrists working within this region provide an innovative primary health care model based upon the Ottawa Charter principals. Podiatrists work in a multidisciplinary team and travel to each community every four weeks. Diabetes effects large proportion of the Indigenous population and is responsible for approximately 3000 foot amputations a year. In acknowledgment of this a primary health care initiative was implemented in Normanton located in the Lower Gulf of Australia. This program was run in collaboration with a Queensland Health Podiatrist and was aimed at training Indigenous Health Workers in screening diabetic feet. By implementing the diabetic project Indigenous Health Workers could pre-screen diabetic feet and recognise the risk a client has of developing an ulcer. They could also recognise foot problems that would require medical attention or the treatment of a Podiatrist. By training staff in this field it was hoped that eventually there would a community member always available to address diabetic foot concerns while the Podiatrist is not in the community and it would recognise high risk feet to the Podiatrist attention before any complication could develop. The work shop was run over two days and there were seven Indigenous Health Workers that participated in the course. The Indigenous Health Workers consisted of NWQPHC, Queensland Health and Home and Community Care Staff. There were six females and one male that attended the course and all participates completed the course successfully. The program was based around SARRAH's course material and taught the participants to be able to: (i) care for feet, (ii) check people's feet, (iii) finding pulses on the foot, (iv) using a monofilament, (v) understand the difference between high risk and low risk feet, (vi) teach clients the basics of self care, (vii) complete a DART form (assessment tool), (viii) understand the referral process for a high risk foot. All participants initially learnt the course work and information about diabetic feet and later were able to practice on each other. The following day several known diabetic clients attended the program for the participants to assess them as if they were a new client. The participants each felt pulses, used a monofilament noted any areas of concern on the feet and filled out a DART form classifying the patient as high risk or low risk. All participants were able to complete each screening technique on each client and are now currently using the DART assessment tool as a standard form for all Diabetic Clients. It is hoped that more Indigenous Health Workers are trained in this course to continue to help the fight against diabetic foot complications. In the future NWQPHC in collaboration with Queensland Health would like Indigenous Health Workers Trained in each community to use the DART assessment form. This would empower the community to take control over the diabetic problem and hopefully decrease the rates of foot amputations through early high risk detection. If this program was successful in the long term the potential of training Indigenous Health Workers as foot assistance has also been explored.

P47

Is there a relationship between static and dynamic ankle joint dorsiflexion during gait in people with a history of neuropathic ulceration?

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Background: The inclusion of limited joint mobility (LJM) as a risk factor for plantar neuropathic foot ulceration in diabetes is interspersed throughout the literature. This is commonly believed to occur through connective tissue thickening and stiffening, thereby reducing available static and dynamic motion below that required for normal foot function. High underfoot pressures are postulated to result, leading to increased ulcer risk. This project investigated this theory as it relates to ankle joint dorsiflexion in people with a range of lower limb complications due to diabetes.

Methods: Fifty-six participants completed the study. Forty-one participants had diabetes and fifteen participants made up an age and gender-matched reference group (NOND). Of the diabetes group, ten had a history of past neuropathic ulceration (DNU), eighteen presented with peripheral neuropathy and no foot ulcer history (DWC) and thirteen had no lower limb complications (DNC). Maximum static ankle joint dorsiflexion was measured using the Lunge Test. Ankle joint kinematic data and plantar pressures were evaluated using the VICON® motion analysis and PedarX® mobile in-shoe systems respectively.

Results: A trend of reduced static foot dorsiflexion existed in those groups with peripheral neuropathy (DNU/DWC) by an average of 3° to 7°. The 95% confidence interval of the mean difference between the DNU and DNC groups, for these measures, did not reach statistical significance however came close (6.89° mean diff, 95% CI: -17.13 to 3.36 left side; 5.44° mean diff, 95% CI: -13.13 to 2.24 right side). The 95% confidence interval of the mean difference for dynamic ankle dorsiflexion was also not statistically significant for the DNU and DNC groups (3.76° mean diff, 95% CI: -1.38 to 8.89 left side; 2.31° mean diff, 95% CI: -1.68 to 6.29 right side). Conversely to the static measures however was the trend for mean dynamic foot dorsiflexion used in gait to be approximately 3° to 4° greater in the DNU group compared to the DNC group. Importantly, the available static range of ankle dorsiflexion was not being fully utilised during gait. Ample range of additional dorsiflexion was available should it be required, to the order of 15° in the DNC group and 17° in the DWC group, on average. No correlation between measures of static and dynamic ankle dorsiflexion were found. In addition, no consistent relationship was detected between dynamic ankle dorsiflexion during gait and peak plantar pressure.

Conclusions: The findings of this study question the validity of past theories whereby LJM is thought to be problematic through blocking dynamic motion requirements.

P48

Something's afoot: podiatry assistants

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In 2007, Kangan Institute commenced inclusion of Allied Health Assistant Certificate 4 - Podiatry Units delivered by a podiatrist. Different models have been delivered including external placement with private podiatrists, service specific units on site and external work based programs. Since then, a number of TAFE based AHA courses have been commenced including those at Swinburne and Gippsland. With National Registration, the recognised qualification for podiatry

assistants is the Certificate III or IV Allied Health Assistant qualification that includes Podiatry Units.

Clarification of the required training for podiatry assistants has offered TAFE services the opportunity to consider the way in which services are offered, and to review the barriers and enablers: (i) to podiatrists using AHA trained podiatry assistants in the work setting and (ii) to acceptance of AHA students for podiatry based clinical placements. This presentation will discuss these issues and present some of the current strategies used in the TAFE sector to enhance the enablers and reduce barriers to the benefit of the profession and its podiatry assistants. It will also discuss methods to expand the training in the future to benefit the podiatry industry.

P49

Learning as you go: an audit of continuing professional development opportunities in the workplace

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The introduction of mandatory Continuing Professional Development (CPD) as a condition of podiatry registration has caused quite a deal of manic amongst the Podiatry population. What practitioners may underestimate is the amount of CPD that is undertaken as part of their everyday work practices. The podiatrists at Eastern Health are fortunate to have a supportive work environment that aims to foster learning opportunities and career advancement. This poster shows an audit of the amount and types of learning opportunities logged by the 12 member podiatry department for the first six months of the mandatory CPD period. The audit uncovered that many of the staff members had satisfied the Podiatry Board of Australia's mandatory requirements within a two-month period. It is hoped that this poster will inspire others to think about their ongoing CPD opportunities within their own workplace.

P50

Good cop, bad cop: challenging patients to make hard decisions about aggressive treatment

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This is a case study that focuses on two acute presentations of diabetic foot ulcerations. Both men had a history of previous ulceration and presented to the Emergency Department at Box Hill Hospital with acutely infected weight-bearing foot ulceration caused by blistering. Both men worked in manual occupations and were subsequently weight-bearing for a large part of the day. In both cases a Total Contact Cast was decided to be the most effective means of treatment. Upon discharge from hospital, one of the men took a week's sick leave from his occupation and his ulceration improved rapidly, so much so that he didn't require a second week of total contact casting. The wound quickly healed and he has had no further problems to date and has returned to work as usual. The second man was in a Total Contact Cast for one week. On review, the Podiatrist determined that he would benefit from a second week in a TCC. The patient refused this treatment as it was inconvenient to his workplace and he didn't like the TCC. He was treated with a padded CAM walker. Unfortunately he presented with an acute infection one week later and subsequently required a transmetatarsal amputation. He also had to take several weeks sick leave from his workplace and had to be slowly rehabilitated into the workplace post-amputation. These cases have highlighted the benefits of aggressive treatment when dealing with weight-bearing diabetic foot ulcerations. Quite often as Podiatrists, we don't want to cause inconvenience to the patient's working life, but this may in fact be to the patient's detriment. Sometimes to provide the best patient centred care, we need to be the 'bad cop' and make unpopular decisions that will offer the best results.

P51

The practice-research nexus in allied health: practitioner-researchers or practitioners and researchers?

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"I must admit before I did honours I thought you'd either be a researcher or you'd be a clinical podiatrist, but now that I've done both.....well basically you need to be keeping up with your research so you know what to do clinically, so it's all intertwined" (Rachel)*.

How do you view yourself as an allied health professional - a clinical practitioner with no time for research, or a researcher spending little time in clinical practice? This presentation will reflect on the theme of 'practice-research nexus' which emerged from my PhD research, exploring the experience of allied health honours students. The traditional view of 'research as enlightenment' proposes that researchers generate novel ideas, test them, present them at conferences or publish them in journals, where they are available for the enlightenment of practitioners. 'Research as retail' suggests that research users want relevant, easy-to-understand evidence, summarised and placed conveniently for use as required. Both of these constructs are problematic and research-based practice infers a hierarchical relationship between theory and practice; research generates knowledge which determines practice. The honours student participants in this research were conscious of this 'theory-practice gap' and this was often highlighted by their experiences on clinical placement;

".....from what I've seen it's easy to sit in your clinic room, close the door and not learn anything else.....just come out of your degree and that's it. One thing honours has taught me is that we don't know everything yet.... there's so much more to learn" (Elle)*.

An increasing amount of readily accessible health and medical information places us as allied health practitioners in a position in which professional and public expectations are increased. We must be in a position to not only utilise research evidence in our practice, but also to contribute to health research and the generation of practice knowledge.

"I have a better appreciation of research and how difficult it really is to do and I really believe in evidence based practice from doing honours. Why are we doing what we're doing (in clinical practice) and why is that better than doing something else?" (Nicola)*.

Through honours, students develop new perspectives on the relationship of research with clinical practice. There is a national imperative to reduce the degree of separation of research from clinical practice and honours is one of the mechanisms to develop the future practitioner-researchers, in allied health.

P52

The reliability of toe systolic pressure and the toe brachial index in patients with diabetes

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Background: The ankle brachial index is a useful clinical test for establishing blood supply to the foot. However, there are limitations to this method when conducted on people with diabetes. As an alternative to the ankle brachial index, measuring toe systolic pressures and the toe brachial index have been recommended to assess the arterial blood supply to the foot. This study aimed to determine the intra and inter-rater reliability of the measurement of toe systolic pressure and the toe brachial index in patients with diabetes using a manual sphygmomanometer and photoplethysmography unit.

Methods: This was a repeated measures, reliability study. Three raters measured toe systolic pressure and the toe brachial index in thirty participants with diabetes. Measurement sessions occurred on two

occasions, one week apart, using a manual photoplethysmography unit (Hadeco Smartdop 45) and a standardised measurement protocol. Intra-class correlation coefficients and 95% limits of agreement (LOA) were calculated.

Results: The mean intra-class correlation for intra-rater reliability for toe systolic pressures was 0.87 (95% LOA: -25.97 to 26.06 mmHg) and the mean intra-class correlation for Toe Brachial Indices was 0.75 (95% LOA: -0.22 to 0.28). The intra-class correlation for inter-rater reliability was 0.88 for toe systolic pressures (95% LOA: -22.91 to 29.17 mmHg) and 0.77 for toe brachial indices (95% LOA: -0.21 to 0.22).

Conclusions: Despite the reasonable intra-class correlation results, the range of error was broad. This potentially clinically significant margin of error raises questions about the reliability of using a manual sphygmomanometer and photoplethysmography to measure toe systolic pressure and toe brachial index. When assessing patients with peripheral arterial occlusive disease, it is important to consider all other non-invasive vascular assessment options.

P53

The first metatarsophalangeal joint meniscus

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An intra-articular ligament of the first metatarsophalangeal joint (MTPJ) has been observed by the authors during dissection for hallux valgus and hallux rigidus corrective surgery over a number of years. The enigmatic incidence and role of this structure prompted further investigation. A literature review was conducted across several scientific databases using the search terms "first metatarsophalangeal joint" AND "meniscus" OR "anatomy" OR "plica" OR "intra-articular ligament" OR "ligament". In an effort to procure additional information several anatomy textbooks including those specific to the foot and ankle were obtained by the primary author for inspection, as were the expert opinions of several fellows of the Australasian College of Podiatric Surgeons. The literature search yielded just two papers pertaining to this structure and no reference had been made in any of the reviewed anatomy texts. One paper made reference to the structure in a case study and proposed it may be an additional ligament or meniscoid tissue. The authors of the second paper found a clear anatomical distinction (origin and insertion) and named it the meniscus of the first MTPJ as it showed histological resemblance to the meniscus in the knee. They proposed the transverse nature of the meniscus may assist in the stability of the joint preventing progression of hallux valgus deformity. On the contrary, the highest incidence of this structure was observed in feet with hallux valgus deformity. No mention has been made of the incidence or role of the meniscus in hallux rigidus pathology. Further research is therefore required to understand the incidence, function and role of the meniscus in the pathology of the first MTPJ.

P54

Fat mass is associated with disabling foot pain

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Background: Several studies have reported associations between increased body mass index (BMI) and foot pain. However, it is unclear as

to whether the mechanism underlying this association is mechanical, metabolic, or both. Therefore, the aim of this study was to examine the relationship between body composition and disabling foot pain.

Methods: 137 subjects aged 25 to 62 years were recruited across a range of BMI (17 to 50 kg/m²) as part of a study examining the relationship between obesity and musculoskeletal health. Disabling foot pain was determined from the Manchester Foot Pain and Disability Index (MFPDI) and was defined as current foot pain and pain in the last month, as well as recording at least one disability item on the MFPDI. Body composition was measured using dual x-ray absorptiometry.

Results: The BMI in this population was normally distributed around a mean of 32.2 kg/m². The risk of disabling foot pain was associated with total fat mass ($p < 0.001$) and skeletal muscle mass ($p = 0.01$). However, when both total fat and skeletal muscle mass were included in the model, the relationship persisted for total fat mass but not muscle mass. The risk of disabling foot pain increased by 6% (95% confidence interval 2 - 9%) for every kilogram increase of total body fat, adjusted for age, gender, physical activity and skeletal muscle mass.

Conclusions: Fat mass, rather than muscle mass, is associated with foot pain and disability. This suggests that the effect of obesity on foot pain may not only be due to increased loading on the foot, but may also act via a metabolic mechanism through increased adiposity. Further work is needed to clarify the mechanisms for this effect and the relative importance of reducing body fat rather than simple weight loss in the reduction of foot pain.

P55

Providing wound management in an aged psychiatric facility

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In January 2010, Podiatry staff at Caulfield Hospital were approached to provide a wound round at Caulfield's Aged Psychiatric care facility, Namara. Staff at the facility acknowledged an increasing prevalence of foot wounds and a concern was raised by senior staff that the nursing staff had limited wound management knowledge and that it was difficult to transfer the residents to other sites for treatment. The Podiatry department introduced a 3 month Pilot Wound Round in January 2010, involving two Podiatrists and nursing staff from the facility to manage all foot wounds. It was imperative a member of the nursing staff was available at all times to assist with difficult residents. This also provided an opportunity for them to be educated about appropriate wound management skills; including choice of appropriate wound dressings, identifying infection and pressure care. The goals of podiatry intervention were to: (i) identify all foot wounds via referral and manage them on site on a weekly basis to maintain continuity and reduce healing times, (ii) provide treatment on site (nursing staff must accompany residents for any off-site appointments), (iii) educate nursing staff to identify pressure areas and make appropriate referrals, (iv) educate staff about the management of the high risk foot including wound management, pressure care and dressings, (v) improve management of foot complications, (vi) advocate for better access to dressings and equipment for the residents. At the commencement of the round seven wounds were present amongst the 30 residents and after 3 months this number was reduced to 3. Significant improvements were seen with the use of appropriate off-loading care such as felt padding, dressing choice, early referral and strategies to aid prevention. There was also a high focus on continuity of dressing regimes which we audited on a regular basis. Towards the end of the three month pilot, all dressing regimes put in place were being followed appropriately. Limitations to outcomes of the round to date have included the staffs' knowledge in wound management practice. Whilst one staff member was nominated to attend the wound round with us on a weekly basis, other staff members who attend to dressing changes during the week have not benefited from the Podiatrists expertise. Other barriers have included learning to deal with the often difficult population group with mental illness. Compliance levels varied significantly and overcoming this was often challenging. In conclusion, the wound round has shown to be a cost effective means of reducing the burden of foot related complications in the

Aged Psychiatric sector and this pilot has improved awareness and management in the prevention, early identification and management of foot wounds.

P56

The "enthesis organ" concept and its relevance to foot and ankle pathology: a literature review

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Background: An "enthesis" is described as a junction between tendon, ligament or joint capsule and bone. Tendinous entheses are a complex and a particularly important entity, as they are responsible for ensuring contractile force generated by muscle is transmitted to the skeleton. While complaints of pain at entheses sites are common, rupture or avulsion of tendinous tissue is not. This review aims to provide insight into what mechanisms the musculoskeletal system has developed for protecting tendinous entheses and what are the effects when these mechanisms are compromised (enthesopathy).

Method: An electronic database search was performed in October 2010. The search strategy used was enthesis* AND foot* AND (ankle* OR enthesopathy* OR enthesis organ* OR enthesitis). A secondary snowball method was conducted targeting reference lists and literature only available in hard copy.

Results: The initial electronic database search identified 526 articles. 468 were excluded based on title and abstract alone. Inclusion and exclusion criteria were applied and excluded a further 26 articles. The snow ball method retrieved a further 7 articles. 39 articles were included in the review. The literature identified comprehensive investigations on anatomical, functional and pathophysiological details of tendinous entheses at varied locations of the foot and ankle. On histological examination, there is extensive interweaving of tendinous tissue with fibrocartilage and bone to form the true enthesis. This interweaving leaves the attachment incredibly robust. Histological sections also revealed structures adjacent, and in close apposition, to entheses that would appear to reduce tensile, compressive and shear stress applied during muscular contraction. The arrangement of these structures has been termed the "enthesis organ". Enthesopathy was also found to be closely linked with spondyloarthropathies.

Conclusion: Pathology of the entheses, enthesopathy, can develop for various reasons including post traumatic or rheumatological. The signs and symptoms of enthesopathy can be varied and can include formation of enthesophytes with chronic pain to changes in nail structure. The review describes the associated anatomy of entheses, the process of enthesopathy and its association with spondyloarthropathies. It will introduce and consolidate podiatrists' understanding of enthesopathies and how they present in the foot and ankle.

P57

The implications of statin induced peripheral neuropathy

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Peripheral neuropathy is a neurological condition that commonly presents to the practicing podiatrist. Traditionally when sensory neuropathy is present one assumes diabetes mellitus to be the contributing aetiology. However, this is not always the case. Other common causes such as spinal damage, alcoholism, and vitamin B12 deficiency can be precipitating aetiologies that the clinician would be aware. 26% of individuals over 65 years of age (without a predisposing disease known to cause neuropathy) will develop peripheral neuropathy at some point in life. What does the clinician do when none of the common causes are present? One clinical presentation tested this predicament. A female patient presented with diagnosed statin induced sensory peripheral neuropathy. This uncommon aetiology lead to a literature search relating to the less common causes of peripheral neuropathy. There are reported cases of statin induced peripheral neuropathy, which in the initial stages

can be reversible. Accumulating this research is difficult due to the wide variances in results and study methods; proving further independent research is needed. The reported incidence rate of peripheral neuropathy ranges between 4-14 times more likely for those on statins compared to control groups. This case study will help to raise the profile of this aetiology with the aim to preventing misdiagnosis. Interestingly, the quality of life and political implications of statin induced peripheral neuropathy are an aspect not commonly considered. What was the eventual outcome and how was the patient's quality of life affected? The patient now suffers from an irreversible peripheral neuropathy. Thus, the patient is now exposed to the complications of peripheral neuropathy, including shoe wear and hosiery changes, daily foot checks, pressure area development, and possibility of future neuropathic ulceration. Could the outcome of peripheral neuropathy have been changed if podiatry was involved earlier in the patient's management? The early detection of peripheral neuropathy may have lead to a change in specific medication to a statin that is not associated with peripheral neuropathy, therefore preventing the irreversible damage. It should be asked was this patient managed appropriately? Without the statins the patient would be at risk of hypercholesterolemia, therefore increasing cardiovascular risks such as acute myocardial infarction. Diet and exercise modifications can have great effect with lowering serum cholesterol. Such modifications should be the initial treatment, or should be utilised in conjunction with pharmacological intervention. Statins should be used to lower serum cholesterol levels when unable to do so with dietary modifications. However, there are alternative statins available which do not contain the same side effects (peripheral neuropathy) as others within the class. So the drug of choice should be made critically. Often medication is the first line treatment option due to patient compliance and ease of medical practitioner review. But it needs to be asked, who would be liable if the patient was to ulcerate and progressed to amputation? The patient, medical practitioner, or podiatrist?

P58

Clinical photography in a high risk foot clinic: a quality audit

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Background: The High Risk Foot Clinic at Liverpool Hospital has employed a standardised system for monitoring the progress of ulcers of the feet since January 2010. A form is completed for each patient with fields for identification, clinical photograph, and clinical details. The forms are reviewed for all patients under current treatment at a weekly meeting. We reviewed the foot ulcer progress charts, examining in particular the quality of the clinical photographs.

Method: A manual review of the charts in use from January 2010 until 30 September 2010 was performed by a single reviewer. Data was collected on number of charts per patient, presence of a clinical photograph, quality of the photograph (focus, lighting and distance), completion of clinical details, and University of Texas wound classification. Data was entered into an Excel[®] spreadsheet.

Results: The review included 732 charts. Of these, 731 had a photograph, and 623 (85%) were of good quality. The most commonly completed clinical detail was "probe to bone - yes/no" (99%), followed by "antibiotic - yes/no" (97%), "offloading device" (81%), and Texas Wound Classification (76%). The range of charts per person was 1-23.

Conclusions: The completion of data on our form appeared to follow the form design, with the frequency of items completed echoing the position of the item on the form. Anecdotally, our group has found clinical photographs to be of great assistance in monitoring our patients, especially when discussing the need for biopsy and for additional off-loading. However, the audit indicated that opportunities for improvement exist. The most common error in photography in our group is failure to use the macro setting to allow close-up images. Fortunately, digital photographs are easy to repeat.

P59

Is idiopathic toe walking a symptom of sensory processing dysfunction?

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Background: It is understood that toe walking involves the absence or limitation of heel strike in the contact phase of the gait cycle. When there is no medical cause of the gait pattern, a diagnosis of idiopathic toe walking (ITW) is made. Although there has been limited research into the pathophysiology of ITW, there has been an increasing number of references proposing that this gait pattern may be linked to sensory processing dysfunction (SPD). The purpose of this study was to investigate and profile 30 children with an ITW gait compared to 30 peers with a typical gait, using both qualitative and quantitative data.

Methods: Participants were assessed using the: (i) Bruininks-Oseretsky Test of Motor Proficiency (BOT-2), (ii) The Sensory Profile, (iii) Sensory Integration and Praxis test (SIPT), (iv) Vibration Perception Threshold (VPT) and (v) interview with parents about social factors of toe walking

Results: Results of testing 33 children thus far have determined children with an ITW gait have lower vibration perception thresholds, a preponderance to be left handedness, and notable differences in sensory seeking and modulation scores as measured by the Sensory Profile. The BOT-2 scores found children who toe walked scored overall lower in the composite scores for fine motor and balance tasks; however, they generally scored above average in the strength sub-test. SIPT results found a significant different in post-rotary nystagmus. Parents discussed excitement and anxiousness as being factors that triggered ITW.

Conclusions: These early results support the theory that the children who had an ITW gait differ in vestibular and tactile processing from the children who had a typical gait. The identification of these differences may assist allied health practitioners understand the gait pattern development and to plan more effective treatment methods.

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Audit of country clients accessing metropolitan podiatry services in South Australia

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Background: The purpose of the audit was to take a snapshot in time (8 week period) of the number of people from Country Health SA (CHSA) receiving podiatry services from the Adelaide Health Service (AHS), and to trace their usage of local services. The audit also aimed to identify strategies to reduce travel and improve patient journey.

Methods: The audit period was for 8 weeks (15/2/10-13/4/10). An OASIS (Online Analytical Statistical Information System) data report of people with CHSA postcodes using AHS services with the following search terms was generated: foot, leg, ulcer, wound, podiatry. The data report was sent to CHSA and AHS podiatry departments for verification and cross referenced against the CHSA client database.

Results: In the 8 week audit period there were 232 occasions of service for 130 people from CHSA postcodes accessing AHS podiatry services. The main clinical presentation of people from Country Health SA accessing the Adelaide Health Service is diabetic foot complications (e.g. ulceration, amputation). Approximately half of the people accessing services (51%) were registered CHSA clients, and only a small proportion (13%) were both registered CHSA clients and CHSA podiatry clients. The other half of people were not registered CHSA clients (49%), a small proportion (14%) were previously registered CHSA clients. Of the clients that were registered CHSA clients but not CHSA podiatry clients, two-thirds of the clients accessed community nursing. Diabetes education and dietetics were also accessed by this client group. Only 8% of people from CHSA postcodes accessing AHS podiatry services were referred directly from CHSA podiatry. The remaining 92% of referrals came from medical specialists, GPs, CHSA

community nursing, private podiatry and inpatient admissions. Of the 232 AHS podiatry appointments for 130 CHSA postcode clients, the majority (71%) had 1-3 appointments in the 8 week audit period. The remaining 29% of clients had 4 or more appointments in an 8 week period, resulting in fortnightly to weekly follow-up appointments at AHS podiatry clinics. Of the clients accessing AHS podiatry, the majority of clients are from inner CHSA locations. The top 4 CHSA locations for AHS podiatry service usage also had the highest podiatrist to population ratio.

Conclusions: As the majority of the 130 people are 'high risk', to have only 51% as registered clients of CHSA and only 13% as registered podiatry clients is concerning as these complex clients generally require services from multiple health professionals at a high frequency, which isn't available in most rural General Practices. With 38% of people registered CHSA clients but not podiatry clients, it is reasonable to surmise there is potential to improve local service coordination or cross-referrals to Podiatry in some areas, and/or there is lack of podiatry services or long podiatry waiting lists. 14% of people that were not current registered CHSA clients but had previously been registered with CHSA, may indicate a need for more rigorous recall systems for the 'high risk' clients. A recall system may have allowed for problems to be managed sooner and locally, reducing the amount of AHS podiatry presentations. The 29% of appointments that were fortnightly or more frequently are potential opportunities to reduce AHS podiatry appointments services through building staff numbers in CHSA podiatry services (where indicated), improving communication between CHSA and AHS podiatry services, and other mechanisms to improve capacity of CHSA Podiatry services such as training and equipment. Multiple strategies have been put into place since the audit period, and an audit of the same period in 2011 will be conducted as a comparison.

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What is the best available evidence for treatment of first metatarsophalangeal joint osteoarthritis?

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Background: Osteoarthritis (OA) affecting of the first metatarsophalangeal joint (MTPJ), is a common and painful condition. Although several different treatments have been suggested throughout the literature, few have been adequately evaluated. Therefore, the aim of this study was to conduct a Cochrane review in order to determine the efficacy of treatments available for first MTPJ OA.

Methods: Randomised controlled trials, quasi-randomised trials, or controlled clinical trials that assessed treatment outcomes for first MTPJ OA were searched for across several electronic databases (to the 14th January 2010) (CENTRAL; MEDLINE; EMBASE; CINAHL; and PEDro). Participants of any age or gender with OA of the first MTPJ defined either radiographically or clinically were included in this review.

Results: Only one trial satisfactorily fulfilled the inclusion criteria and was included in this review. This trial evaluated the effectiveness of two physical therapy programs in 20 individuals with OA of the first MTPJ. Assessment outcomes included pain levels, first MTPJ range of motion and plantarflexion strength of the hallux. Mean differences at 4 weeks follow up were 3.80 points [95% CI: 2.74 to 4.86] for self reported pain, 28.30 degrees [95% CI: 21.37 to 35.23] for first MTPJ range of motion and 2.80 kilograms [95% CI; 2.13 to 3.47] for muscle strength. Although differences in outcomes between treatment and control groups were reported, the risk of bias was high. The trial failed to employ appropriate randomisation or adequate allocation concealment, used a relatively small sample and incorporated a short follow up (4 weeks). No adverse reactions were reported.

Conclusions: Only one quasi-randomised controlled trial for first MTPJ OA was found. The reviewed trial presented a high risk of bias, limiting the conclusions that could be drawn from the presented data. The inclusion of only one trial indicates the need for more robust randomised controlled trials to determine the efficacy of interventions for this condition.

Cite abstracts in this supplement using the relevant abstract number, e.g.: Zammit *et al.*: What is the best available evidence for treatment of first metatarsophalangeal joint osteoarthritis?. *Journal of Foot and Ankle Research* 2011, **4(Suppl 1)**:P61