



## Stand or fall

Neil Baker OBE  
Consultant Podiatrist, 60 Degree Vascular and Diabetic foot Clinic,  
Bneid Al Gar, Kuwait

**W**elcome to another *Diabetes Digest!* I want to draw your attention to a paper from Singapore. This single-blind, parallel-group randomised controlled trial examined the effectiveness of once-weekly, home-based strength and balance training. It examined health-related quality of life (HRQoL) and functional status in individuals with diabetic peripheral neuropathy (DPN). DPN was determined by vibration perception threshold of >25 volts and/or absent sensation to a 10 g monofilament and/or Michigan Neuropathy Screening score of 7 or greater. Subjects were between 40 and 79 years of age. The exclusion criteria included: foot ulceration/infection/amputation; non-diabetic neuropathy, alcohol abuse and any conditions affecting functional mobility or balance.

The primary outcomes were measured changes in HRQoL, secondary outcomes were related to functional activities. The latter were timed up-and-go [TUG] (>stand> walk > return), five times sit-to-stand [FTSTS], functional reach, static balance, ankle muscle strength and knee range of motion) and balance confidence. The control arm received no interventions except standard medical diabetes care. Outcomes measures were obtained over a 6-month period at baseline, 2 and 6 months by an independent, thus blinded, trained assessor. The exercise programme was taught by a physiotherapist on a 1-1 basis with subjects encouraged to perform the exercises daily or at least three times weekly. At each assessment, HRQoL (including PCS and EQ5-5L index scores) questionnaires were completed, functional measures including body sway, joint range of movement, muscle strength etc were objectively recorded by a trained independent assessor blinded to randomisation. Mean differences in scores between groups were compared using mixed models. Of the 143 participants randomised (intervention,  $n=70$ ; control  $n=73$ ), 67 participants were included in each arm for the final intention-to-treat analysis as nine subjects were lost to follow-up.

The mean subject age was 62 years, 56% ( $n=80$ )

were women and 77% were of South Asian ethnicity. Mean diabetes duration was 15.3 years (SD 10.7) with a mean HbA<sub>1c</sub> of 8.5% and BMI of 28.4 (SD 5.7). Both groups were demographically and clinically comparable except more women were in the control group. The intervention group completed a reported a median of 25 days (range 0–49 days) of completed home exercises. There were no significant differences between groups on the primary outcomes of PCS score (mean difference [MD] 1.56 [95% CI –1.75, 4.87];  $P=0.355$ ) and EQ5D-5L index score (MD 0.02 [95% CI –0.01, 0.06];  $P=0.175$ ). However, there were significant improvements in TUG test performance (MD –1.14 [95% CI –2.18, –0.1] s;  $P=0.032$ ), FTSTS test performance (MD –1.31 [95% CI –2.12, –0.51] s;  $P=0.001$ ), ankle muscle strength (MD 4.18 [95% CI 0.4, 7.92] N;  $P=0.031$ ), knee range of motion (MD 6.82 [95% CI 2.87, 10.78]°;  $P=0.001$ ) and balance confidence score (MD 6.17 [95% CI 1.89, 10.44];  $P=0.005$ ).

This study demonstrated that short-term structured strength and balance training resulted in sustained improvements in functional status at 6 months in individuals with DPN. However, these did not appear to have to impact on HRQoL. The principal limitations of this study include: no measure of severity of DPN, the study numbers and duration of follow-up were too low to demonstrate long term effects. The body pain component of HRQoL does not account for painful neuropathy. It would be interesting to repeat this study in other ethnic groups as the joint range of motion, lifestyles maybe significantly different in other regions of the world.

Despite this, for me, it stimulates several thoughts; we should consider more active physiotherapy involvement — can we preserve functional status, improve balance confidence and reduce the likelihood of falls and injuries in individuals with DPN? ■

Venkataraman K, Tai BC, Khoo EYH (2019) Short-term strength and balance training do not improve quality of life but improves functional status in individuals with diabetic peripheral neuropathy: a randomised controlled trial. *Diabetologia* doi: 10.1007/s00125-019-04979-7.

## Wounds

### Does debridement improve clinical outcomes in people with diabetic foot ulcers treated with continuous diffusion of oxygen?

Readability ////  
Applicability to practice ////  
WOW! Factor ///

**1** The authors conducted a post hoc analysis aimed at evaluating the association between the frequency of diabetic foot ulcer (DFU) debridement and the quantity of ulcers that healed over a 12-week period after treatment with active continuous diffusion of oxygen (CDO).

**2** A total of 146 patients with DFUs entered into a double-blind, placebo-controlled, randomised study, with one group treated with either active CDO or a fully operational placebo device. The average age of participants was  $56.3 \pm 12.4$  years and 77% were male. All participants received identical offloading, dressings, and follow-up and all were followed for 12 weeks or until wound closure.

**3** In the CDO group, 204% more ulcers healed than in the placebo group (46.2% vs. 22.6%, respectively;  $P=0.016$ ). In addition, CDO's relative performance became greater when compared to placebo when frequent debridement was used (51.2% vs. 21.3%, respectively;  $P = .006$ ).

**4** It was concluded that the relative performance of CDO seems to increase when used with frequent debridement, advocating its potential use in the future. A case was made for the use of active CDO therapy with standard wound care.

Lavery LA, Niederauer MQ, Papas KK, Armstrong DG (2019) Does debridement improve clinical outcomes in people with diabetic foot ulcers treated with continuous diffusion of oxygen? *Wounds* pii WND520190731-1. [Epub ahead of print]

## CMAJ

## Population-based secular trends in lower-extremity amputation for diabetes and peripheral artery disease

Readability ✓✓✓

Applicability to practice ✓✓✓✓

WOW! Factor ✓✓✓

**1** The authors highlighted the fact that the clinical burden of limb loss secondary to diabetes and peripheral artery disease is poorly characterized, therefore, they examined trends in lower-extremity amputation rates related to diabetes, peripheral artery disease (PAD) or both.

**2** All individuals aged 40 years and older undergoing lower-extremity amputations related to diabetes or PAD in Ontario, Canada, between 2005 and 2016 were included in the study. The quarterly amputation rates (per 100 000 individuals aged  $\geq 40$  years), either major or minor were calculated and time-series analyses with exponential smoothing models were used to describe trends, as well as forecast 2 years in time.

**3** Of the 20,062 patients who underwent a lower-extremity amputation, 12,786 (63.7%) underwent a major (above ankle) amputation. In addition, 81.8% had diabetes, 93.8% had PAD, while 75.6% had both. A significant increase in amputation rate was seen among patients with diabetes, PAD and both. Major amputation rates did not significantly change among those with diabetes, PAD or both.

**4** Over the past decade, lower-extremity amputations related to diabetes, PAD or both have increased. The results support renewed efforts to prevent and decrease the burden of amputation.

Hussain MA, Al-Omran M, Salata K et al (2019) Population-based secular trends in low-er-extremity amputation for diabetes and peripheral artery disease. *CMAJ* 191(35): E955-E961

## Ann Plast Surg

## Evidence for healing diabetic foot ulcers with biologic skin substitutes: a systematic review and meta-analysis

Readability ✓✓✓

Applicability to practice ✓✓✓✓

WOW! Factor ✓✓✓

**1** Standard-of-care (SOC) therapy alone is often not sufficient to heal diabetic foot ulcers, necessitating the use of adjuvant wound therapies. The authors carried out a systematic review and meta-analysis on the efficacy of healing DFUs with biologic skin substitutes.

**2** Conducted in accordance with PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), the review examined four electronic databases (PubMed/MEDLINE, EMBASE [Ovid], Cochrane CENTRAL [Ovid], and Web of Science) from inception to February 27, 2019. Searches relating to 3 main concepts were conducted: biologic skin substitutes, wound healing, and diabetic foot ulcers.

**3** A total of 25 studies were identified that measured the proportion of complete wound closure at 12 weeks. Wounds treated with biologic dressings were 1.67 times more likely to heal at 12 weeks when compared to those treated with SOC dressings ( $P < 0.00001$ ). Of five studies assessing wound closure at 6 weeks, wounds treated with biologic dressings were 2.81 times more likely to heal than those treated with SOC dressings ( $P = 0.0001$ ).

**4** This review supports the view that biologic skin substitutes are more effective than SOC dressings at healing diabetic foot ulcers by 12 weeks.

Gordon AJ, Alfonso AR, Nicholson J, Chiu ES (2019) Evidence for healing diabetic foot ulcers with biologic skin substitutes: a systematic review and meta-analysis. *Ann Plast Surg* 83(4S Suppl 1):

## J Vasc Surg

## Critical analysis and limitations of resting ankle-brachial index in the diagnosis of symptomatic peripheral arterial disease patients and the role of diabetes mellitus and chronic kidney disease

Readability ✓✓✓

Applicability to practice ✓✓✓

WOW! Factor ✓✓

**1** This limitations of the ankle-brachial index (ABI) and toe-brachial index (TBI) were analysed in this study, if conducted alone, in patients with symptomatic PAD, diagnosed by duplex ultrasound (DUS) examination, chiefly in patients with diabetes and chronic kidney disease (CKD).

**2** This retrospective review examined patients who had undergone resting ABIs, TBI, and/or DUS. ABI of 0.90 or less in either leg was considered abnormal, while the term 'inconclusive ABIs' was used if ABI was 1.3 or greater. A TBI of less than 0.7, meanwhile, was considered abnormal.

**3** A total of 2,226 ABIs and 1,383 DUS examinations were included with 46% of these patients having diabetes, 16% CKD and 39% coronary artery disease. ABIs were normal in 53% of patients, abnormal in 34% and 13% were inconclusive. Of those with limb-threatening ischaemia, 40% had normal ABIs, 40% abnormal and 20% inconclusive.

**4** Of those with PAD with 50% or greater stenosis on DUS examination, normal/inconclusive resting ABIs were found in 43%. It was concluded that TBI may help in patients with inconclusive ABIs.

AbuRahma AF, Adams E, AbuRahma J et al (2019) Critical analysis and limitations of resting ankle-brachial index in the diagnosis of symptomatic peripheral arterial disease patients and the role of diabetes mellitus and chronic kidney disease. *J Vasc Surg* S0741-5214(19)31662-3.

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