

Wounds digest

In this section, we present brief synopses of a range of recently published articles that may be of interest to healthcare professionals working in the wound care setting. The aim of this round-up is to provide an overview, rather than a detailed summary and critique, of the research papers selected. Full references are provided should you wish to look at any of the papers in more detail.

1 The association of wound factors and symptoms of fatigue and pain with wound healing in chronic venous leg ulcers

Readability	✓	✓			
Relevance to daily practice	✓	✓	✓	✓	
Novelty factor	✓	✓			

- This prospective, longitudinal, and observational study examined the association of wound area, wound exudate C-reactive protein (CRP), matrix metalloproteinase protein (MMPs), and symptoms of fatigue and pain in people with chronic venous leg ulcers (CVLUs). Additionally, the authors aimed to identify factors associated with the wound healing trajectory in CVLUs.
- The authors recruited 74 participants with CVLU who received weekly sharp debridement at a wound care clinic during the 8-week study period. The mean age of participants was 71.8 years (SD 9.8) and the baseline mean wound area was 2,278 mm² (SD 7,085 mm²).
- To examine associations among wound CRP, MMPs, pain, fatigue and wound healing trajectory over time, they calculated Bayes factors (BF) based on a linear mixed model. Higher fatigue was strongly associated with higher MMP levels, lower CRP and large wound areas. Higher CRP and MMPs activity in wound exudate and higher fatigue were associated with a larger wound area.
- The authors concluded that the results indicate that wound exudate CRP is associated with larger wound areas; wound exudate MMPs and CRP do not influence changes in wound areas; and patients who have higher MMPs with larger wound areas tend to have more fatigue.

Kim J, Stechmiller J, Weaver M et al (2022) The association of wound factors and symptoms of fatigue and pain with wound healing in chronic venous leg ulcers. *Int Wound J* [Online ahead of print]

2 Pressure ulcers in patients with COVID-19 acute respiratory distress syndrome undergoing prone positioning in the intensive care unit: a pre- and post-intervention study

Readability	✓	✓	✓	✓	
Relevance to daily practice	✓	✓	✓	✓	✓
Novelty factor	✓	✓	✓		

- This study aimed to determine the impact of a prevention care bundle on the incidence of pressure ulcers (PUs) in patients with COVID-19 acute respiratory distress syndrome undergoing prone positioning in the intensive care unit.
- The intervention included a care bundle addressing the following: increasing frequency of head turns, use of an open gel head ring,

application of prophylactic dressings to bony prominences, use of a pressure redistribution air mattress, education of staff on the early identification of evolving PUs and engaging in bedside training sessions with nursing and medical staff. The primary outcome of interest was the incidence of PU development. The secondary outcomes of interest were severity of PU development and the anatomical location of the PUs.

- This was a single-centre pre- and post-test intervention study. In the pre-intervention study, 20 patients were included and 16 of these developed PUs, with 34 ulcers in total. In the post-intervention study, a further 20 patients were included and 12 of these patients developed PUs, with 32 ulcers in total; a 25% reduction in the number of patients developing a PU, and a 6% decrease in the total number of PUs observed. Grade II PUs were the most prevalent in both study groups.
- In the post-intervention study, there was a reduction in the incidence of grade III and deep tissue injuries. However, there was an increase in the number of unstageable PUs in the post-intervention group with 6% (n=2) of PUs being classified as unstageable, meanwhile there were no unstageable PUs in the pre-intervention group. This is an important finding to consider as unstageable PUs can indicate deep tissue damage and therefore need to be considered alongside PUs of a more severe grade.
- The use of a new evidence-based care bundle for the prevention of PUs in the management of patients in the prone position has the potential to reduce the incidence of PU development.

McEvoy NL, Friel O, Clarke J et al (2022) Pressure ulcers in patients with COVID-19 acute respiratory distress syndrome undergoing prone positioning in the intensive care unit: a pre- and post-intervention study. *Nurs Crit Care* [Online ahead of print]

3 Results of a prospective observational study of autologous peripheral blood mononuclear cell therapy for no-option critical limb-threatening ischemia and severe diabetic foot ulcers

Readability	✓	✓	✓	✓	
Relevance to daily practice	✓	✓			
Novelty factor	✓	✓	✓	✓	

- Cell therapy with autologous peripheral blood mononuclear cells (PB-MNC) may help restore limb perfusion in patients with diabetes and critical limb-threatening ischaemia (CLTI) who have been deemed ineligible for revascularisation and consequently are at risk of major amputation (called "no-option").
- This was a prospective, non-controlled, observational study on no-option CLTI diabetic patients who underwent intramuscular PB-MNC therapy a maximum of three times. The primary endpoint was

amputation rate at 1 year following the first treatment. Ulcer healing, walking capability and mortality during the follow-up period were evaluated. Angiogenic cells and extracellular vesicles were assessed at baseline and after each cell treatment, according to primary outcome and tissue perfusion was measured as transcutaneous oxygen pressure (TcPO₂).

- Fifty patients were consecutively enrolled and the primary endpoint (amputation rate) was 16%. TcPO₂ increased after PB-MNC therapy (17.2 ± 11.6 versus 39.1 ± 21.8 mmHg, p < .0001). Ulcer healing with back-to-walk occurred in 60% of the study population (88% of survivors) during follow-up (median 1.5 years).
- In no-option CLTI patients with diabetes, the PB-MNC therapy led to improved tissue perfusion, a high rate of healing, and back-to-walk.

Panunzi A, Madotto F, Sangalli E et al (2022) Results of a prospective observational study of autologous peripheral blood mononuclear cell therapy for no-option critical limb-threatening ischemia and severe diabetic foot ulcers. *Cardiovasc Diabetol* 21(1): 196

4 Preoperative pressure ulcers, mortality, and complications in older hip fracture surgery patients

Readability	✓	✓	✓	✓	
Relevance to daily practice	✓	✓	✓	✓	✓
Novelty factor	✓	✓	✓		

- The effect of a preoperative pressure ulcer (PPU) in hip fracture patients on postoperative outcomes has not been well studied. The authors hypothesised that the presence of a PPU would be associated with increased mortality and serious complications in hip fracture surgery patients.
- They conducted a cohort study of 19,520 hip fracture patients from 2016 to 2019 using data from the National Surgical Quality Improvement Program. The study's primary outcome was 30-day mortality. Secondary outcomes included deep vein thrombosis (DVT), pulmonary embolism, surgical site infection, pneumonia and unplanned hospital readmission. Propensity score analysis and inverse probability of treatment weighting were used to control for confounding and reduce bias.
- The presence of a PPU was independently associated with a 21% increase in 30-day mortality (OR 1.2; P=0.004). The presence of a PPU was also independently associated with increased odds of DVT (OR 1.59; P<0.001), pneumonia (OR 1.39; P<0.001) and unplanned hospital readmission (OR 1.43; P<0.001), and a significant increase in the mean length of hospital stay of 0.4 days (P=0.007).
- The authors found that PPU were independently associated with increased 30-day mortality, DVT, pneumonia, hospital length of stay and unplanned hospital readmission.
- These findings are important so that appropriate risk adjustment can be undertaken for hip fracture surgery patients. Furthermore, the presence of a PPU may help identify patients at risk of potentially preventable complications, such as DVT and pneumonia. Heightened surveillance or more aggressive preventive strategies may be warranted in these patients.

Porter SB, Pla R, Chow JH et al (2022) Preoperative pressure ulcers, mortality, and complications in older hip fracture surgery patients. *J Am Acad Orthop Surg Glob Res Rev* 6(11): e22.00117

5 Flexor tendon tenotomy treatment of the diabetic foot

Readability	✓	✓	✓	✓	
Relevance to daily practice	✓	✓	✓	✓	
Novelty factor	✓	✓	✓	✓	

- The aim of this study was to evaluate the effects of needle flexor tendon tenotomy treatment of diabetic hammertoe deformity.
- The authors carried out a multicentre randomised controlled trial of individuals with diabetes and ulcers or impending ulcers associated with hammertoes. Participants were randomly assigned to tenotomy and standard nonsurgical treatment or to standard nonsurgical treatment alone. Primary outcomes were time to ulcer healing and progression from impending ulcer to active ulcer.
- After screening, the study included 95 participants with diabetes (59.0% men). The mean follow-up was 291 ± 70 days and mean age was 67.7 ± 9.8 years. Sixteen participants had ulcers, and eight were randomly assigned to intervention; of the 79 with impending ulcers, 39 were randomly assigned to intervention. For participants with ulcers, healing rates favoured tenotomy (100% versus 37.5%, P=0.026) as did time to ulcer healing (P=0.04). For those with impending ulcers, incidence of progression to an active ulcer was lower (1 versus 7, P=0.028) and the number of ulcer-free days higher (P=0.043) in the tenotomy group.
- The authors concluded that needle flexor tendon tenotomy was effective and safe when treating and preventing ulcers associated with the diabetic hammertoe deformity.

Andersen JA, Rasmussen A, Engberg S et al (2022) Flexor tendon tenotomy treatment of the diabetic foot: a multicenter randomized controlled trial. *Diabetes Care* 45(11): 2492–500

6 Influence of pedal arch quality on 5-year survival and limb salvage in patients with diabetic foot ulcers undergoing peripheral angiography

Readability	✓	✓	✓		
Relevance to daily practice	✓	✓	✓		
Novelty factor	✓	✓	✓		

- The aim of this study was to evaluate the influence of pedal arch quality on 5-year survival and limb salvage in diabetic patients with foot wounds undergoing peripheral angiography.
- Between January and December 2014, 153 diabetic patients with foot wounds underwent peripheral angiography. Final foot angiograms were used to allocate patients according to pedal arch: complete pedal arch (CPA), incomplete pedal arch (IPA), and absent pedal arch (APA). Five-year survival and limb salvage rates were analysed.
- A below-the-knee (BTK) artery was the target vessel in 80 cases (52.3%). Five-year rates of survival were similar in all groups (P=0.1): CPA 30%, IPA 27.5%, and APA 26.4%. Five-year limb salvage rates were significantly better in patients with CPA/IPA (p<0.001): CPA 95.1%, IPA 94.3%, and APA 67.3%.
- The authors concluded that pedal arch quality significantly affected limb salvage, but not survival at 5 years.

Troisi N, Guidotti A, Turini F et al (2022) Influence of pedal arch quality on 5-year survival and limb salvage in patients with diabetic foot ulcers undergoing peripheral angiography. *Vascular* 30: 848–55