

Wounds digest

In this section, a brief synopsis is presented 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 Does localized iron loss in venous disease lead to systemic iron deficiency? A descriptive pilot study

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

- There are numerous theories that suggest haemosiderin (stored iron) plays a role in disease pathophysiology in patients with venous leg ulcers. The authors set out to undertake a pilot study centring on patients with chronic venous leg ulcers to establish the relationship between wound fluid iron levels, serum iron parameters and healing.
- The study involved 15 patients with venous ulcers, who had blood samples taken for full blood count and iron studies, and wound fluid was taken from the wound surface using filter paper. After measurements were taken of the wounds at initial and 4 week (+/- 2 day) follow-up visits, a positive correlation was found by the authors between wound fluid and serum iron (correlation co-efficient of 0.27). In addition, patients with the lowest wound fluid iron level were also anaemic.
- The largest wounds were found in the patients with anaemia, however, no association was found between initial wound area and wound fluid iron level. A reduction in wound area was seen in 38% of patients after 4 weeks and 80% of these were neither iron deficient or anaemic. On the other hand, in the patients whose wounds did not reduce in size, some 88% were anaemic or iron deficient.
- The findings suggest a high prevalence of anaemia and iron deficiency (often undiagnosed) in patients with chronic venous ulcers and the authors concluded that the diagnostic criteria for iron deficiency in individuals with chronic wounds must be revised to reflect the effect of chronic inflammation on iron metabolism.

Ferris AE, Harding KG (2020) Does localized iron loss in venous disease lead to systemic iron deficiency? A descriptive pilot study. *Wound Repair Regen* 28(1): 33–8

2 An integrated experimental-computational study of the microclimate under dressings applied to intact weight-bearing skin

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

- The root aetiological cause of pressure ulcers (PUs) is cell and tissue deformations, which triggers a synergistic tissue damage flow that accelerates over relatively short periods of time. The authors stated that as skin microclimate condition changes are well known to indirectly contribute to PU-risk levels, it is surprising

that information concerning heat accumulation under dressings is poor in the literature.

- This study saw the effects of dressings on the microclimate of weight-bearing buttocks skin during 1-hour supine lying sessions examined. A novel and originally developed experimental-computational approach was utilised to compare the use of a polymeric membrane dressing (PolyMem®, Ferris Mfg. Corp) and a standard placebo foam dressing on skin microclimate under and near the dressings.
- The authors highlighted dressings' thermal conductivity properties as being integral in the context of protective dressing performances, due to its association with potential heat accumulation under dressings.
- To the authors' knowledge, this study represents the first time in the literature that the relevance of a dressing's thermal properties have been studied in relation to alleviating the risk of developing PUs. At the same time, it offers a systematic, methodological bioengineering process for assessing a dressing's thermal performance.

Schwartz D, Gefen A (2020) An integrated experimental-computational study of the microclimate under dressings applied to intact weight-bearing skin. *Int Wound J* doi: 10.1111/iwj.13309. [Epub ahead of print]

3 Meta-analysis: predictive validity of Braden for pressure ulcers in critical care

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

- For numerous reasons, pressure ulcer (PU) incidence in intensive care units (ICUs) is higher than other types of care settings. In the assessment of risk for PUs, the Braden Scale is widely used, however, in terms of ICU settings, its predictive properties are controversial, according to the authors.
- The authors set out to evaluate the Braden Scale's predictive accuracy relating to the measurement of PU risk in adult ICU patients. A literature search was carried out, which incorporated English databases (PubMed, Cochrane Library, OVID and Web of Science), Chinese databases (SinoMed, CNKIs and Wanfang) and grey literature.
- Included in this study were 11 articles, which involved 1,058 patients with PUs and the Braden Scale's pooled sensitivity and specificity for predicting ICU adults' PU risk was found to be 0.89 (95% CI, 0.87–0.91; I₂ = 94.9%, P=0.0000) and 0.28 (95% CI, 0.27–0.29; I₂ = 99.2%, P=0.0000), respectively. The pooled diagnostics odds ratio stood at 6.29 (95% CI: 4.09–9.68). The overall weighted area under the curve was 0.7812 ± 0.0331 (95% CI: 0.7163–0.8461)

and the Q^* value was 0.7196 ± 0.0283 (95% CI: 0.6641–0.7751). Meta-regression analysis determined no heterogeneity in blinding ($P=0.074$), study design ($P=0.679$), or cut-off value ($P=0.821$).

- The effectiveness of the Braden Scale was put at 'moderate' in terms of predictive validity, 'good' in terms of sensitivity and 'low' in terms of specificity in adult critically ill patients. For ICU patients specifically, the authors recommended either a modification of the Braden Scale or else a new tool to replace it with a higher predictive power.

Wei M, Wu L, Chen Y et al (2020) Meta-analysis: predictive validity of Braden for pressure ulcers in critical care. *Nurs Crit Care* doi: 10.1111/nicc.12500. [Epub ahead of print]

4 Flap reconstruction for deep sternal wound infections: factors influencing morbidity and mortality

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

- Flap reconstruction is required in some cases of deep sternal wound infections (DSWI) to eradicate dead space, as well as provide healthy soft tissue coverage. Operative management may be improved through a better understanding of risk factors for complications following DSWI flap reconstruction.
- The authors undertook a retrospective study covering 2007–2018 focused on patients with DSWI after cardiothoracic surgery who had been referred to a single reconstructive surgeon for flap reconstruction. Examples of patient and operative factors included procedure types and outcomes. Morbidity and mortality predictors were analysed.
- The inclusion criteria was met by 119 patients and the unilateral (49.6%) or bilateral (40.3%) pectoralis muscle flaps were performed most frequently. The principal postoperative complication was superficial surgical site infection (17.6%), while debridement/revisional procedures were required by 19 patients (16%) and five experienced flap failure (4.2%).
- Thirty-day mortality stood at 15.1%, while the key factors associated with mortality were end-stage renal disease ($P=0.002$), congestive heart failure ($P=0.049$), cardiopulmonary bypass time ($P=0.0001$), low albumin ($P=0.004$), need for open chest ($P=0.020$), and high ASA classification ($P=0.003$). Complication rates after flap reconstruction for DSWIs remain high and end-stage renal disease, vertical rectus abdominis myocutaneous flap reconstruction and multi-drug resistant infection may all predict a complicated postoperative course in this patient group.

Piwnica-Worms W, Azoury SC, Kozak G et al (2020) Flap reconstruction for deep sternal wound infections: factors influencing morbidity and mortality. *Ann Thorac Surg* doi: 10.1016/j.athoracsur.2019.12.014. [Epub ahead of print]

5 Defying hard-to-heal wounds with an early antibiofilm intervention strategy: 'wound hygiene'

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

- It is now widely accepted that most of the wounds that do

not undertake a normal healing trajectory contain biofilm. An advisory board was convened in March 2019, which saw experts weigh up the barriers and opportunities in a bid to help drive a broader adoption of a biofilm-based approach to wound care.

- The key barriers to the clinical adoption of rigorous and proactive microbial decontamination were identified as poor clarity and articulation of wound terminology. The board came up with the term 'wound hygiene', which was designed to communicate a comprehensive wound decontamination plan with an associated message of expected regular routine.
- It was concluded that the concept of 'wound hygiene' supports thorough wound practice, addressing biofilm and other wound healing barriers, as well as being aligned with antimicrobial stewardship platforms.

Murphy C, Atkin L, Dissemond J et al (2019) Defying hard-to-heal wounds with an early antibiofilm intervention strategy: 'wound hygiene'. *J Wound Care* 28(12): 818–22

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

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

- 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.
- 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 three main concepts were conducted: biologic skin substitutes, wound healing, and diabetic foot ulcers.
- 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 ($P=0.0001$).
- 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): S31–S44