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Title: Interventions for the treatment and prevention of pressure ulcers

Abstract

Pressure ulcers can affect multiple aspects of an individual's life. Though preventable, pressure ulcers place a substantial economic burden on healthcare services. Countries around the world have set pressure ulcer prevention and treatment as a high priority. National Clinical Guidelines recommend a wide range of preventative and curative treatments. However, there is still much uncertainty regarding the effectiveness of preventative and curative treatments. This overview of systematic reviews aims to describe the findings of 15 Cochrane reviews on treatment and prevention of pressure ulcers included in a previous umbrella review and to expand upon their findings in the context of clinical practice.

Key Points

- There was limited, inconsistent and methodologically weak evidence for a large number of current preventative and curative treatments for pressure ulcers.
- Patient video education and topical application of fatty acid may help prevent pressure ulcers development.
- Pine resin salve, hydrocolloid, hydrogel, polyurethane, silver and ibuprofen-releasing foam dressing may be effective in treating pressure ulcers.
- Further high-quality research is required on both prevention and treatment of pressure ulcers.

Introduction

The term “pressure ulcer” is used to describe a localised wound to the skin as a result of prolonged pressure, or pressure combined with friction to the same area for long periods (Bhattacharya and Mishra 2015). The estimated prevalence rate of pressure ulcers in the community is 0.77 per 1000 adults within the United Kingdom (Stevenson et al. 2013) The consequences and impact of pressure injuries are significant and include pain, reduced quality of life, increased risk of death, and higher healthcare costs (Demarré et al. 2015; Gorecki et al. 2009; Song et al. 2019). Patients with pressure ulcers often experience long hospital stays, additional surgical procedures and complications such as infection, sepsis and depression (Jaul et al. 2018; Theisen et al. 2012). Though mostly preventable, pressure ulcers pose a substantial economic burden (Agrawal and Chauhan 2012).

The prevention and treatment of pressure ulcers is a high priority issue worldwide (Mervis and Phillips 2019). Practice guidelines, such as those developed by NICE (2014), direct clinicians towards a range of preventative and treatment interventions (National Clinical Guideline 2014). In a recent study exploring the barriers and facilitators for implementation of evidence-based practice in nursing community pressure sore management the domains of knowledge and beliefs of capabilities of treatment were identified as key variables in implementation of best practice (Taylor et al. 2021). A recent umbrella review (Review of Reviews) by Walker et al. (2020) aimed to provide a detailed, critical, and up-to-date review on pressure ulcer prevention and treatment, including a critical synthesis of existing evidence and recommendations for research and practice (Walker et al. 2020). However, this review only provided a summary of findings for three out of the 25 Cochrane reviews which were included and evaluated for quality. Subsequently only providing a very narrow view on a substantial evidence base. In particular 15 of the reviews included in the umbrella review provided full Grading of Recommendations, Assessment, Development and Evaluations (GRADE) which were not fully reported upon.

Aims

This overview of systematic reviews aims to describe the findings of the 15 Cochrane reviews which reported findings using GRADE included in the previous review by Walker et al. (2020) and to expand upon their findings in the context of clinical practice (Arora et al. 2020; Chen et al. 2014; Dumville et al. 2015a; Dumville et al. 2015b; Dumville et al. 2015c; Gillespie et al. 2014; Joyce et al. 2018; Jull et al. 2015; McInnes et al. 2015; Moore and Webster 2018; Moore and Patton 2019; Norman et al. 2016; Porter-Armstrong et al. 2018; Walker et al. 2020; Walker et al. 2017; Westby et al. 2017).

Methods of the review by Walker et al. (2020)

The umbrella review by Walker et al. (2020) undertook a robust single database search of the Cochrane wound database from date of inception to January 23rd, 2020. Any Cochrane systematic review which included patients who received pressure ulcer treatment or prevention interventions which could be delivered by a registered nurse in any clinical setting were included. Within the umbrella review title and abstract, and full paper screening was undertaken by three reviewers independently. Assessment of the methodological quality of the included reviews in the umbrella review was carried out by a single reviewer with verification of 20% by a second reviewer using the Measurement Tool to Assess Systematic Reviews (AMSTAR 2).

Data extraction and Assessment of bias

The 15 systematic reviews which were identified in the umbrella review were each data extracted by a single author (JH, OH, ES or AW). The following data items were extracted: author, date, review, population, setting, intervention, comparator, outcome, relative effect (95% CI) and grade quality assessment from each Cochrane review. The critical appraisal (AMSTAR 2) of the 15 systematic reviews was data extracted from the umbrella review by Walker et al. (2020) by a single author (OH).

Results

Out of the 25 reviews included in the umbrella review only four preventative, ten treatment and one prevention and treatment review reported a GRADE quality assessment. Using the AMSTAR2 tool nine out of the 15 reviews which used GRADE assessment were rated as high confidence (Arora et al. 2020; Chen et al. 2014; Dumville et al. 2015a; Dumville et al. 2015b; Dumville et al. 2015c; Joyce et al. 2018; McInnes et al. 2018; Moore and Webster 2018; Moore and Patton 2019), and six reviews were rated as medium confidence (Gillespie et al. 2014; Jull et al. 2015; Norman et al. 2016; Porter-Armstrong et al. 2018; Walker et al. 2017; Westby et al. 2017), in that the review provides an accurate and comprehensive summary of the results of the available studies that address the question of interest (see Table 2 for AMSTAR2 assessment). The greatest weakness of the 15 reviews was a lack of study design justification, with more than half failing to provide an explanation for the criterion of included random controlled trials (Chen et al. 2014; Gillespie et al. 2014; McInnes et al. 2018; Moore and Patton 2019; Norman et al. 2016; Porter-Armstrong et al. 2018; Walker et al. 2017; Westby et al. 2017). The findings of those reviews deemed moderate in confidence were limited by a lack of justification for the study design, conflicts of interest and only partially comprehensive search strategies. All reviews detailed a research question, inclusion criteria, protocol, process of study selection, conducted data extraction in duplicate, risk of bias assessment, discussed heterogeneity, and conducted meta-analysis (where appropriate). Out of the 45 interventions examined in the 15 Cochrane reviews, 13 of the interventions demonstrated statistically significant improvement in one or more outcomes. Out of these 13 effective interventions, only one intervention for one outcome was graded to have moderate quality evidence [The authors believe that the true effect is probably close to the estimated effect (Brozek et al. 2009)]. The remaining interventions were graded to have low [The true effect might be markedly different from the estimated effect] to very low evidence [The true effect is probably markedly different from the estimated effect] for one or more outcomes (see Table 1 for full results).

Prevention

For preventative treatments there was a statistical [unlikely to occur by chance] and clinically significant [level of effect at the lowest confidence interval would still be deemed to be clinically beneficial] reduction in pressure ulcer incidence for the atopic application of fatty acid compared to other topical interventions or standard care for individuals at risk of pressure ulcer development at 30-day follow-up but not at 16 weeks (Grade: low) (Moore and Webster 2018). Furthermore, the preventative intervention of silicone dressing compared to no dressing demonstrated a statistically significant reduction in pressure ulcer incidents (Grade: low), stage 1, 2 and 4 (Grade: very low). Additionally, Video education was statistically significant in improving the knowledge of pressure ulcer management for staff caring for patients at high risk of pressure ulcers (Grade: very low) (Porter-Armstrong et al. 2018).

Topical/dressings treatments

There was a statistical and clinically significant increase in risk of complete wound healing for Pine resin salve compared to Hydrocolloid dressings in adults diagnosed with a pressure ulcer of category 2 or above (Grade: low) (Norman et al. 2016). However, there was no evidence of reduced risk of infection (Grade: very low). There was also a statistical, but non clinically significant, increased risk in reduction in wound area by at least 25% (Grade: very low), improvement in wound infection (Grade: very low) and no evidence of increased adverse events (Grade: very low), for Iodine sugar compared to Lysozyme. However, there was no evidence of reduced risk of complete wound healing (Grade: very low).

There was a statistically significant increase in the proportion of patients with complete wound healing for Foam dressings (Grade: low), Hydrocolloid dressings (Grade: very low), Hydrogel (Grade: very low) and Tripeptide copper gel (Grade: very low) compared to Saline gauze in people with pressure ulcers (Westby et al. 2017). There was a statistically significant decrease in time to complete healing for both Laser and UV phototherapy in patients being treated for pressure ulcers (Grade: very low) (Chen et al. 2014).

There was a clinical and statistically significant reduction in time to complete healing for Polyurethane, Silver and Ibuprofen-releasing foam dressings compared to basic contact dressings (Grade: very low) with no evidence of difference in risk of adverse events in people with a stage 2 pressure ulcer and above (Grade: low) (Walker et al. 2017). However, there was no evidence of difference in incidence of healing in the short and medium term (Grade: very low).

Electrotherapy

There was a statistical and clinically significant increase in risk of pressure ulcer healing for Electrical stimulation compared to sham intervention (Grade: moderate) (Arora et al. 2020). However, there were non-quantified reported adverse events of redness of the skin, itchy skin, dizziness and delusions, deterioration of the pressure ulcer, limb amputation and occasionally death (Grade: low) and there was no evidence of reduction in time to complete healing (Grade: very low).

Modes of healthcare/equipment

There was a statistical but non-clinically significant improvement in risk of number of pressure ulcers healed for enhanced multidisciplinary teams and multidisciplinary teams compared to usual care in people with pressure ulcers residing in long-term-care facilities (Grade: very low) (Joyce et al. 2018). However, there was no evidence of difference for hospital admission rates for enhanced multidisciplinary team compared to usual care (Grade: very low). Additionally, there was no evidence of difference for reduction in pressure ulcers surface area, time to complete healing, hospital readmission and emergency department visits for multidisciplinary team working compared to usual care (Grade: very low).

There was a statistical and clinically significant increase in pressure ulcer healing within 5 to 10 days for profiling bed with foam mattress compared to hospital beds with foam mattress in patients from two surgical and two medical wards (Grade: very low) (McInnes et al. 2018).

Table 1: Full systematic review GRADE results

Name review	Population	Setting	Intervention	Comparator	Outcome	Relative effect (95% CI)	Grade
(Arora et al. 2020)	*People with pressure ulcers*	Inpatients and outpatients	Electrical stimulation (plus standard care)	Sham/no ES (plus standard care)	Proportion of pressure ulcers healed	Risk ratio 1.99 (1.39 to 2.85)	Moderate
	People with pressure ulcers	Inpatients and outpatients	Electrical stimulation (plus standard care)	Sham/no ES (plus standard care)	Time to complete healing	Hazard ratio HR 1.06 (0.47 to 2.41)	Very low
	People with pressure ulcers	Inpatients and outpatients	Electrical stimulation (plus standard care)	Sham/no ES (plus standard care)	Complications/ adverse events related to pressure ulcers (3 to 12 weeks)	Adverse events included redness of the skin, itchy skin, dizziness and delusions, deterioration of the pressure ulcer, limb amputation and occasionally death. (The data were not sufficiently detailed or comparable to analyse quantitatively)	Low
(Chen et al. 2014)	Patients being treated for pressure ulcers	Hospitals, nursing homes, outpatient settings	Phototherapy: UV	No phototherapy, sham phototherapy, or another form of phototherapy	Time to complete healing (weeks)	Control 7.95 weeks Vs 2.13 weeks lower (3.53 to 0.72 lower)	very low
			Phototherapy: laser			Control 6.83 weeks vs 5.77 higher (0.25 lower to 11.79 higher)	very low
(Dumville et al. 2015c)	People with pressure ulcers	N/R	Hydrogel dressings	Basic wound contact dressings	Proportion of ulcers completely healed Follow-up: mean 10 weeks	RR 0.97 (0.56 to 1.68)	very low
					Adverse event data (wound infection and pain during treatment)	It is not clear that adverse event data were systematically collected the same way for both trial groups. Available	

Name review	Population	Setting	Intervention	Comparator	Outcome	Relative effect (95% CI)	Grade
					Follow-up: mean 10 weeks	data was very limited and was not analysed	
	People with pressure ulcers	N/R	Hydrogel dressings	Hydrogel dressings	Adverse events (wound infection) Follow-up: mean 4 weeks	RR 0.13 (0.01 to 2.44)	Low
					Adverse events (wound-related pain) Follow-up: mean 4 weeks	RR 1.92 (0.01 to 2.44)	Low
					Adverse events (pain on dressing removal) Follow-up: mean 4 weeks	RR 1.19 (0.80 to 1.76)	Low
(Dumville et al. 2015b)	People with spinal cord injury and Pressure ulcers	N/R	Negative pressure wound therapy	**Standard dressings**	50% (or more) reduction in wound volume at the end of the six-week follow-up	RR 1.00 95% CI 0.60 to 1.66	Very low
					50% (or greater) reduction in wound volume of two weeks	Two weeks (inter-quartile range (IQR) 1 to 2) vs three weeks (IQR 3 to 4)	Very low
	People with pressure ulcers		Negative pressure wound therapy	Dressing group	number of wounds healed	RR 3.00, 95% CI 0.15 to 61.74;	Very low
					adverse events	RR: 1.25, 95% CI 0.64 to 2.44;	Very low
(Dumville et al. 2015a)	Patients with pressure ulcers	Not reported	Alginate dressing	Hydrocolloid dressing	Change in wound size (mean 8 week follow up)	N/A	Very low
					Wound infection (mean 8 week follow up)	R 2.79 (0.12 to 67.10)	Very low
					Adverse events (mean 8 week follow up)	RR 1.12 (0.36 to 3.44)	Low
	Patients with pressure ulcers	Not reported	Alginate dressings	Different brand of alginate dressing	Complete wound healing	RR 1.50 (0.17 to 12.94)	Very low
					Adverse events	RR 0.50 (0.12 to 2.12)	Very low
	Patients with pressure ulcers	Not reported	Alginate dressing	Dextranomer paste dressing	Wound infection	RR 0.96 (0.14 to 6.51)	Very low
					Adverse events	RR 0.38 (0.13 to 1.13	Very low
	Patients with pressure ulcers	Not reported	Silver-alginate dressing	Alginate dressing	Chang in wound size	Not reported	Very low
					Wound infection	Not reported	Very low
		Not reported	Alginate dressing	Radiant heat system	Change in wound size	Not reported	Very low

Name review	Population	Setting	Intervention	Comparator	Outcome	Relative effect (95% CI)	Grade
	Patients with pressure ulcers						
					Adverse events (pain)	Not reported	Very low
(Gillespie et al. 2014)	Adults with pressure sores	Any health setting	2-hourly repositioning on any support surface	4-hourly repositioning on any support surface	Pressure injury (stage 1-4)	RR 1.06 (0.80 to 1.41)	Very low
	Adults with pressure sores	Any health setting	30° tilts at 3-hourly	90° tilts overnight	Pressure injury (stage 1-4)	RR 0.62 (0.10 to 3.97)	Very low
(Joyce et al. 2018)	People with spinal cord injury receiving rehabilitation treatment for the first time	Spinal cord injury services	Transmural care	Usual follow up care	Incidence of pressure sores	RR 0.93 (0.53 to 1.64)	Very low
					Adverse events: readmission to clinical rehab	RR 2.00 (0.19 to 20.93)	Very low
	People requiring admission to hospital	Tertiary hospital	Hospital at home	Hospital admission	Pressure sore incidence rate	RR 0.32 (0.03 to 2.98)	Very low
					Adverse events: death	RR 0.72 (0.17 to 3.06)	Very low
					Adverse event: Hospital readmission	RR 0.58 (0.15 to 2.28)	Very low
	People with pressure ulcers residing in long-term-care facilities	Long-term-care facilities	EMDT	Usual care	Pressure ulcer incidence rate	RR 1.12 (0.74 to 1 .68)	Very low
					Number of pressure ulcers healed	RR 1.69 (1.00 to 2.87)	Very low
					Reduction in pressure ulcers surface area	Healing rate 1.0 0 6 (0.99 to 1.03)	Very low
					Time to complete healing	R 1.48 (0.79 to 2.78)	Very low
					Adverse events: hospital readmission	Estimated to be 1.2 (0.62 to 2.36) times larger during the EMDT	Very low
					Adverse events: ED visits	Estimated to be 1.3 (0.58 to 2.90) times larger during the EMDYT	Very low
		High-care nursing homes	Multidisciplinary wound care	Usual care	Number of pressure sores healed	RR 1.18 (0.98 to 1.42)	Very low

Name review	Population	Setting	Intervention	Comparator	Outcome	Relative effect (95% CI)	Grade
	People who were resident in nursing homes				Time to complete healing (days)	HR 1.73 (1.20 to 2.50)	Very low
					Adverse events	Not reported	Not reported
(Jull et al. 2015)	Patients with Minor acute wounds	Any	Honey	Conventional dressing	Complete healing	The mean complete healing (time to healing) in the intervention groups was 2.26 higher (3.09 lower to 7.61 higher)	Very low
					Adverse events	RR 1.19 (0.69 to 2.05)	Very low
					Negative wound swab	RR 0.91 (0.13 to 6.37)	Very low
					Cost	Mean cost of dressing materials per patient was 0.49 ZAR in the honey group and 12.06 ZAR in the control (hydrogel) group	Very low
					Quality of life	N/A	N/A
	Patients with Burns	Any	Honey	Conventional dressing	Complete healing (days)	The mean complete healing (time to healing) in the intervention groups was 4.68 lower (5.09 to 4.28 lower)	high
					Adverse events	RR 0.56 (0.15 to 2.06)	Very low
					Negative wound swab	RR 1.31 (1.01 to 1.7)	Very low
					Costs	Not estimable	N/A
					Quality of life	Not estimable	N/A
	Patient with burns	Any	Honey	Silver sulfadiazine	Complete healing	RR, 1.00 (0.98 to 1.02)	High
					Mean time to complete healing (days)	The mean time to complete healing in the intervention groups was 5.12 lower (9.51 to 0.73 lower)	Very low
					Adverse events	RR 0.29 (0.2 to 0.42)	high
					Negative wound swab	RR 3.92 (1.32 to 11.63)	Very low
					Costs	Cost of dressing treatment per % TBSA affected was 0.75 PKR for honey and 10 PKR for silver sulfadiazine.	Low
					Quality of life	Not reported	N/A
		Any	Honey		Complete healing (time)	HR 1.1 (0.8 to 1. 5)	Low

Name review	Population	Setting	Intervention	Comparator	Outcome	Relative effect (95% CI)	Grade
	Patient with venous leg ulcers			Control - no description	Complete healing (proportion wound healed)	RR 1.15 (0.96 to 1.38)	Low
					Adverse events	RR 1.28 (1.05 to 1.56)	Low
					Infection	RR 0.71 (0.49 to 1.04)	Low
					Costs	Mean cost in the intervention group was 9.45 NZD lower (95%CI 39.63 NZD lower to 1 6. 0 7 NZD higher	Very low
					QoL (SF-36 PCS)	Mean PCS in the intervention group was 1.1 higher (95% CI 0.8 lower to 3 higher)	Moderate
					QoL (SF-36 MCS)	Mean MCS in the intervention groups was 0.7 higher (95% CI 1.1 lower to 2.4 higher)	Moderate
(McInnes et al. 2018)	Adults with pressure ulcers	Medical and surgical inpatients	Profiling bed with foam mattress	Hospital bed with foam mattress	Pressure ulcer healing (5-10 days)	RR 3.96 (1.28 to 12.24)	Very low
	Nursing home residents >59 years of age	Nursing home	Water mattress support	Low tech mattress	Pressure ulcer healing (4 weeks)	RR 0.93 (0.63 to 1.37)	Low
	Elderly nursing home residents with multiple medical problems	Nursing home	Low air loss bed	Low tech mattress overlay	Pressure ulcer complete healing (33-40 days)	RR 1.30 (0.87 to 1.96)	Low
	Varied	Multiple	Alternating pressure mattress	None documented	Ulcer completely healed (4 weeks)	RR 0.57 (0.26 to 1.27)	Low
					Decrease in pressure ulcer size (4 weeks)	RR 0.58 (0.21 to 1.65)	Low
					Ulcer completely healed (18 months)	RR 0.99 (0.90 to 1.09)	Low
	Varied	Multiple	Alternating pressure mattress	Alternating pressure mattress overlay	Pressure ulcer improvement	RR 0.97 (0.80 to 1.17)	Low
					Pressure ulcer healing	RR 0.96 (0.58 to 1.60)	Low
	Patients with pressure ulcers	Aged care facility, acute care hospital and home setting	Alternating pressure mattress	Air filled device	Proportion of patients with healed pressure ulcer (0-42 days)	RR 5.50 (0.73 to 14.44)	Low
	Patients with pressure ulcers	Acute care hospital and nursing homes	Alternating pressure cushion	Dry flotation cushion	Pressure ulcers completely healed (43-58 days)	RR 0.47 (0.14 to 1.56)	Low

Name review	Population	Setting	Intervention	Comparator	Outcome	Relative effect (95% CI)	Grade
(Moore and Webster 2018)	Individuals at risk of pressure ulcer development	Nursing homes, orthopaedic unit, high dependency unit	Fatty acid	Other topical intervention or standard care	Pressure ulcer incidence: fatty acid vs olive oil (16 weeks)	RR 1.28 (0.76 to 2.17)	Low
					Pressure ulcer incidence: fatty acid vs control compound (30 days)	RR 0.42 (0.22 to 0.80)	Low
					Pressure ulcer incidence: fatty acid vs standard care (30 days)	RR 0.70 (0.41 to 1.18)	Low
					Pressure ulcer incidence: fatty acid vs olive oil	RR 1.46 (0.77 to 2.25)	Low
					Adverse event: fatty acid vs olive oil	RR 2.22 (0.20 to 24.37)	Low
	Individuals at risk of pressure ulcer development	Nursing homes, geriatric medicine	Active topical agent	Placebo/control	Pressure ulcer incidence: active lotion vs placebo	RR 0.73 (0.45 to 1.19)	Very low
					Pressure ulcer incidence: DMSO cream vs placebo	RR 1.99 (1.10 to 3.57)	Low
					Pressure ulcer incidence: Conotrane vs placebo	RR 0.74 (0.52 to 1.07)	Very low
					Pressure ulcer incidence: Prevasore vs control	RR 0.33 (0.04 to 3.11)	Very low
					Stage3 pressure ulcer incidence: Conotrane vs placebo	RR 1.25 (0.34 to 4.55)	Very low

Name review	Population	Setting	Intervention	Comparator	Outcome	Relative effect (95% CI)	Grade
					Stage 4 pressure ulcer incidence: Conotrane vs placebo	RR 0.33 (0.01 to 8.11)	Very low
					Adverse events: active lotion vs placebo	OR 6.14 (0.29 to 129.89)	Very low
	Individuals at risk of pressure sore development	Intensive care unit, medical/surgical units	Silicone dressing	No dressing	Pressure ulcer incidence (0-7 days)	RR 0.25 (0.16 to 0.41)	Low
					Stage 1 pressure ulcer incidence	RR 0.27 (0.08 to 0.90)	Low
					Stage 2 pressure ulcer incidence	RR 0.40 (0.17 to 0.94)	Very low
					Stage 4 pressure ulcer incidence	RR 0.20 (0.01 to 4.13)	Very low
					Unstageable pressure ulcer incidence	RR 0.20 (0.01 to 4.09)	Very low
					Deep tissue injury pressure ulcer incidence	RR 0.99 (0.06 to 15.69)	Very low
					Adverse events	None reported	Very low
	Individuals at risk of pressure ulcer development	Intensive care, coronary care and medical clinic, spinal surgery, geriatric hospital	Other dressing	Control	Pressure ulcer incidence: polyurethane film vs hydrocolloid dressing (30 days)	RR 0.58 (0.24 to 1.41)	Very low
					Pressure ulcer incidence: Kang huier vs routine care (3 days)	RR 0.42 (0.08 to 2.05)	Very low

Name review	Population	Setting	Intervention	Comparator	Outcome	Relative effect (95% CI)	Grade
					Pressure ulcer incidence: PPD vs no dressing (3 weeks)	RR 0.18 (0.04 to 0.76)	Very low
					Pressure ulcer incidence (thin polyurethane foam vs no dressing (mean 14.5 hours)	RR 1.31 (0.83 to 2.07)	Low
					Pressure ulcer incidence: adhesive foam dressing vs no dressing (mean 14.5 hours)	RR 1.65 (1.10 to 2.48)	Very low
(Moore and Patton 2019)	Patients at risk of pressure ulcers	Hospital setting	Braden pressure ulcer risk assessment and training	Pressure ulcer risk assessment using clinical judgement and training	Pressure ulcer incidence (8 weeks)	RR 0.97 (0.53 to 1.77)	Very low
					Severity of new pressure ulcers Time to ulcer development Pressure ulcer prevalence	Not reported	Very low
	Patients at risk of pressure ulcers	Hospital setting	Braden pressure ulcer risk assessment and training	Pressure ulcer assessment using clinical judgement	Pressure ulcer incidence (8 weeks)	RR 1.43 (0.53 to 1.77)	Very low
					Severity of new pressure ulcers Time to pressure ulcer development Pressure ulcer prevalence	Not reported	Very low
	Patients at risk of pressure ulcers	Hospital setting	Waterlow pressure ulcer risk assessment	Pressure ulcer risk assessment using clinical judgement	Pressure ulcer incidence (4 days)	RR 1.10 (0.68 to 1.81)	Low

Name review	Population	Setting	Intervention	Comparator	Outcome	Relative effect (95% CI)	Grade
					Severity of new pressure ulcers – stage 1	RR 1.05 (0.58 to 1.90)	Low
					Severity of new pressure ulcers – stage 2	RR 1.25 (0.50 to 3.13)	Low
					Time to pressure ulcer development Pressure ulcer prevalence	Not reported	Not reported
	Patients at risk of pressure ulcers	Hospital	Ramstadius pressure ulcer risk assessment	Pressure ulcer risk thisassessment using clinical judgement	Pressure ulcer incidence (4 days)	RR 0.79 (0.46 to 1.35)	Low
					Severity of new pressure ulcers – stage 1	RR 0.90 (0.48 to 1.68)	Low
					Severity of new pressure ulcers – stage 2	RR 0.50 (0.15 to 1.65)	Low
					Time to pressure ulcer development Pressure ulcer prevalence	Not reported	Low
	Patients at risk of pressure ulcers	Hospital setting	Waterlow pressure ulcer risk assessment	Ramstadius pressure ulcer risk assessment tool	Pressure ulcer incidence (4 days)	RR 1.41 (0.83 to 2.39)	Low
					Severity of new pressure ulcers – stage 1	RR 1.16 (0.63 to 2.15)	Low
					Severity of new pressure ulcers – stage 2	RR 2.49 (0.79 to 7.89)	Low
					Time to ulcer development Pressure ulcer prevalence	Not reported	Low
(Norman et al. 2016)	Adults diagnosed with a pressure ulcer	Treated in any clinical setting	Povidone iodine	Hydrocolloid	Complete wound healing	RR 0.9 [0.41 to 1.96]	Low

Name review	Population	Setting	Intervention	Comparator	Outcome	Relative effect (95% CI)	Grade
	of category 2 or above		Povidone iodine	Hydrogel	Complete wound healing	RR 0.64 (0.43 to 0.97)	Low
			Povidone iodine	Saline	Infection (eradication)	RR 0.81 (0.48 to 1.37)	Low
			Povidone iodine	Protease-modulating matrix treatment	Complete wound healing	RR 0.78 (0.62 to 0.98)	Moderate
			Cadexomer iodine	Standard care	Complete wound healing	RR 6.0 (0.80 to 45.20)	Very low
					Adverse events	RR 10.27 (0.62 to 169.16)	Very low
					Reduction in wound area	Mean difference 18.80 (-5.65 to 43.25)	Very low
					Pain	Mean difference -4.4 (-10.82 to 2.02)	Very low
			Pine resin salve	Hydrocolloid	Complete wound healing	RR 2.83 (1.14 to 7.05)	Low
					Infection	RR 1.0 (0.07 to 14.79)	Very low
			Iodine sugar	Lysozyme	Complete wound healing	RR 1.20 (0.60 to 2.37)	Very low
					Adverse events	RR 0.32 (0.03 to 3.00)	Very low
					Serious adverse events	RR 0.32 (0.01 to 7.72)	Very low
					Reduction in wound area by at least 25%	RR 1.33 (1.02 to 1.73)	Very low
					Improvement in wound infection Status (to highest level)	RR 1.65 (1.01 to 2.68)	Very low
			Iodine sugar	Gentian violet	Change in wound area	Mean difference 11.10 (-5.66 to 27.86)	Low
					Change in resistance (eradication of MRSA)	RR 0.83 (0.53 to 1.30)	Low
			Polyhexanide dressing	Polyhexanide swabs	Change in resistance (eradication of MRSA)	RR 1.48 (1.02 to 2.13)	Moderate
					Pain	Mean difference -2.03 (-2.66 to -1.40)	Moderate
			Povidone iodine	Silver sulfadiazine	Infection (eradication)	RR 0.65	Low

Name review	Population	Setting	Intervention	Comparator	Outcome	Relative effect (95% CI)	Grade
						(0.41 to 1.01)	
			Honey	Ethoxy-diaminoacridine plus nitrofurazone	Complete wound healing	RR 11.42 (0.66 to 196.40)	Very low
			Silver sulfadiazine	Saline	Infection (eradication)	RR 1.26 (0.94 to 1.69)	Low
(Porter-Armstrong et al. 2018)	Staff caring for patients at risk of pressure ulcers	Hospital and nursing homes	Education	No education	Knowledge in hospital group	Mean knowledge score was 0.30 units higher (1.0 lower to 1.6 higher)	Very low
					Knowledge in nursing-home Group	Mean knowledge score was 0.30 units higher (0.77 lower to 1.37 higher)	Very low
					Change in health professionals' Clinical behaviour	Not reported	
					Incidence of new pressure ulcers	Not reported	
					Severity of pressure ulcers	Not reported	
					Patient-reported outcomes	Not reported	
					Carer-reported outcomes	Not reported	
	Staff caring for patients at risk of pressure ulcers	Nursing homes	Training, monitoring and observation	Monitoring and observation	Change in health professionals' Knowledge	Not reported	
					Change in health professionals' Clinical behaviour	Not reported	
					Incidence of new pressure Study population Ulcers	RR 0.63 (0.37 to 1.05)	Very low
					Severity of new pressure ulcers	No data were presented by the study author	
					Patient-reported outcomes	Insufficient data within the study report to further interrogate this outcome	
					Carer-reported outcomes	Insufficient data within the study report to further interrogate this outcome	
		Nursing homes	Training, monitoring and observation	Observation alone	Change in health professionals'	Not reported	

Name review	Population	Setting	Intervention	Comparator	Outcome	Relative effect (95% CI)	Grade
	Staff caring for patients at risk of pressure ulcers				Knowledge		
					Change in health professionals' Clinical behaviour	Not reported	
					Incidence of new pressure ulcers	RR 1.21 (0.6 to 2.43)	Very low
					Severity of new pressure ulcers	Not reported	
					Patient-reported outcomes	Insufficient data within the study report to further interrogate this outcome	
					Carer-reported outcomes	Insufficient data within the study report to further interrogate this outcome	
	Staff caring for patients at risk of pressure ulcers	Nursing homes	Monitoring and observation	Observation alone	Change in health professionals' Knowledge		
					Change in health professionals' Clinical behaviour		
					Incidence of new pressure ulcers	RR 1.93 (0.96 to 3.88)	Very low
					Severity of new pressure ulcers	No data are presented by the study author	
					Patient-reported outcomes	Insufficient data within the study report to further interrogate this outcome	
					Carer-reported outcomes	Insufficient data within the study report to further interrogate this outcome	
	Staff caring for patients at risk of pressure ulcers	Urban acute care hospital	Video education	Didactic lecture	Change in health professionals' Knowledge	Mean knowledge score was 4.60 units higher (3.8 units to 6.12 units higher)	Very low
					Change in health professionals' Clinical behaviour	Not reported	
					Incidence of new pressure ulcers	Not reported	
					Severity of pressure ulcers	Not reported	
					Patient-reported outcomes	Not reported	
					Carer-reported outcomes	Not reported	

Name review	Population	Setting	Intervention	Comparator	Outcome	Relative effect (95% CI)	Grade
	Staff caring for patients at risk of pressure ulcers	Hospitals and nursing homes	E-learning	Classroom education	Knowledge of pressure ulcer classification	RR 0.92 (0.80 to 1.07)	Very low
					Change in health professionals' Clinical behaviour	Not reported	
					Incidence of new pressure ulcers	Not reported	
					Severity of pressure ulcers	Not reported	
					Patient-reported outcomes	Not reported	
					Carer-reported outcomes	Not reported	
(Walker et al. 2017)	People of any age with an existing pressure ulcer of Category/Stage II or above	Any care setting	Silicone foam dressing	Hydropolymer foam dressing	Incidence of healed pressure ulcers, Short-term follow-up (8 Weeks or less)	RR 0.89 (0.45 to 1.75)	Very low
					Time to complete healing	Not estimable	
					Adverse events, short-term follow-Up (8 weeks or less)	RR 0.37 (0.04 to 3.25)	Very low
					Quality of life	Not estimable	
	People of any age with an existing pressure ulcer of Category/Stage II or above	Any care setting	Hydrocellular, Hydropolymer and polyurethane foam dressings	Hydrocolloid dressing	Incidence of healing, Short-term follow-Up (8 weeks or Less)	RR 0.85 (0.54 to 1.34)	Very low
					Time to complete Healing	Outcome not measured or reported for this comparison	
					Adverse events, short-term follow-up (8 weeks or less)	RR 0.88 (0.37 to 2.11)	Very low
					Quality of life	Outcome not measured or reported for this comparison	
	People of any age with an existing pressure ulcer of Category/Stage II or above	Any care setting	Polyurethane foam dressing	Hydrogel dressing	Incidence of healing, Short-term follow-up (8 weeks or less)	RR 1.00 (0.78 to 1.28)	Very low
					Time to complete Healing	n/a	Very low

Name review	Population	Setting	Intervention	Comparator	Outcome	Relative effect (95% CI)	Grade
					Adverse events, short-term follow-Up (8 weeks or less)	RR 0.33 (0.01 to 7.65)	Very low
					Quality of life	n/a	Outcome not measured or reported for this comparison
	People of any age with an existing pressure ulcer Category/Stage II or above	Any care setting	Polyurethane, silver and ibuprofen-releasing foam dressings	Basic contact dressings (gauze, saline-soaked gauze, low adherence dressing secured by a = vapour-permeable film)	Incidence of healing, short-term follow-up (8 weeks of less)	RR 1.33 (0.62 to 2.88)	Very low
					Incidence of healing, medium-term follow-up (8 to 24 weeks)	RR 1.17 (0.79 to 1.72)	Very low
					Time to complete healing (days) medium-term follow-up (8 to 24 weeks)	The mean time to complete healing with foam dressing was 35.80 days less (56.77 to 14.83 less)	Very low
					Adverse events, medium- term follow-up (8 to 24 weeks)	RR 0.58 (0.33 to 1.05)	Low
					Quality of life	Outcome not measured or reported for this comparison	
					Incremental cost per event, short-term follow-up (8 Weeks or less)	n/a	Very low
(Westby et al. 2017)	People with pressure ulcers	Hospital, community or care home, or combinations	Alginate dressing	Saline gauze	Proportion with complete healing	RR 1.09 (0.11 to 10.57)	Very low
			Sequential hydrocolloid alginate Dressings			RR 0.50 (0.12 to 1.98)	Very low
			Basic wound contact dressing			RR 1.30 (0.65 to 2.58)	Low
			Collagenase ointment			RR 2.12 (1.06 to 4.22)	Low
			Dextranomer			RR 4.76 (0.86 to 26.39)	Very low
			Foam dressings			RR 1.52 (1.03 to 2.26)	Low

Name review	Population	Setting	Intervention	Comparator	Outcome	Relative effect (95% CI)	Grade
			Hydrocolloid dressing With/without Alginate			RR 1.22 (0.06 to 24.74)	Very low
			Hydrocolloid dressings			RR 1.43 (1.00 to 2.05)	Very low
			Hydrogel			RR 1.55 (1.02 to 2.36)	Very low
			Iodine-containing dressings			RR 1.08 (0.58 to 2.03)	Very low
			Phenytoin			RR 1.27 (0.58 to 2.80)	Very low
			Protease-modulating dressings			RR 1.65 (0.92 to 2.94)	Moderate
			Polyvinylpyrrolidone + zinc oxide			RR 1.31 (0.37 to 4.62)	Low
			Combination silicon dressings			RR 1.93 (0.38 to 9.98)	Very low
			Soft polymer dressings			RR 1.35 (0.55 to 3.27)	Very low
			Sugar + egg white			RR 0.70 (0.03 to 15.62)	Very low
			Tripeptide copper gel			RR 3.90 (1.04 to 14.63)	Very low
			Vapour-permeable Dressings			RR 1.45 (0.74 to 2.81)	Very low

Table 2: Critical appraisal of the 15 graded systematic reviews (A Measurement Tool to Assess systematic Reviews: AMSRT2) (Walker et al. 2020)

Review	1. Question and inclusion	2. Protocol	3. Study design justification	4. Comprehensive search	5. Study selection	6. Data extraction	7. Excluded studies justification	8. Included studies details	9. Risk of bias (RoB)	10. Funding sources	11. Statistical methods	12. RoB on meta-analysis	13. RoB in individual studies	14. Explanation for heterogeneity	15. Publication bias	16. Conflict of interest	Overall methodological confidence rating
(Arora et al. 2020)	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	High
(Chen et al. 2014)	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	High
(Dumville et al. 2015c)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NMC	NMC	Y	Y	NMC	Y	High
(Dumville et al. 2015b)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NMC	NMC	Y	Y	NMC	Y	High
(Dumville et al. 2015a)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NMC	NMC	Y	Y	NMC	Y	High
(Gillespie et al. 2014)	Y	Y	N	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Moderate
(Joyce et al. 2018)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	NMC	NMC	Y	Y	NMC	Y	High
(Jull et al. 2015)	Y	Y	Y	PY	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Moderate
(McInnes et al. 2018)	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	NMC	NMC	Y	Y	NMC	Y	High
(Moore and Webster 2018)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	High
(Moore and Patton 2019)	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	NMC	NMC	Y	Y	NMC	Y	High
(Norman et al. 2016)	Y	Y	N	PY	Y	Y	Y	Y	Y	Y	NMC	NMC	Y	Y	NMC	N	Moderate
(Porter-Armstrong et al. 2018)	Y	Y	N	PY	Y	Y	Y	Y	Y	N	NMC	NMC	Y	Y	NMC	N	Moderate
(Walker et al. 2017)	Y	Y	N	PY	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Moderate
(Westby et al. 2017)	Y	Y	N	PY	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Moderate

*Note: Y = yes, PY = partial yes, N = no, NSI = no studies identified, NMC = no meta-analysis conduct

Discussion

All 15 studies appraised in this commentary were Cochrane systematic reviews. An assessment of quality was undertaken using the AMSTAR 2 critical appraisal tool for systematic reviews (Shea et al., 2017). Overall, it was deemed that the 15 Cochrane systematic reviews provided a comprehensive overview of evidence within the available studies. It is important to note that the data extraction of the 15 Cochrane reviews was carried out by a single reviewer. Similarly in the original umbrella review the assessment bias was carried out by a single reviewer with verification of 20% of the review included.

Implications for practice

When seeking to prevent pressure ulcers, there is evidence (low quality) supporting Video education as an effective method of increasing knowledge of pressure ulcer management among staff caring for high-risk patients (Porter-Armstrong et al. 2018). For preventative treatments, topical application of Fatty acid may reduce the risk of pressure ulcers acutely (30 days follow-up) (Moore and Patton 2019). However, the long-term preventative benefits for topical application of Fatty acid are less clear (16 week follow-up).

When treating existing pressure ulcers, current evidence (low quality) suggests that Pine resin salve is more effective than Hydrocolloid dressings for achieving complete wound healing in those with category 2 pressure ulcers or higher; however, this treatment did not reduce the risk of infection in the studies examined (low quality) (Norman et al. 2016). Foam (low quality), Hydrocolloid (very low quality), and Hydrogel (very low quality) have all been found to be more effective than Saline gauze dressings for achieving complete healing (Westby et al. 2017), and time to complete healing is reduced when using Polyurethane (very low quality), Silver (very low quality) and Ibuprofen-releasing foam (very low quality) dressings instead of basic contact dressings, with no additional risk of adverse events (Walker et al. 2017). While Electrical stimulation has evidence for being effective in healing pressure ulcers (moderate quality), it has not been shown to reduce time to complete healing and there are adverse

events associated with this treatment, including: skin redness, itching, dizziness, delusions, worsening of the pressure ulcer, limb amputation, and death.

Multidisciplinary teams and enhanced multidisciplinary teams may have a small positive effect on healing pressure ulcers in long-term-care facility residents compared to usual care (very low quality) (Joyce et al. 2018); however, existing evidence does not demonstrate any differences between these teams and usual care for reducing the surface area of pressure ulcers, time for pressure ulcers to completely heal, and number of emergency hospital visits or hospital readmissions. There was evidence (very low evidence) to suggest that higher-specification foam mattresses may provide acute increase healing times. However, for other bed surfaces/types the benefits were inconsistent.

Future research

The 15 reviews highlighted that several treatments for pressure ulcer improve clinical outcomes compared to usual care or no intervention. However, the certainty in evidence of these findings was mainly 'low' to 'very low'. This was partly because of a high risk of bias among the included studies of each review (e.g., concerns with publication bias, blinding and incomplete outcome data) and concerns of imprecision. Consequently, further research is needed in the form of high quality random controlled trials to strengthen current evidence. Specifically, studies should adopt high quality methodological approaches such as randomisation, concealed allocation, follow up (short and long term) and double blinding to minimise bias. Studies also need to report key outcomes such as adverse events, quality of life and patient tolerability to determine the wider effect of the range of treatments for patients with pressure ulcers.

Further research would benefit from a greater emphasis on prevention of pressure ulcers given that most studies have focused on management and treatment. Preventative interventions need to consider proposing specific clinical locations, length, and frequency of treatment as this is key to their application to practise, and future research. Studies could also explore the possible mechanism of preventative treatment which may begin to explain why prevention of pressure ulcers has not been effective in the

long-term (30 days) but has shown to be effective for reducing incidents in the longer short-term (16 days).

With the recent developments in pressure ulcer interventions, it is important for future studies to assess the cost-effectiveness across the range of treatments. Future research could predict overall economic costs associated with each intervention, providing services with a cost to health benefit for each competing treatment.

Conclusion

This overview of reviews found that there was limited, inconsistent and methodologically weak evidence for a large number of current preventative and curative treatments for pressure ulcers. People at high risk of developing pressure ulcers may benefit from receiving video education and topical application of fatty acid. For the treatment of pressure ulcers, the use of Pine resin salve, hydrocolloid, hydrogel, polyurethane, silver and ibuprofen-releasing foam dressing may provide benefits in healing. However, for both these preventative and curative treatments the evidence is of low to very low quality. Subsequently there is a need for further research to verify these findings and assess the cost effectiveness of these interventions.

CPD reflective questions

1. What is the main methodological weakness of the reviews which are included in this commentary?
2. What is the evidence base for any interventions you use for pressure ulcer prevention?
3. What is the evidence base for any interventions you use for the treatment of pressure ulcers?

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Reference

Agrawal K, Chauhan N. 2012. Pressure ulcers: Back to the basics. Indian J Plast Surg. 45(2):244-254.

Arora M, Harvey LA, Glinsky JV, Nier L, Lavrencic L, Kifley A, Cameron ID. 2020. Electrical stimulation for treating pressure ulcers. Cochrane Database of Systematic Reviews. (1).

Bhattacharya S, Mishra RK. 2015. Pressure ulcers: Current understanding and newer modalities of treatment. Indian J Plast Surg. 48(1):4-16.

Brozek JL, Akl EA, Alonso-Coello P, Lang D, Jaeschke R, Williams JW, Phillips B, Lelgemann M, Lethaby A, Bousquet J et al. 2009. Grading quality of evidence and strength of recommendations in clinical practice guidelines. Part 1 of 3. An overview of the grade approach and grading quality of evidence about interventions. Allergy. 64(5):669-677.

Chen C, Hou WH, Chan ESY, Yeh ML, Lo HLD. 2014. Phototherapy for treating pressure ulcers. Cochrane Database of Systematic Reviews. (7).

Demarré L, Van Lancker A, Van Hecke A, Verhaeghe S, Grypdonck M, Lemey J, Annemans L, Beeckman D. 2015. The cost of prevention and treatment of pressure ulcers: A systematic review. Int J Nurs Stud. 52(11):1754-1774.

Dumville JC, Keogh SJ, Liu Z, Stubbs N, Walker RM, Fortnam M. 2015a. Alginate dressings for treating pressure ulcers. Cochrane Database of Systematic Reviews. (5).

Dumville JC, Owens GL, Crosbie EJ, Peinemann F, Liu Z. 2015b. Negative pressure wound therapy for treating surgical wounds healing by secondary intention. Cochrane Database of Systematic Reviews. (6).

Dumville JC, Stubbs N, Keogh SJ, Walker RM, Liu Z. 2015c. Hydrogel dressings for treating pressure ulcers. Cochrane Database of Systematic Reviews. (2).

Gillespie BM, Chaboyer WP, McInnes E, Kent B, Whitty JA, Thalib L. 2014. Repositioning for pressure ulcer prevention in adults. Cochrane Database Syst Rev. 2014(4):Cd009958.

Gorecki C, Brown JM, Nelson EA, Briggs M, Schoonhoven L, Dealey C, Defloor T, Nixon J. 2009. Impact of pressure ulcers on quality of life in older patients: A systematic review. J Am Geriatr Soc. 57(7):1175-1183.

Jaul E, Barron J, Rosenzweig JP, Menczel J. 2018. An overview of co-morbidities and the development of pressure ulcers among older adults. BMC Geriatrics. 18(1):305.

Joyce P, Moore ZEH, Christie J. 2018. Organisation of health services for preventing and treating pressure ulcers. Cochrane Database of Systematic Reviews. (12).

Jull AB, Cullum N, Dumville JC, Westby MJ, Deshpande S, Walker N. 2015. Honey as a topical treatment for wounds. Cochrane Database Syst Rev. (3):Cd005083.

McInnes E, Jammali-Blasi A, Bell-Syer SE, Leung V. 2018. Support surfaces for treating pressure ulcers. Cochrane Database Syst Rev. 10(10):Cd009490.

McInnes E, Jammali-Blasi A, Bell-Syer SEM, Dumville JC, Middleton V, Cullum N. 2015. Support surfaces for pressure ulcer prevention. Cochrane Database of Systematic Reviews. (9).

Mervis JS, Phillips TJ. 2019. Pressure ulcers: Pathophysiology, epidemiology, risk factors, and presentation. J Am Acad Dermatol. 81(4):881-890.

Moore ZE, Webster J. 2018. Dressings and topical agents for preventing pressure ulcers. Cochrane Database Syst Rev. 12(12):Cd009362.

Moore ZEH, Patton D. 2019. Risk assessment tools for the prevention of pressure ulcers. Cochrane Database of Systematic Reviews. (1).

National Clinical Guideline C. 2014. National institute for health and care excellence: Guidelines. The prevention and management of pressure ulcers in primary and secondary care. London: National Institute for Health and Care Excellence (NICE).

Norman G, Dumville JC, Moore ZEH, Tanner J, Christie J, Goto S. 2016. Antibiotics and antiseptics for pressure ulcers. The Cochrane database of systematic reviews. 4(4):CD011586-CD011586.

Porter-Armstrong AP, Moore ZEH, Bradbury I, McDonough S. 2018. Education of healthcare professionals for preventing pressure ulcers. Cochrane Database of Systematic Reviews. (5).

Song Y-P, Shen H-W, Cai J-Y, Zha M-L, Chen H-L. 2019. The relationship between pressure injury complication and mortality risk of older patients in follow-up: A systematic review and meta-analysis. International Wound Journal. 16(6):1533-1544.

Stevenson R, Collinson M, Henderson V, Wilson L, Dealey C, McGinnis E, Briggs M, Nelson EA, Stubbs N, Coleman S et al. 2013. The prevalence of pressure ulcers in community settings: An observational study. Int J Nurs Stud. 50(11):1550-1557.

Taylor C, Mulligan K, McGraw C. 2021. Barriers and enablers to the implementation of evidence-based practice in pressure ulcer prevention and management in an integrated community care setting: A qualitative study informed by the theoretical domains framework. Health Soc Care Community. 29(3):766-779.

Theisen S, Drabik A, Stock S. 2012. Pressure ulcers in older hospitalised patients and its impact on length of stay: A retrospective observational study. Journal of Clinical Nursing. 21(3-4):380-387.

Walker RM, Gillespie BM, McInnes E, Moore Z, Eskes AM, Patton D, Harbeck EL, White C, Scott IA, Chaboyer W. 2020. Prevention and treatment of pressure injuries: A meta-synthesis of cochrane reviews. J Tissue Viability. 29(4):227-243.

Walker RM, Gillespie BM, Thalib L, Higgins NS, Whitty JA. 2017. Foam dressings for treating pressure ulcers. Cochrane Database of Systematic Reviews. (10).

Westby MJ, Dumville JC, Soares MO, Stubbs N, Norman G. 2017. Dressings and topical agents for treating pressure ulcers. Cochrane Database of Systematic Reviews. (6).