Recommendation 5.1 Evidence Profile

Recommendation question 5: Should the use of health technologies be recommended or not for the treatment of pressure injuries?

Recommendation 5.1: The expert panel suggests that nurses and health providers, in collaboration with the person and their essential caregivers, consider using electrical stimulation for treatment of pressure injuries if the person meets indications and there are no contraindications.

Population: Persons with pressure injuries
Intervention: Electrical stimulation
Comparison: No technology or standard care
Outcomes: Healing of existing pressure injury [critical], Worsening pressure injury [critical], Health provider compliance with use of health technology [critical] (not measured), Person/caregiver satisfaction [critical] (not measured), Pain [critical] (not measured)

Setting: All health-care settings, including but not limited to: community care, outpatient care, and acute care.

Bibliography: 4, 156

Quality assessment							No. of participants		Effect	Certainty	Reference
№ of studies	**Study design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Publication bias**	**Intervention**	**Control**			
Healing of existing pressure injuries (measured as proportion of ulcers completely healed) (follow-up time: 3 to 12 weeks)											
11[a]	RCTs	Serious[b]	Not serious	Not serious	Serious[c]	Not detected	Healed PIs/total number of PIs: n=105/284	Healed PIs/total number of PIs: n=34/228	RR 1.99 (1.39 to 2.85) For every 100 pressure injuries that received electrical stimulation, 15 more ulcers would be completely healed (ranges from 6 more to 28 more).	⊕⊕◯◯ Low	4: Arora et al., 2020
Worsening pressure injury (measured as increased size) (follow-up 2.85 to 12 weeks)											
6[d]	RCTs	Not serious[e]	Not serious	Not serious	Very serious[f]	Not detected[g]	Worsened PIs/ total number of PIs: n=1/30	Worsened PIs/ total number of PIs: n=14/109	RR 0.07 (0.01 – 0.50) For every 100 pressure injuries that received electrical stimulation for treatment of PIs (i.e., High Voltage Monophasic Pulsed Current), 12 less PIs will have worsened (increased size) (ranges from 13 less to 7 less).	⊕⊕◯◯ Low	156: Girgis and Duarte, 2018
Health provider compliance with technology (not measured)											

Quality assessment							No. of participants		Effect	Certainty	Reference
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Publication bias	Intervention	Control			
N/A											
Person/caregiver satisfaction (not measured)											
N/A											
Pain (not measured)											
N/A											

Additional table- Individual study details:

Reference	Study Design	Country	Intervention Group Details	Control Group Details	Reported Effects/Outcomes	Risk of bias
Outcome: Healing of existing pressure injury						
Adunksy 2005; Asbjornsen 1990; Baker 1996; Feeder 1991; Franek 2011; Grifin 1991; Houghton 2010; Polak 2016a; Polak 2016b; Polak 2017; Polak 2018; Wood 1993 (Taken from review Arora et al., 2020)	11 RCTs	Israel, Norway, Poland (5 studies), Canada, USA (4 studies)	The mean age of the participants in the included studies ranged from 26 years to 83 years. Overall, 50% of participants were male. The chronicity of the PIs was variable, ranging from a mean of 4 days in Adunksy 2005 to more than 12 months in Feeder 1991. In 16 studies, PIs were on the sacral and coccygeal region (30%), ischium (24%), lower extremities including heels (23%), greater trochanter of the femur (7%), and other parts of the body (4%). Electrical stimulation (ES) was administered from two to 20 hours per week (median 5, interquartile range 4 to 8) and for between three and 12 weeks (median 6, interquartile range 4 to 8). Majority of studies administered pulsating current. PIs: N=284 105 PI completely healed/ 284 total PIs Type of electrical stimulation: Adunsky: active decubitus direct current treatment and conservative treatment	The control group included sham, placebo or no ES (plus standard care). Standard care included any of the following: wound dressings, pressure relief, regular turning, nutritional advice, and nutritional supplements. The studies administered standard care in the same manner to both groups. PIs: N= 228 34 PI completely healed/228 total PIs	The data in all these studies were expressed as the number of PIs healed. Eleven studies with a total of 501 participants (512 PIs) provided sufficient data for meta-analysis, and were pooled using a fixed-effect model. ES probably increases the proportion of pressure ulcers healed when compared with no ES (risk ratio (RR) 1.99, 95% confidence interval (CI) 1.39 to 2.85; I 2 = 0%	Systematic review: LOW Individual studies: SERIOUS

			Ashiomsen: TENS and conventional treatment Baker: asymmetric biphasic stimulation, symmetric biphasic stimulation and microcurrent stimulation plus standard therapy (3 experimental groups) Feeder: monophasic pulsed ES plus cointervention Franek: - High Voltage Monophasic Stimulation (HVMS) and pharmacologic agents Griffin: HVPC and nursing care Houghton: HVPC plus standard wound care programme Polak, 2016a: HVMPC group and standard wound care Polak, 2016b: ES group Polak, 2017: cathodal ES and cathodal and anodal ES Polak, 2018: cathodal and anodal ES Wood, 1993: PLIDC (treated ulcer) and standard treatment			
Outcome: Worsening pressure injury						
Kloth and Feeder, 1988 Griffin et al, 1991 Houghton et a;, 2010 Polak et al, 2016 Polak and Kloth, 2016 Polak and Kloth, 2017 (Taken from review Girgis and Duarte, 2018)	6 RCTs	USA, Canada, Poland (4 studies)	PIs: N= 30 1 PI increased surface area/ 30 total PIs HVMPC stimulation protocol parameters were as follows: The voltage ranged between 50-200V and most commonly ranged between 100-175V (a voltage just below that elicits visible muscle contraction). The monopolar technique was frequently used, as the active electrode was placed over the PI in all of the studies but the polarity differed across studies. The dispersive electrode was often placed 15 to 20 cm from the active electrode. The mean age of patients in the treatment arm was 55.96±18.74 years and in the control arm was 59.8±16.36 years. Pressure ulcers ranged from Stage 2- Stage 4.	PIs: N=109 14 PI increased surface area/ 109 total PIs Standard wound care (SWC) varied across studies. Pressure redistribution surfaces were used in four studies. Enzymatic debridement was used in four studies while mechanical debridement was done in one study.	In all identified studies, 1 PI in the treatment arm increased in surface area, in comparison with 14 PIs in the control arm RR 0.07 (0.01 – 0.50) For every 100 pressure injuries that receive High Voltage Monophasic Pulsed Current, 12 less PIs will have worsened (increased size) (ranges from 13 less to 7 less).	Systematic review: LOW Individual studies: SERIOUS

Acronyms

CI: Confidence interval
ES: electrical stimulation
HVMS: High Voltage Monophasic Stimulation

HVPC: high voltage pulsed current
HVMPC: high voltage monophasic pulsed current
PI: Pressure Injuries
PLIDC: pulsed low-intensity direct current
RCT: randomized control trial
RR: risk ratio
ROB: risk of bias
TENS: transcutaneous electrical nerve stimulation
vs: versus
WMD: weighted mean difference

References

Arora M, Harvey LA, Glinsky JV, Nier L, Lavrencic L, Kifley A, et al. Electrical stimulation for treating pressure ulcers. Cochrane Wounds Group, editor. Cochrane Database of Systematic Reviews [Internet]. 2020 Jan 22 [cited 2023 Nov 26]; Available from: https://doi.wiley.com/10.1002/14651858.CD012196.pub2

Girgis B, Duarte JA. High Voltage Monophasic Pulsed Current (HVMPC) for stage II-IV pressure ulcer healing. A systematic review and meta-analysis. Journal of tissue viability. 2018;27(4):274–84.

Explanations:

[a] Eleven RCTs were included from a systematic review (Arora et al., 2020).
[b] The systematic review was appraised as low risk of bias using the ROBIS tool. The review authors appraised individual studies using the ROB 2.0 tool. All studies but one had high risk of bias in at least one domain (performance bias or selective reporting). We downgraded by 1.
[c] Low number of events less than the optimal 300 (n=139). We downgraded by 1.
[d] Six RCTs were included from a systematic review (Girgis and Duarte, 2018).
[e] The systematic review was appraised as low risk of bias using the ROBIS tool. The review authors appraised individual studies using the PEDro (Physiotherapy Evidence Database) scale tool. All studies had high risk of bias in at least one domain. Reasons for risk of bias were primarily lack of blinding of participants and/or outcome assessors. We did not downgrade as blinding is unlikely to affect this outcome (wound worsening/change in size).
[f] Very low number of events less than the optimal 300 (n=15). We downgraded by 2.
[g] Note that 3 of the studies (Griffin, Houthon and Kloth) are industry sponsored.