

Recommendation 1.0 Evidence Profile

Recommendation question 1: Should the use of health technologies be recommended or not for early detection and assessment of pressure injuries?

Recommendation 1.0: The expert panel suggests that nurses and health providers use thermography as an adjunct to skin assessment for early detection of pressure injuries.

Population: Persons with or at risk of pressure injuries

Intervention: Health technologies used for early detection and assessment of pressure injuries

Comparison: Standard care or visual skin assessment alone

Outcomes: Incidence rate of pressure injury [critical], accuracy of predicting pressure injury development [critical], Pressure injury precursor signs and symptoms [critical] (not measured), Health provider compliance with use of health technology [critical] (not measured), Person/caregiver satisfaction [critical] (not measured)

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

Bibliography: 3

Quality assessment							No. of participants		Effect	Certainty	Reference
No of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Publication bias	Intervention	Control			
Accuracy of predicting pressure injury development											
3 ^a	Non-randomized studies	Very Serious ^b	Not serious ^c	Not serious	Very serious ^d	Not detected	N= 598 (participants)	N=58* (participants) *most studies did not report a control group	In three studies where thermography was compared to visual inspection (Braden scale and Norton scale), thermography was more accurate in predicting PI development ^e (stage 1 or DTI).	⊕○○○ Very low	3: Baron et al., 2023
Incidence rate of pressure injury											
1 ^f	Non-randomized study	Very serious ^g	Not serious	Not serious	Very serious ^h	Not detected	Number of HAPI: 0 (average monthly rate: 0) N=114 people admitted to ICU	Average monthly HAPI rate pre-intervention: 2.58 *total N not reported in historic period	Monthly HAPI rate was 0 during the study period compared to a pre-study average of 2.58 per month.	⊕○○○ Very low	3: Baron et al., 2023

Quality assessment							No. of participants		Effect	Certainty	Reference
No of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Publication bias	Intervention	Control			
Pressure injury precursor signs and symptoms (not measured)											
N/A											
Health provider compliance with technology (not measured)											
N/A											
Person/caregiver satisfaction (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: accuracy of predicting pressure injury development						
Judy et al, 2011 Newman and Davis, 1981 Cai, 2021 (Taken from review Baron et al., 2023)	SR of prospective cohort studies	USA, China, Scotland	Total n= 598 Studies compared thermography (infrared thermography in Judy and Cai) against visual inspection in predicting PI development. In the study by Cai et al, patients were followed up daily until the appearance of a PI of any stage, discharge, death, transfer to another hospital, or the use of a dressing that would impair the uptake of images. In the study by Judy et al, follow-up occurred on each subsequent day until hospital discharge, whereas in the study by Newman and Davis, follow-up occurred within 10 days of admission.	N=58 (most studies did not clearly report a control group) Visual inspection through use of the Braden scale (Judy, 2011 and Cai, 2021) and Norton scale (Newman and Davis, 1981).	<u>Judy, 2011</u> : The study device identified more patients at risk than the Braden Scale. The IRT predicted risk for all five participants with PI as well as the location where the PI developed. The Braden Scale correctly identified only three of five. <u>Cai, 2021</u> : According to the Youden index for IRT (0.753), the relative temperature was superior to the Braden Scale in predicting PI occurrence, with high sensitivity (85.37%) and specificity (89.89%) <u>Newman and Davis, 1981</u> : Of the 28 patients who had thermal anomalies, 6 developed PIs within 10 days. In contrast, 2 of the 19 patients considered at risk or at high risk by the Norton Scale developed PIs. Thermography provided a more accurate and reliable indication of the risk of early development of PI within 10 days compared to the Norton Scale.	Systematic review: LOW Individual studies: VERY SERIOUS
Outcome: incidence rate of pressure injury						

<p>Koerner et al., 2019 (Taken from review Baron et al., 2023)</p>	<p>Cross-sectional</p>	<p>USA</p>	<p>The study by Koerner et al. used thermal imaging as an adjunct to visual skin assessment in newly admitted ICU patients to minimize PI development and mitigate potential financial consequences.</p> <p>Koerner et al. performed head-to-toe clinical assessments to identify any thermal anomaly on admission and carried out daily visual inspection to observe progression to an identifiable DTI.</p>	<p>Cross-sectional data was compared with a historical cohort. Historical incidence (2.58 HAPIs per month).</p>	<p>Historical rate of HAPI 2.58 per month compared to 0 during the study period.</p> <p>A total of 12 thermal anomalies in 9 of 114 patients during the time from admission through a 2-month follow-up period. A proven prevention protocol was immediately implemented for each patient. Of the 12 anomalies, two eventually manifested with visually identifiable DTIs. This rate represented a 60% reduction in DTIs when compared with historical incidence at the institution.</p>	<p>VERY SERIOUS</p>
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Acronyms:

- CI: confidence interval
- DTI: deep tissue injury
- HAPI: Hospital Acquired Pressure Injury
- ICU: intensive care unit
- IRT: infrared thermography
- NA: not applicable
- NR: Not reported
- PI: pressure injury
- RR: relative risk
- SEM: subepidermal moisture

Reference

Baron MV, Martins PRH, Brandenburg C, Koepp J, Reinheimer IC, Dos Santos AC, et al. Accuracy of Thermographic Imaging in the Early Detection of Pressure Injury: A Systematic Review. *Advances in skin & wound care.* 2023;36(3):158–67.

Explanations

- ^a Three non-randomized studies were included from a systematic review (Baron et al., 2023).
- ^b The review was assessed using the ROBIS tool for systematic reviews, and had low risk of bias. Review authors report low methodological quality. All studies are non-randomized and scored between 13-18 on the Downs and Black checklist. We downgraded by 2.
- ^c Minor concerns over inconsistency due to heterogeneity in the comparisons used (Braden scale, Norton scale, visual assessment). We downgraded by 0.5
- ^d The number of events was less than the optimal 300 (n=13). We downgraded by 2.
- ^e Due to the heterogeneity of the studies and accuracy measures we were unable to report a pooled effect estimate, for further details see individual study details table.
- ^f One non-randomized study was included from a systematic review (Baron et al., 2023).
- ^g Authors report low methodological quality. The study was non-randomized and scored 13/27 on the Downs and Black checklist. We downgraded by 2.
- ^h The number of events was less than the optimal 300 (n=0). We downgraded by 2.