Queensland Health

Assistive Technology for Preventing and Healing Pressure Injuries on Heels

Medical Aids Subsidy Scheme

October 22, 2026

DELIVERING FOR QUEENSLAND

Queensland Government

Learning Objectives

- Understand pressure injury risks specific to heels
- Understand the role of the multidisciplinary team in pressure injury prevention and healing
- Learn of options for reducing pressure injury risk and their clinical considerations

Heel pressure injuries "account for nearly ¼ of all pressure [injuries] in.. hospitals or nursing homes"[1]

Note: may be lower in Australian hospital intensive care units (15.9%)[2]

1. Gefen, A. (2017). Why is the heel particularly vulnerable to pressure ulcers? *British Journal of Nursing, 26*(20), s62-74.
2. Yarad, E., O'Connor, A., Meyer, J., et al. (2021). Prevalence of pressure injuries and the management of support surfaces (mattresses) in adult intensive care patients: a multicentre point prevalence study in Australia & New Zealand. *Australian Critical Care, 34*, 60-66.

“51% of all grade 3 and 4 [pressure injuries] were on the patient’s heel”[1]

1. Atkin, L., Chaplin, E., Dingley, J., et al. (2026). Pressure ulceration of the heel: prevalence, complexities and management. *British Journal of Nursing, 35*(3), S10-15.



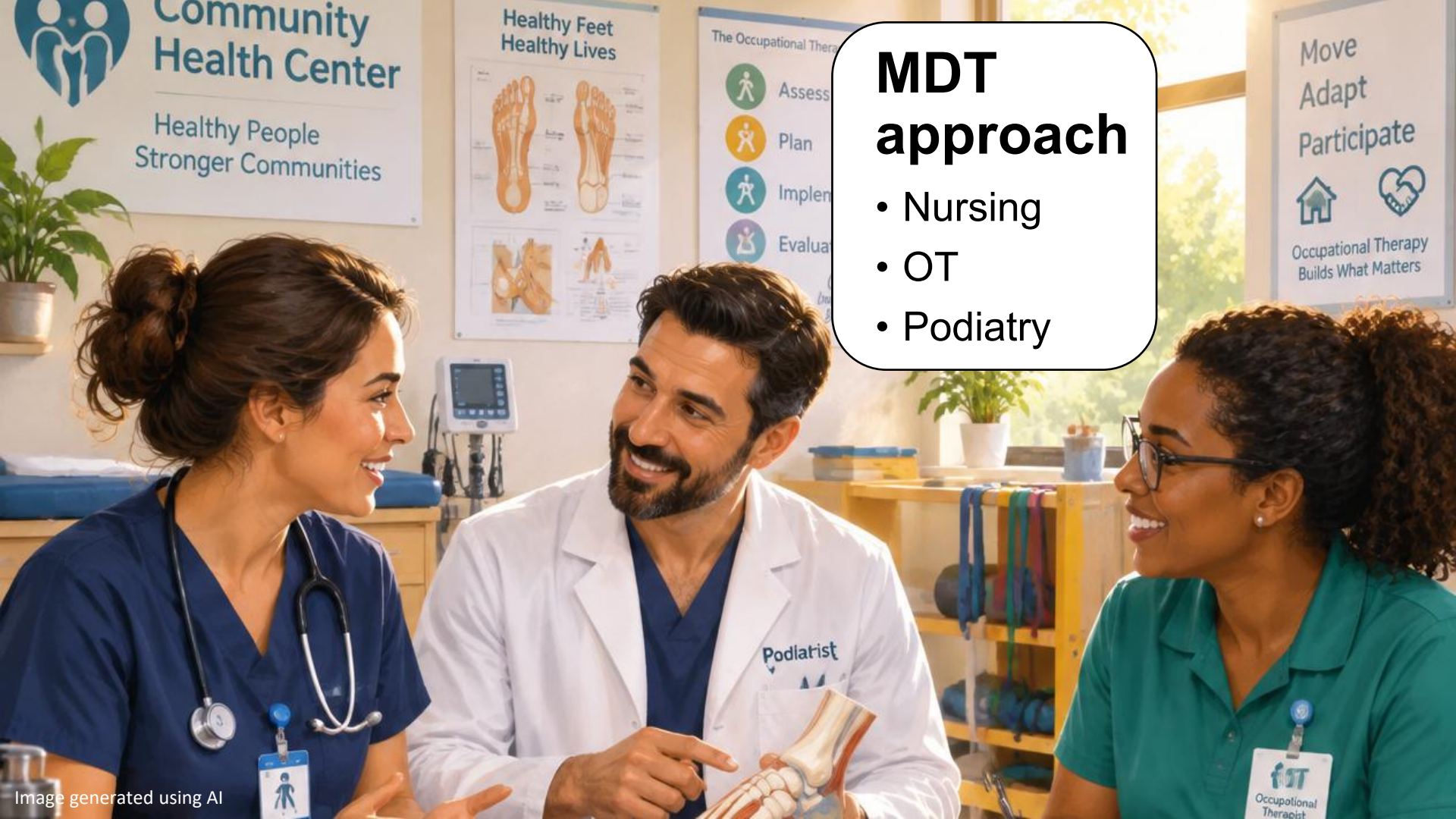
Grade 2 pressure injury

Image from: Atkin, L., Chaplin, E., Dingley, J., et al. (2026). Pressure ulceration of the heel: prevalence, complexities and management. British Journal of Nursing, 35(3), S10-15.



Suspected deep tissue injury

Image from: Black, J. (2023). Ten top tips: pressure ulcers on the heels. Wounds International, 14(2), 8-11.



MDT approach

- Nursing
- OT
- Podiatry

Image generated using AI

Risk Factors for Pressure Injuries to the Heels

Intrinsic factors

- Age
- Reduced Mobility
- Sensory Impairment
- Peripheral arterial disease
- Nutritional status
- Comorbidities
- Cognitive impairment
- History of pressure injuries

Extrinsic Factors

- Pressure
- Shear
- Friction
- Moisture
- Microclimate
- Medical devices
- Medication
- Inadequate offloading

1. Atkin, L. et.al. (2026). Pressure ulceration of the heel: prevalence, complexities and management. British Journal of Nursing (35), 3, S10 – S15. https://doi.org/10.12968/bjon.2025.0369
2. Twilley, H., & Jones, S. (2016). Heel ulcers – pressure ulcers or symptoms of peripheral arterial disease? An exploratory matched case control study. Journal of Tissue Viability, 25, 150-156.

Heel Anatomy

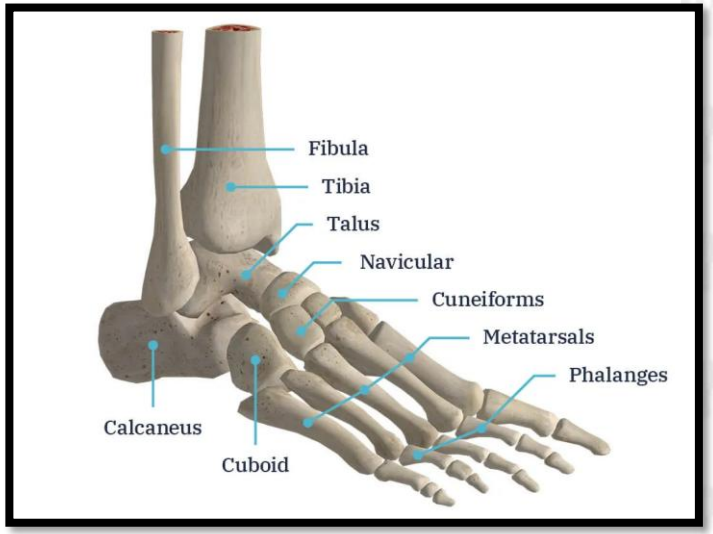
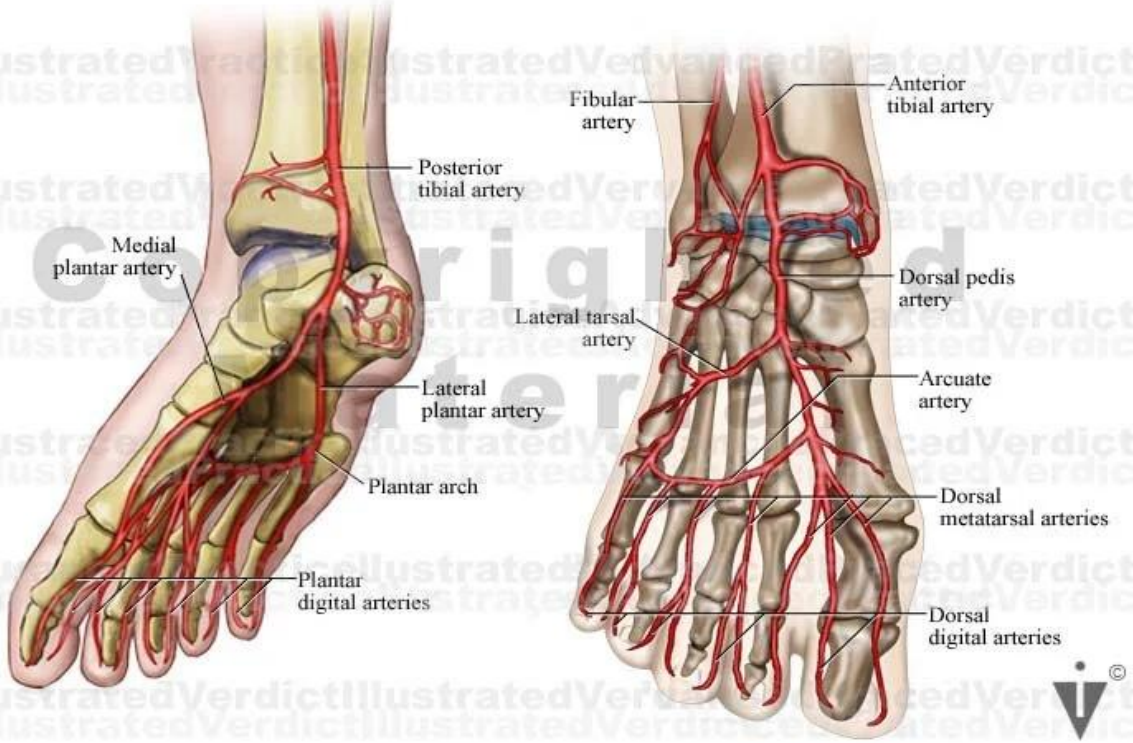
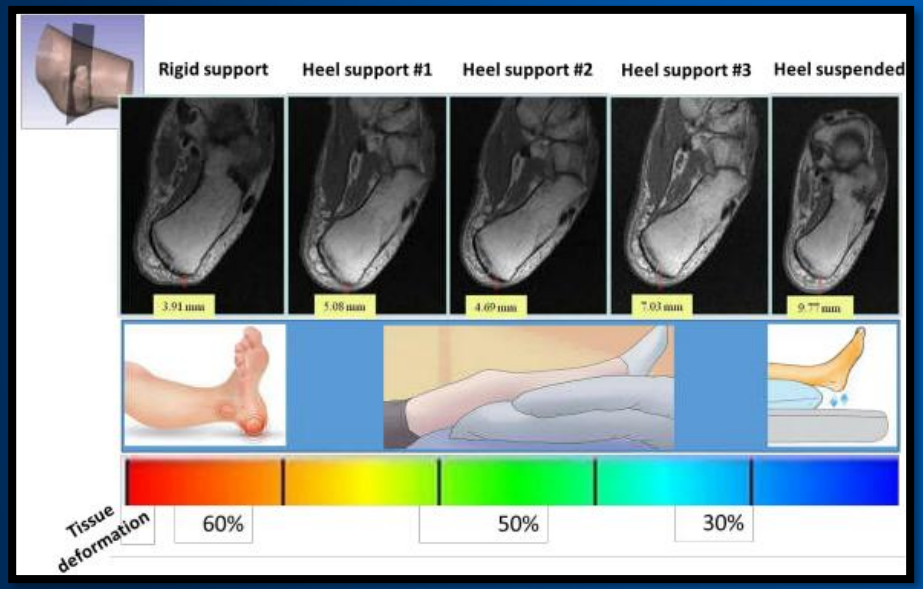
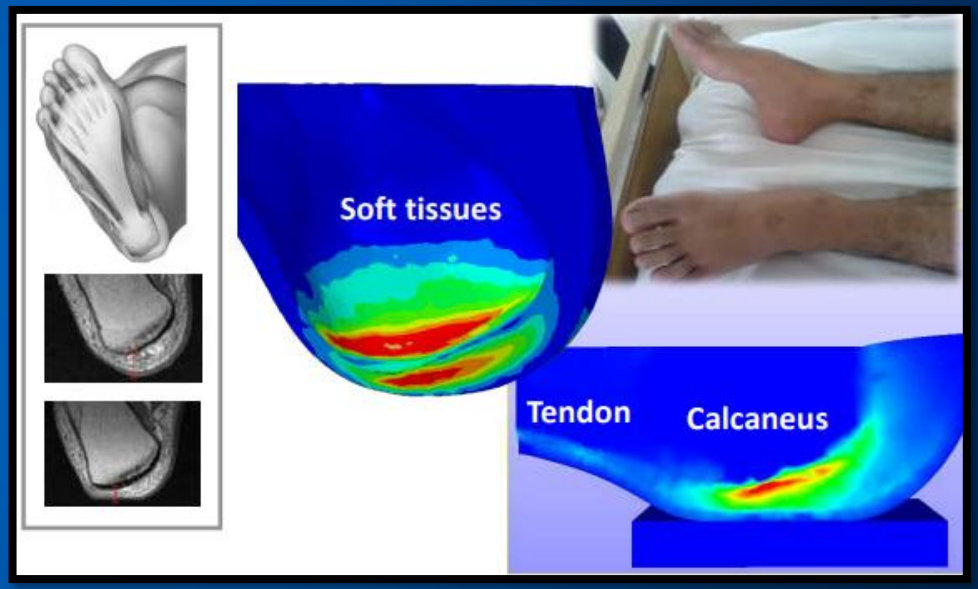


Image from: ar.inspired pencil.com



Why are the Heels More Vulnerable to Pressure Injuries?





Images from: Gefen, A. (2017). Why is the heel particularly vulnerable to pressure ulcers? *British Journal of Nursing(26),* 20, S62 – S74 Adapted from Tenenbaum et al., 2013.

Podiatry perspectives on wound management and footwear with heel-based pressure injuries

- Wound dressing considerations
  - High Shear area
  - Increased interstitial fluid
  - Bony prominence/Shape
- Footwear considerations (off-loading)
  - Open heel
  - Falls risk
  - Wound is Achilles insertion site



Image generated with Canva AI

Reduce pressure

Method of pressure relief:

- Immersion & envelopment
- Off-loading

Assistive technology options:

- Heel protectors (RR ≤ 0.2)[1,2]
- Wedges, bolster, blocks and pillows (RR=0.16)[1,3]
- Mattresses (RR ≤ 0.5)[4]

Heel protectors



Spenco heel protector
Image from: Safety and Mobility

Mattresses



Image from: Silver Cross

Wedges



Image from: Independent Living Specialists

1. National Pressure Injury Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance. Preventing Heel Pressure Injuries. In: Prevention and Treatment of Pressure Ulcers/Injuries: Clinical Practice Guideline. The International Guideline: Fourth Edition. Emily Haesler (Ed.). 2025.
2. Greenwood, C., Nelson, E.A., Nixon, J., et al. (2022). Comparative effectiveness of heel-specific medical devices for the prevention of heel pressure ulcers: a systematic review. *Journal of Tissue Viability, 31*, 579-592.
3. Haesler E. (2017). Evidence summary: Pressure injuries: preventing heel pressure injuries with positioning. Wound Practice & Research, 25(4), 212-214.
4. Nicosia, G., Gliatta, A.E., Woodbury, M.G., & Houghton, P.E. (2007). The effect of pressure-relieving surfaces on the prevention of heel ulcers in a variety of settings: a meta-analysis. *International Wound Journal, 4*, 197-207.

Challenges

Elevation position devices (e.g., pillows, wedges)

- Inconsistent application
- Incorrect positioning
- Not suitable for multiple sleeping positions

Heel protectors

- Poor compliance[1]
- Perceived increased falls risk[1]

Mattresses

- High cost
- Inconsistent heel positioning

1. Clegg, R., & Palfreyman, S., (2014). Elevation devices for the prevention of heel pressure ulcers: a review. *British Journal of Nursing, 23*(s20), 24.



Lying supine, sedated

Changing positions, agitated, non-mobile

Lying supine, mobile

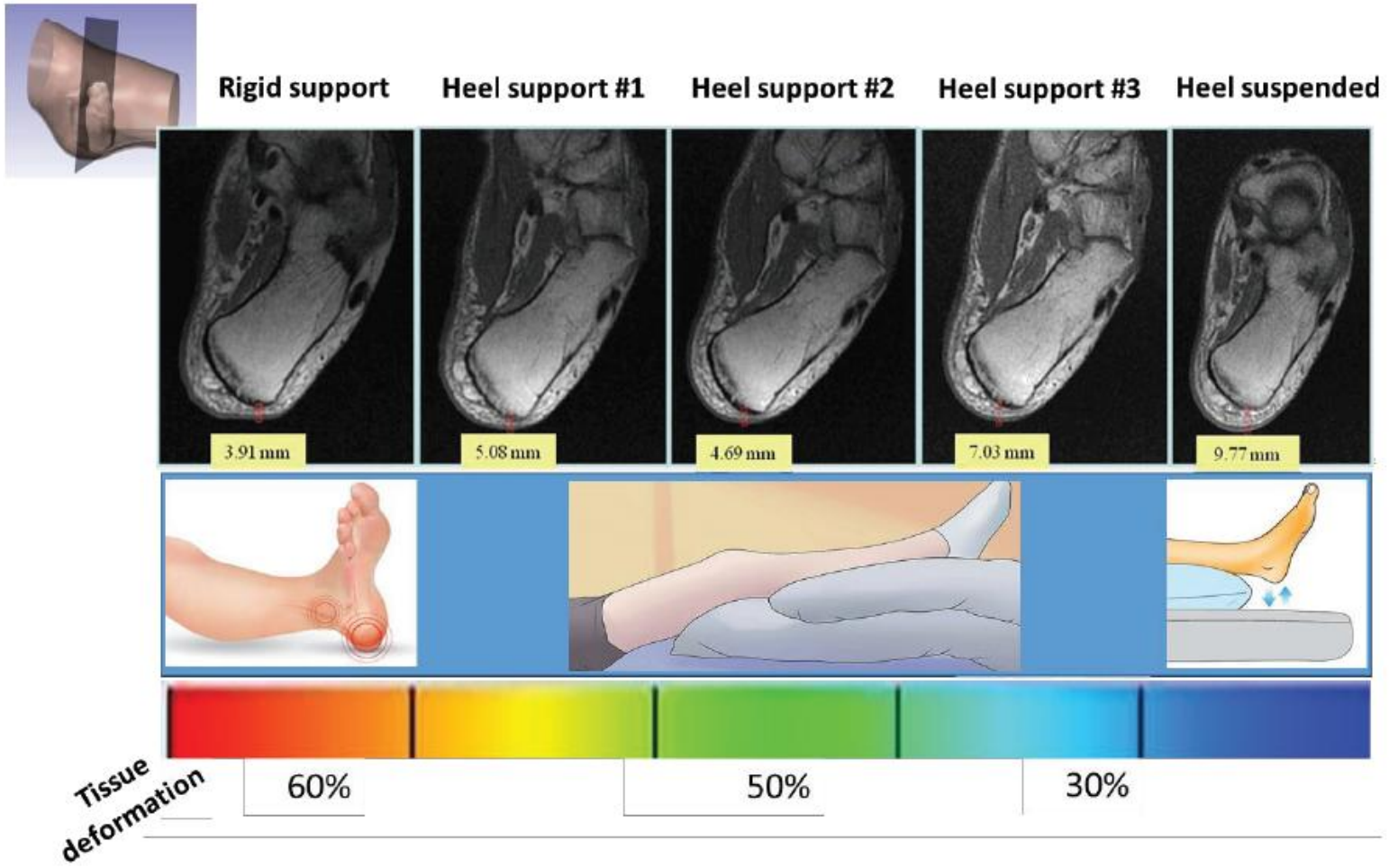
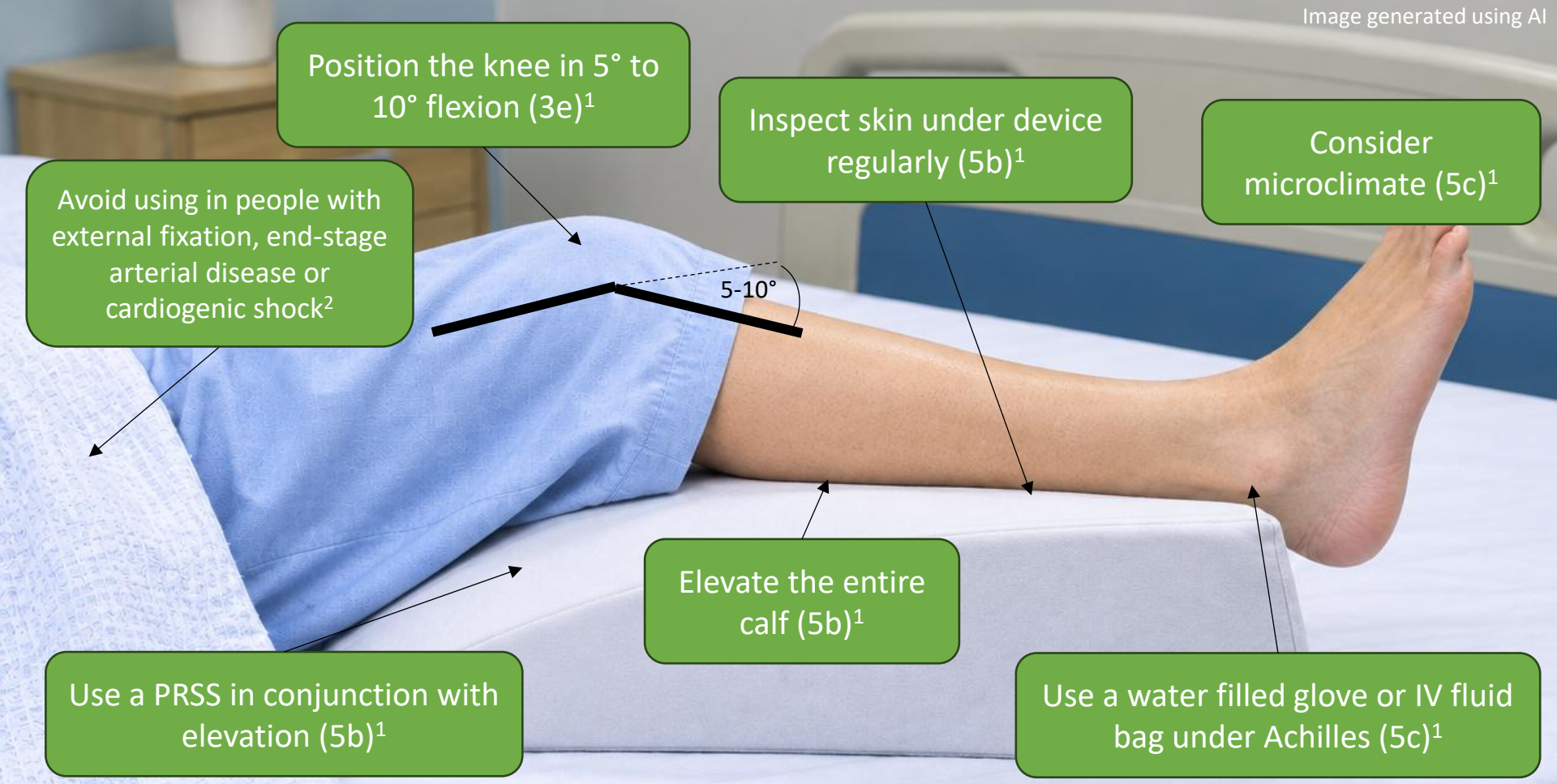


Image from: Gefen, A. (2017). Why is the heel particularly vulnerable to pressure ulcers? *British Journal of Nursing, 26*(20), s62-74. Adapted from Tenenbaum et al., 2013.



1. Haesler E. (2017). Evidence summary: Pressure injuries: preventing heel pressure injuries with positioning. *Wound Practice & Research, 25*(4), 212-214.
2. Black, J. (2023). Ten top tips: pressure ulcers on the heels. *Wounds International, 14*(2), 8-11.

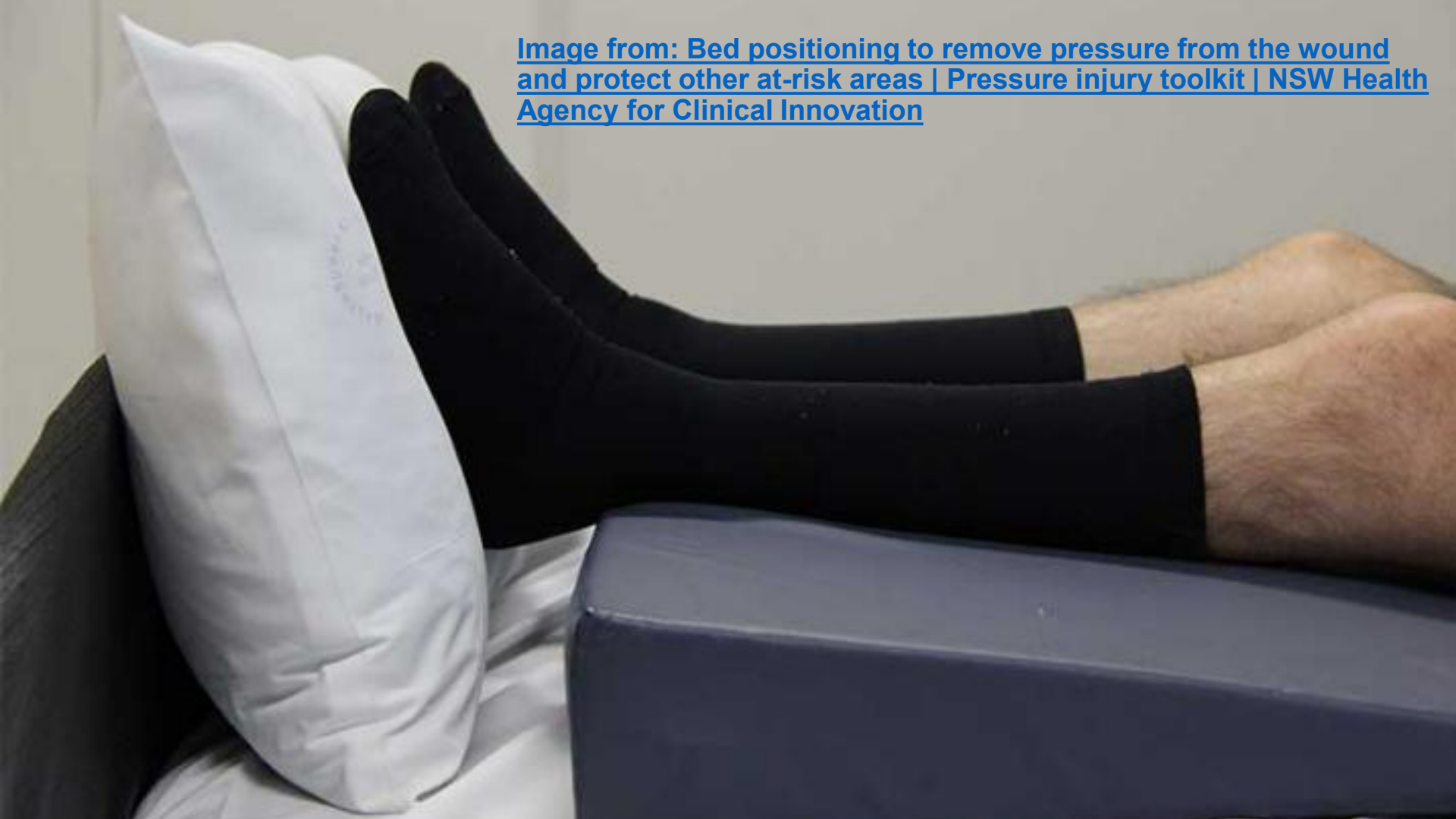


Image from: Bed positioning to remove pressure from the wound and protect other at-risk areas | Pressure injury toolkit | NSW Health Agency for Clinical Innovation

Positioning devices



Snooooooze W Leg Trough With Wrap
Image from: back to sleep



Heel wedge – double
Image from: TheraMed

Available on PCEP



Macmed Wedge Heel Single
Image from: MacMed

Available on PCEP

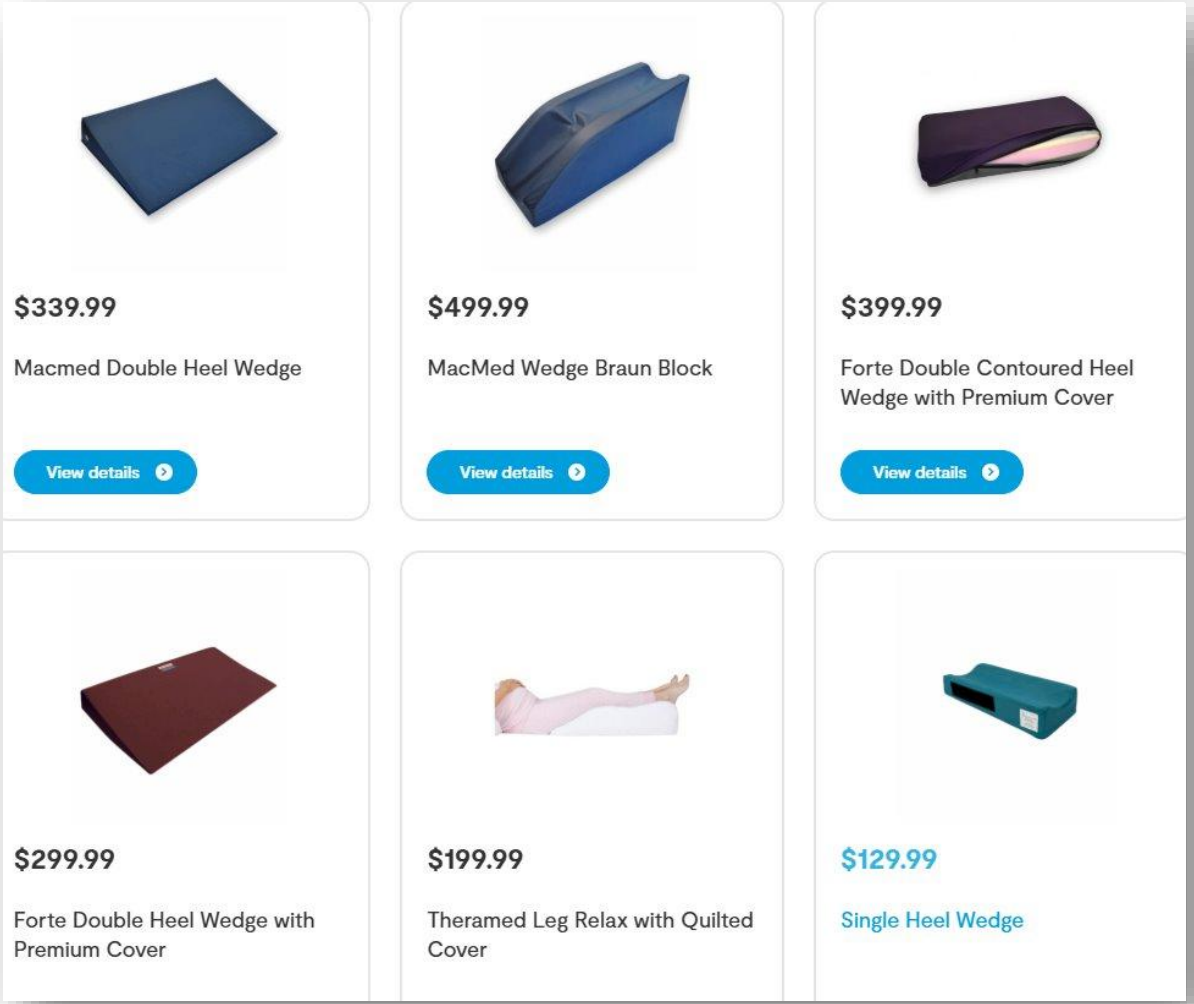


Repose wedge $323
Image from: MacMed



Repose Flex $324
Image from: MacMed

Positioning devices



Images from: Independent Living Specialists

Bed cradles

- Reduce pressure on forefoot
- Reduce pressure through heel
- Reduce passive plantarflexion



Image from: Patient Care Products

Arslan, K., & Ates, S. (2024). The effects of using heel protectors on the prevention of heel pressure injuries and plantar flexion contractures. *Nursing in Critical Care, 29*, 1729-1738.



Intervention group (heel protectors):
No pressure injuries
ROM increased

Control group (pillows + ranging):
11.9% developed pressure injuries
ROM decreased

Image generated using AI



Prevalon heel boot $215 each

Image from: Stryker.com

Cost of routinely providing 2 boots to 394 ICU patients (Waterlow score ≥ 15 or Braden scale ≤ 12) = $169,420

Spotlight on research[1]:

Design: Single-blind RCT (n=394), Australian ICU units

Intervention: Prevalon heel boots vs standard care (pillow positioning).

Outcome: RR = 0.09 favouring heel protectors.

Savings of 20 hospital acquired heel pressure injuries -

Direct treatment cost (stages as per study, with cost of suspected deep tissue injuries costed at Stage 2), adjusted for inflation = $197,921

1. Barakat-Johnson, M., Lai, M., Stephenson, J., et al. (2022). Efficacy of a heel offloading boot in reducing heel pressure injuries in patients in Australian intensive care units: a single-blind randomised controlled trial. *Intensive & Critical Care Nursing, 70*. doi: 10.1016/j.iccn.2022.103205
2. Nghiem, S., Campbell, J., Walker, R.M. et al. (2022). Pressure injuries in Australian public hospitals: A cost of illness study. *International Journal of Nursing Studies, 130*, 104191.

Heel Protectors



PRAFO Heel Pressure Relief Orthosis
$295.00 – $375.00



Prevalon Heel Protector
$250.00

Images from: Restora Healthcare



Image from: Aleva



Image from: NovitaTech



Image from: independence australia



Image from: fascilitis



Image from: independence australia



Spenco Foot Pillow (Pair)
$99.00



Spenco Foot Pillow (Single)
$59.00

Images from: Restora Healthcare



Aspire Heel Protector

Image from: Aidacare



Sheepskin Short Slipper Boot

Image from: independence australia



Repose Foot Protectors Plus (pair) $414
Image from: MacMed

Mattresses



Foam mattress heel slope/zone

Image from Silver Cross



PRM top layer folded back

Image of Eleta E400 from EnableLifecare



Figure 3. Apex Pro-care heel section

Heel relief section

Image from Shingfield et al. (2017)



Overlays

Images from: Aidacare

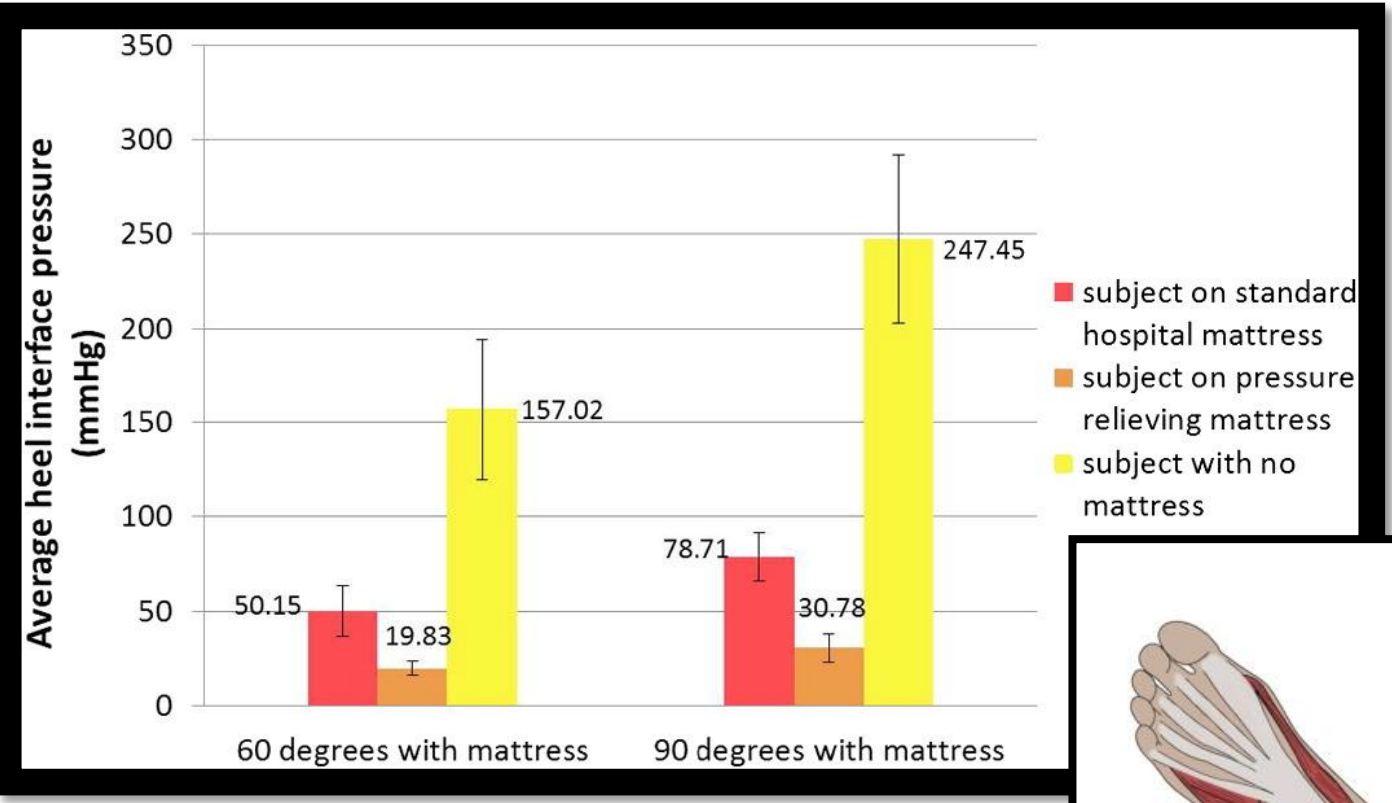


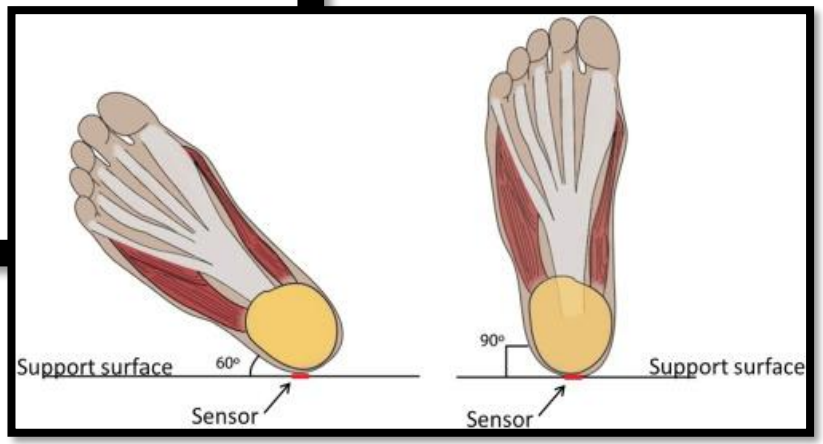
Deflatable cell (e.g., Nimbus 4)

Image from Arjo.com

1. Shingfield, L., Carr, H., & Thomson, J. (2017). Apex pro-care mattress: how can this advanced mattress assist in prevention of pressure injuries. Community Wound Care, s20-27.
2. Masterson, S., & Younger, C. (2014). Using an alternating pressure mattress to offload heels in ICU. *British Journal of Nursing, 23*(s15), s44.

Mattresses & heel pressure





Graphs & image from: Tong, S-F., Yip, J., Yick, K-L. et al. (2016). Effects of different heel angles in sleep mode on heel interface pressure in the elderly. *Clinical Biomechanics, 32*, 229-235.

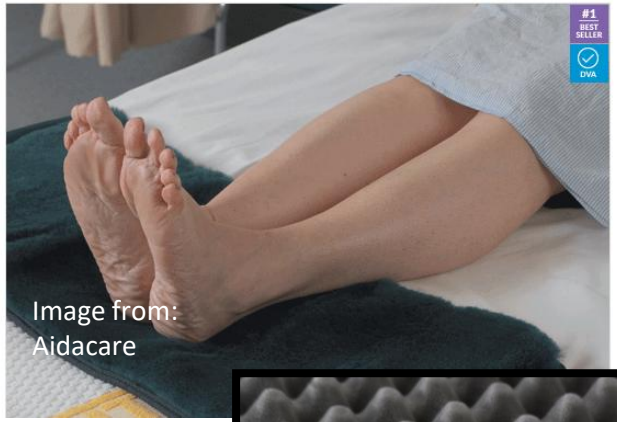


Image from:
Aidacare

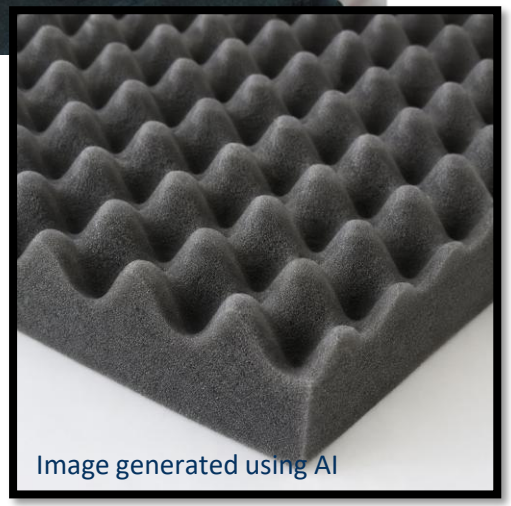


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Medical Sheepskin

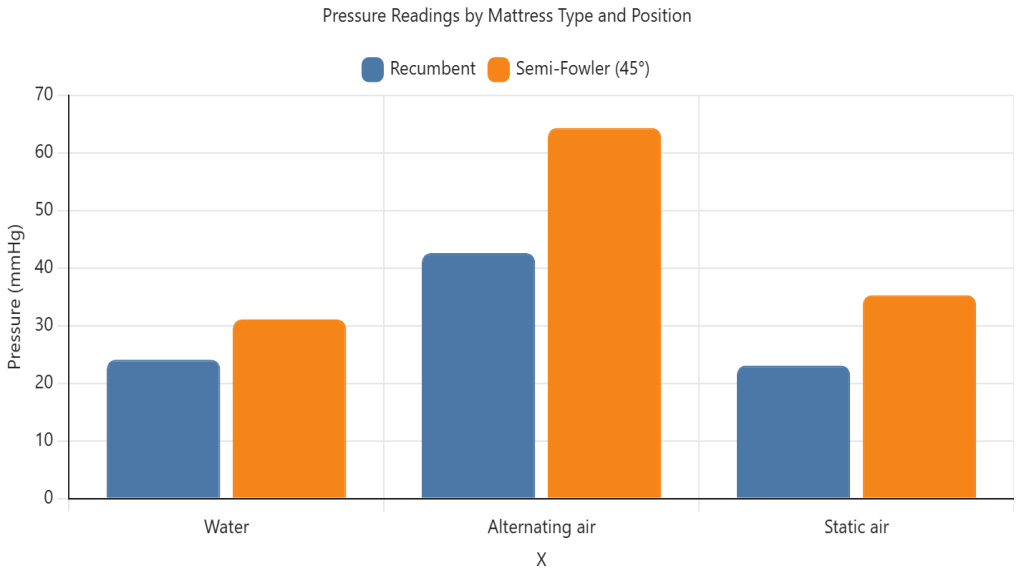
Small study (n=58), RR=0.42 pressure injuries (generally, not specifically on heels) for sheepskin versus standard care[1]. Potential issues include being too warm, discomfort (e.g., itching), and infection control[2]. May not be cost effective if given to all patients[3].

Egg-crate foam

Small study (n=30), within subject design comparing egg-crate foam, polyurethane foam and gel. Foam produced the lowest pressures and greatest comfort[4]. In contrast, when used as a heel protector, egg-crate foam performed similarly to 2 other heel protectors[5].

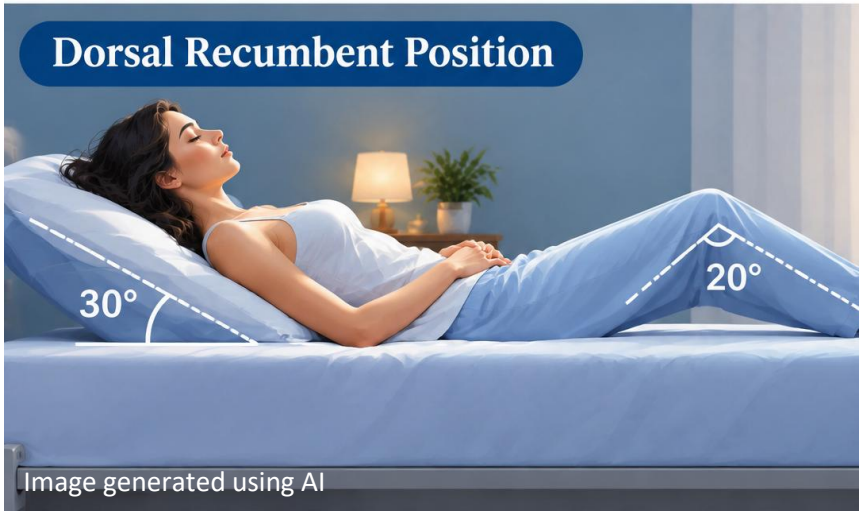
1. Jolley, D.J., Wright, R., McGowan, S., et al. (2004). Preventing pressure ulcers with the Australian Medical Sheepskin: an open-label randomised controlled trial. *Medical Journal of Australia, 180*, 324-327.
2. Mistaen, P., Achetberg, W., Ament, A., et al. (2010). The effectiveness of the Australian Medical Sheepskin for the prevention of pressure ulcers in somatic nursing home patients: a prospective multicenter randomized-controlled trial. *Wound Repair & Regeneration, 18*, 572-579.
3. Mistiaen, P., Ament, A., Francke, A., et al. (2010). An economic appraisal of the Australian Medical Sheepskin for the prevention of sacral pressure ulcers from a nursing home perspective. *BMC Health Services Research, 10*, 226.
4. Han, M.J., & Ko, S. (2021). Comparison of interface pressures and subjective comfort of pressure-relieving overlays on the operating table for healthy volunteers. *International Journal of Environmental Research & Public Health, 18l(5), 2640.*
5. Clegg, R., & Palfreyman, S. (2014). Elevation devices for the prevention of heel pressure ulcers: a review. *British Journal of Nursing, 23*(2), s20-s25.

Heel pressure by position



Sideranko, S., Quinn, A., Burns, K., & Froman, R.D. (1992). Effects of position and mattress overlay on sacral and heel pressures in a clinical population. *Research in Nursing & Health, 15*(4), 243-323.





Seating - including recliners & fallout chairs

Good Practice Statement

S5:It is good practice to position seated individuals in such a way that reduces pressure, shear and friction. This includes:

- **selecting a chair or wheelchair that provides support and maintains stability,**
- **selecting a reclined seated position in which the individual's legs are elevated and supported so the heels are free from the support surface or, if reclining is not appropriate or possible, ensuring that the individual's feet are well-supported, and/or**
- **using dynamic weight shifting (tilt and recline).**



Supported seating position



Recline and tilt

Image from: National Pressure Injury Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance. Preventing Heel Pressure Injuries. In: Prevention and Treatment of Pressure Ulcers/Injuries: Clinical Practice Guideline. The International Guideline: Fourth Edition. Emily Haesler (Ed.). 2025.

Reduce friction & shear



- Socks with low coefficient of friction
  - e.g., Parafricta bootee – resolved Gr1 PIs in 4 weeks, 16-84% reduction in PIs developed[1]
- Decrease sweating (decrease ambient temperature)
- Reduce head of bed angle to <30° where practicable[2]
- Full length slide sheet during transfers[2]
- Select covers with a mattress-skin friction coefficient <0.4[3]

1. Gefen, A. (2017). Why is the heel particularly vulnerable to pressure ulcers? *British Journal of Nursing, 26*(20), s62-74.
2. McLaren-Kennedy, A., Chaboyer, W., Thalib, L., & Latimer, S. (2023). The effect of head of bed elevation on sacral and heel subepidermal moisture in healthy adults: a randomised crossover study. *Journal of Tissue Viability, 32*, 2-8.
3. Van Zwam, W.G.H., van Turnhout, M.C., Oomens, C.W.J., et al. (2020). Risk factors for developing heel ulcers for bedridden patients: a finite element study. *Clinical Biomechanics, 78*, 105094.

Peripheral Arterial Disease (PAD)

People with PAD are much more likely to develop a heel pressure injury[1]

In a study of 120 patients in intensive care, people with PAD were 5.1 times as likely to develop a heel pressure injury ($p=0.007$)[1]. In another study ($n = 155$), 83% of people with heal ulcers were found to have ischaemia[2].

Heel pressure injuries are very slow to heel for people with PAD, but improve with treatment[3]

In a study of 186 patients in a surgery and wound treatment centre, healing was significantly slower in the PAD group ($p=0.0268$) but improved significantly with bypass surgery.

PAD is frequently undiagnosed[4]

In a study of 36 hospital patients, the rate of undiagnosed PAD was 11 times higher in the group with heel pressure injuries.

1. Surmacz, A., Sałacinska, I., Kózka, M., et al. (2026).Risk factors for the development of pressure injury in the heel area in critically ill patients. *Journal of Clinical Medicine, 15*(1969), 1-16.
2. Malik, R., Pinto, P., Bogaisky, M., & Ehrlich, A.R. (2013). Older adults with heel ulcers in the acute care setting: frequency of noninvasic vascular assessment, surgical intervention and 1-year mortality. *Journal of the American Medical Directors Association, 14*(12), 916-919.
3. Nishio, Y., Tsuji, Y., Kitano, I., & Terashi, H. (2021). Influence of peripheral arterial disease on wound healing in heel pressure ulcers. *Kobe Journal of Medical Science, 67*(4), E146-154.
4. Twilley, H., & Jones, S. (2016). Heel ulcers – pressure ulcers or symptoms of peripheral arterial disease? An exploratory matched case control study. *Journal of Tissue Viability, 25*, 150-156.

Screening for PAD - Toe pressures

Toe pressure with photoplethysmography (PPG) for screening for PAD have around;

- ~80% specificity[1,2,3]
- >90% sensitivity[1]
- Similar outcomes in diabetic and non-diabetic people[3]



Huntleigh Dopplex ATP Ankle Toe Pressure Kit (image from TeamMed)

Clues that further assessment may be needed[4]:

- Cool feet
- Shiny skin
- Reduced hair growth
- Absent pedal pulses

1. Varaki, E.S., Gargiulo, G., Penkala, S., & Breen, P.P. (2018). Peripheral vascular disease assessment in the lower limb: a review of current and emerging non-invasive diagnostic methods. *Biomedical Engineering Online, 17*(61), 1-27.
2. Bonham, P.A., Kelechi, T., Mueller, M., & Robison, J. (2010). Are toe pressures measured by a portable photophlethysmograph equivalent to standard laboratory tests? *Journal of Wound, Ostomy & Continence Nursing, 37*(5), 475-486.
3. Tehan, P.E., Barwick, A.L., Sebastian, M., & Chuter, V.H. (2017). Diagnostic accuracy of resting systolic toe pressure for diagnosis of peripheral arterial disease in people with and without diabetes: a cross-sectional retrospective case-control study. *Journal of Foor & Ankle Research 10*(58), 1-7.
4. Atkin, L., Chaplin, E., Dingley, J., et al. (2026). Pressure ulceration of the heel: prevalence, complexities and management. British Journal of Nursing, 35(3), S10-15.

Improve wound or skin condition

Preventative[1]

- Barrier creams
- Prophylactic wound dressings, multilayered silicone foam (RR=0.3)[2,3]
- Olive oil (RR=0.25-0.53)

Remediative

- Implement good practice wound care[2]
- Consider medical grade honey[4]
- Negative pressure wound therapy, electrostimulation[2]
- Nutritional therapy[2]

Spotlight on research[4]:

Design: Case series 9 recalcitrant locally-infected heel PIs (median patient age = 86y) resistant to antiobiotics, wounds > 4 weeks

Intervention: medical grade honey dressings.

Outcome: All improving within 3-4 weeks.

1. Broome, K., (2026). 5 things you might not know about pressure injury prevention. *Poster presented at OT Exchange 2026, Brisbane*.
2. National Pressure Injury Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance. Prevention and Treatment of Pressure Ulcers/Injuries: Clinical Practice Guideline. The International Guideline: Fourth Edition. Emily Haesler (Ed.). 2026.
3. Fu, T., Wu, X., & Yu, B. (2025). Efficacy of silicone foam dressings in preventing pressure injuries in the sacral and heel areas of patients: a meta-analysis. *Frontiers in Medicine, 12*, 1644830.
4. Papanikolaou, G.E., Gousios, G., & Cremers, N.A.J. (2023). Use of medical-grade honey to treat clinically infected heel pressure ulcers in high-risk patients: a prospective case series. *Antibiotics, 12*, 605.

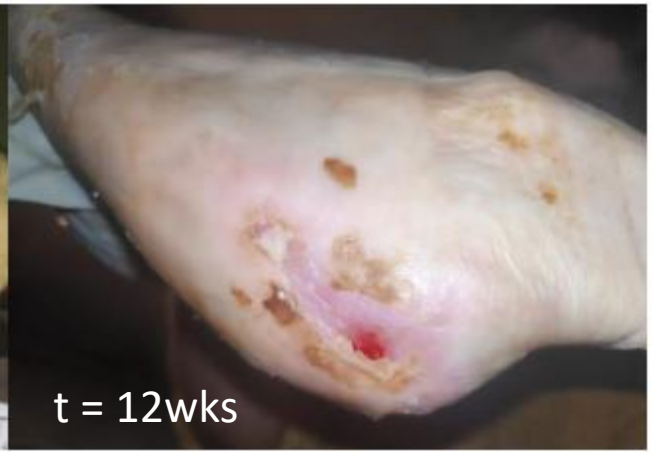












Images from: Papanikolaou, G.E., Gousios, G., & Cremers, N.A.J. (2023). Use of medical-grade honey to treat clinically infected heel pressure ulcers in high-risk patients: a prospective case series. Antibiotics, 12, 605.

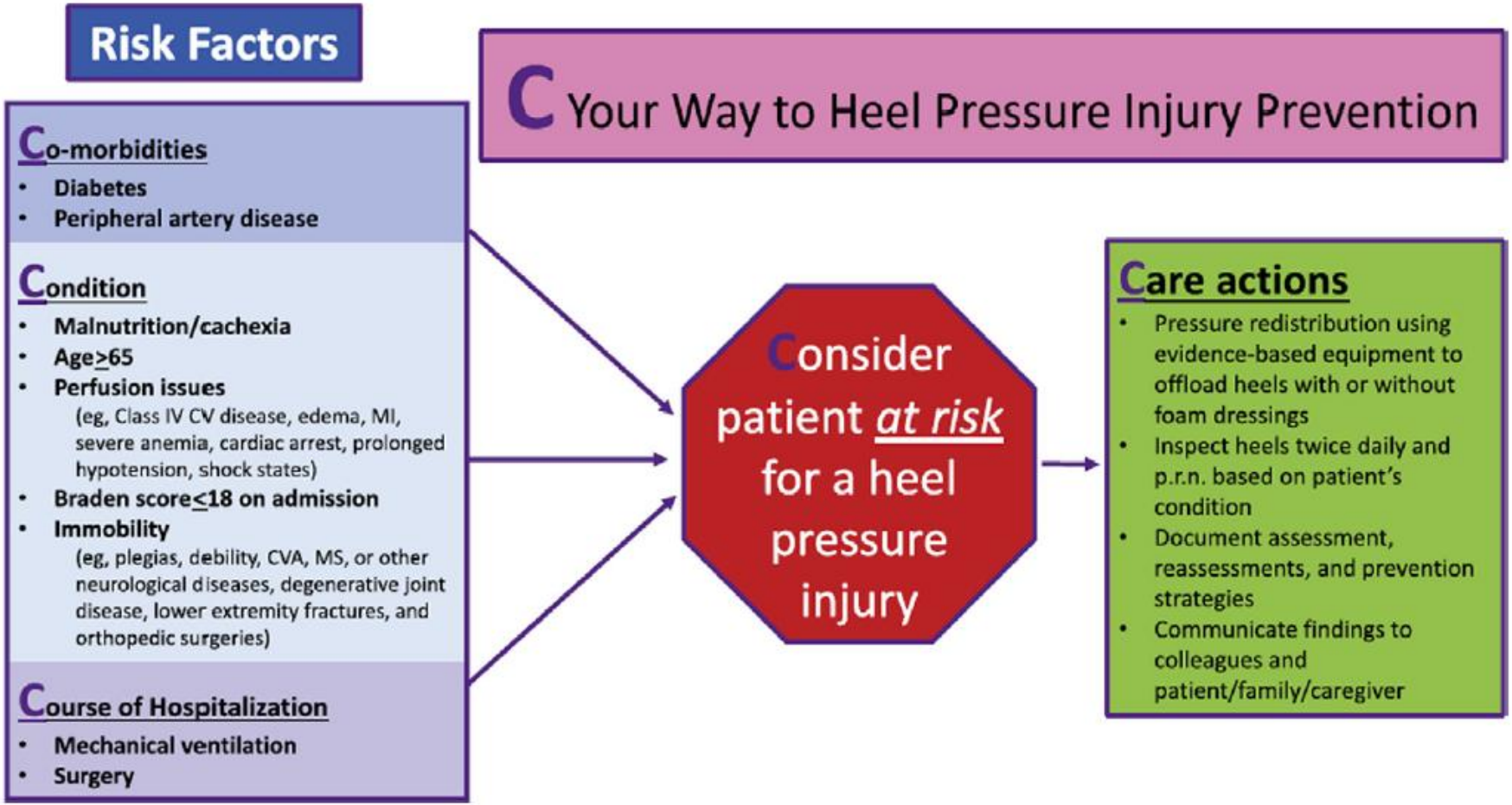
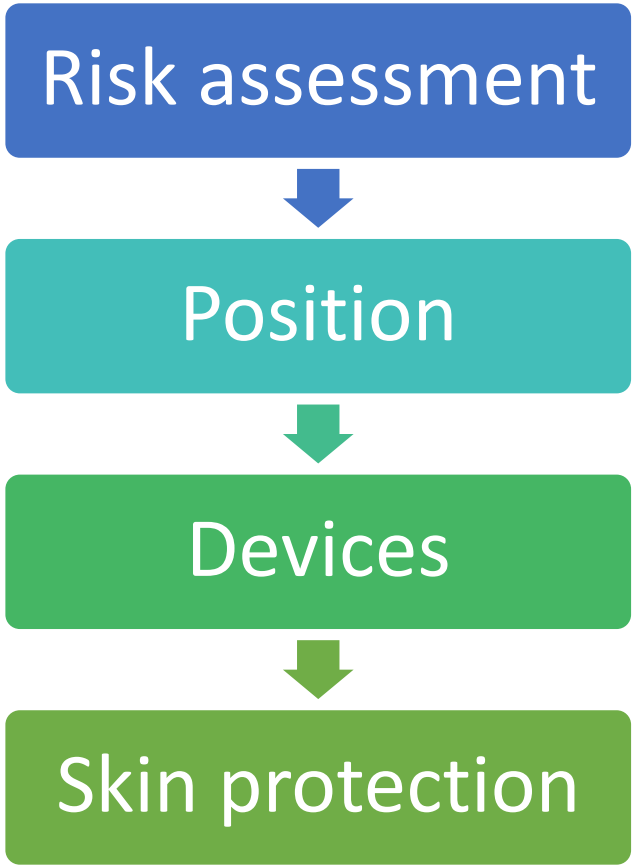


Image from: Delmore, B., & Ayello, E.A. (2020). Heel pressure injuries in the adult critical care population. *Critical Care Nursing Clinical of North America, 32*, 589-899.

Take home messages

1. Identify people at risk, especially those with PAD.
2. Check bed or recliner positioning and adjust.
3. Implement (appropriately) one of; pillows, wedges, heel protectors, overlays, mattresses; matched to client context.
4. Consider low-friction booties or surfaces, prophylactic wound dressings or olive oil.




Client with CVA. Lives at home with family support.
Image generated using AI



Client with lung cancer. Plan to discharge home with palliative care.

Image generated using AI



Image generated using AI

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