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Pressure Injury Management in Bedridden Oncology Patients: Clinical Considerations on Chemotherapy and Radiotherapy Effects

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Introduction

Pressure injuries are localised damage to the skin and underlying soft tissues caused by sustained pressure, shear, or both. They remain common among severely immobile patients: in the international DecubICUs study, pressure injuries affected more than one quarter of intensive-care patients, and severe injuries were associated with increased hospital mortality (Labeau et al., 2021). The 2019 EPUAP/NPIAP/PPPIA International Clinical Practice Guideline provides a key framework for pressure-injury prevention and management across clinical settings (Kottner et al., 2019; Kottner, Cuddigan, Carville, & Haesler, 2020). Cancer does not alter the fundamental mechanisms of pressure injury, but several disease- and treatment-related factors can increase tissue vulnerability and impair healing.

Cytotoxic chemotherapy can interfere with cellular proliferation, angiogenesis, and tissue repair, while previously irradiated tissue may remain fibrotic, hypovascular, and senescent long after treatment (Słonimska et al., 2024; Chakraborty et al., 2025; Huang et al., 2025). Cachexia, sarcopenia, anaemia, treatment-related neuropathy, and cytopenias further increase susceptibility to tissue damage and complicate wound management. However, most studies evaluating pressure-injury prevention and treatment have not specifically focused on oncology populations, so many clinical decisions in this population rely on evidence extrapolated from broader patient groups.

This educational article summarises current evidence on the prevention and management of pressure injuries in bedridden oncology patients, with particular attention to the effects of chemotherapy and radiotherapy, and highlights oncology-specific factors that may influence risk assessment, wound management, and goals of care. It is informed by current international guidelines, systematic reviews, clinical studies, and relevant oncology and wound-care literature.

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How Cancer and Its Treatments Affect Pressure-Injury Risk and Healing

The proximate biology of pressure injury, sustained tissue deformation, ischaemia-reperfusion injury, and lymphatic disruption, is shared across populations (Mao et al., 2010). The oncology distinction lies mainly in repair capacity and competing systemic stressors.

Mechanistic evidence indicates that cytotoxic chemotherapy can inhibit keratinocyte and fibroblast migration, angiogenesis, and extracellular-matrix deposition (Słonimska et al., 2024). Some regimens may also contribute indirectly through nephrotoxicity, hypoalbuminaemia, neuropathy, or reduced oral intake (Mizuno et al., 2016). These observations are biologically plausible but should not be treated as quantified pressure-injury effect sizes: the translation from preclinical wound biology to pressure-injury outcomes in chemotherapy-treated patients remains uncertain.

Late radiation effects tend to be more durable. Chronic radiation injury is characterised by microvascular loss, fibrosis, persistent oxidative stress, and cellular senescence, with clinical manifestations that can include telangiectasia, ulceration, and secondary cutaneous malignancy (Chakraborty et al., 2025; Huang et al., 2025). Experimental approaches such as transdermal deferoxamine and stem-cell-derived exosomes remain preclinical or investigational (Lintel et al., 2022; Yang et al., 2023). Hyperbaric oxygen has supporting evidence for selected late radiation tissue injuries, but not specifically for routine pressure-injury treatment (Brooks & Gross, 2023; Lin et al., 2023).

Cancer cachexia and malnutrition add a further burden through loss of protective soft tissue, reduced anabolic reserve, and hypoalbuminaemia (Munoz et al., 2020; Munoz et al., 2022). Taken together, these mechanisms justify heightened clinical vigilance, but they do not imply that every oncology patient requires more aggressive prevention or a different treatment algorithm: the available evidence supports individualisation rather than a separate oncology guideline.

Prevention and Risk Assessment

Risk assessment

Structured risk assessment alongside clinical judgement is recommended by the International Guideline (Kottner et al., 2019; Kottner, Cuddigan, Carville, & Haesler, 2020), although a Cochrane review could not show that formal risk tools alone reduce pressure-injury incidence compared with clinical judgement (Moore & Patton, 2019). Braden, Waterlow, or Norton scores are therefore best used as structured prompts rather than stand-alone decision rules. In oncology patients, it is worth documenting variables not captured by conventional scores: current treatment phase, anticipated nadir, platelet and neutrophil trends, prior radiation fields, cachexia, continence, mobility, and the patient's ability to reposition. Oncology surgical cohorts have also identified additional risk associations, including advanced age, longer procedures, hypotension, vasopressor exposure, hypothermia, and blood loss, though these findings are not directly transferable to every bedridden medical patient (W. Y. Chen et al., 2024). None of this amounts to a validated oncology-specific risk model; it reflects clinical interpretation grafted onto existing tools.

Support surfaces and repositioning

Reactive air and alternating-pressure surfaces may reduce pressure-injury incidence compared with foam, and alternating-pressure surfaces have shown favourable economic evidence in some settings, although the supporting evidence is of low certainty and drawn from general at-risk populations rather than oncology cohorts (Shi et al., 2021; Shi et al., 2021). Reactive air overlays have shown benefit in long-term-care settings (Serraes et al., 2018), and the PRESSURE 2 trial suggested a small treatment-phase advantage for alternating pressure that diminished during follow-up (Nixon et al., 2019). The optimal repositioning interval remains unresolved: the Bergstrom multisite trial found no significant difference in pressure-injury incidence among 2-, 3-, and 4-hour turning schedules on high-density foam (Bergstrom et al., 2014), and later reviews reporting a possible benefit from more frequent turning are limited by heterogeneous, low-certainty evidence (Avsar et al., 2020; Jocelyn Chew et al., 2018; Asiri, 2023). In practice, the surface and repositioning plan should match overall risk rather than follow a fixed two-hour rule for every patient. In a completely immobile or highly frail oncology patient, escalating from

high-specification foam to reactive or alternating-pressure support can be considered, while turning frequency is individualised according to skin response, comfort, tolerance, mobility, and the surface in use. The 30-degree lateral position remains a practical pressure-reduction strategy, but the schedule should stay patient-specific.

Prophylactic dressings, skin care, and bundled prevention

Prophylactic multilayer silicone foam dressings over the sacrum and heels reduce hospital-acquired pressure injury in several critical-care and surgical studies (Sillmon et al., 2021). Oncology-specific data are limited to a small randomised trial in head-and-neck cancer surgery and a retrospective bundled-care study, both suggesting fewer pressure injuries when prophylactic dressings were incorporated into broader prevention programmes (Xie et al., 2025; M. Chen et al., 2024). Evidence on medical-device-related prevention similarly favours multicomponent strategies over isolated products (Lyu et al., 2023). In higher-risk bedridden oncology patients, prophylactic silicone foam can therefore be considered as an adjunct to, not a substitute for, offloading, regular skin inspection, moisture control, gentle pH-balanced cleansing, barrier products, and continence management. The strongest implementation signal is for bundled care with staff education, audit, and standardised documentation, rather than for any single dressing.

Nutrition

International guidance supports nutritional screening and individualised nutritional intervention in patients at risk of, or living with, pressure injury (Munoz et al., 2020; Munoz & Posthauer, 2022). A 2024 Cochrane review found that the overall effect of nutritional supplementation on pressure-injury outcomes remains uncertain; collagen-containing formulations had the clearest signal for reducing wound area, while evidence for arginine-containing formulas was weaker (Langer et al., 2024). Other reviews confirm the association between malnutrition and pressure-injury risk without establishing a single optimal formula (Saghaleini et al., 2018; Munoz et al., 2022).

Management of Established Pressure Injuries

Assessment and mechanical unloading

Assessment remains grounded in standard wound practice: classification, dimensions, depth, tissue type, periwound condition, exudate, odour, pain, and signs of infection (Kottner, Cuddigan, Carville, Balzer, et al., 2020). In oncology patients, it is also worth recording current treatment, blood-count trends when clinically relevant, prior radiation fields, nutritional trajectory, performance status, and whether the wound shows atypical features. Serial photography supports consistent documentation, and automated image-classification methods are emerging but are not yet a substitute for clinical assessment (Ikuta et al., 2024). Mechanical unloading remains foundational: the same surface and repositioning principles used for prevention apply once an injury is present, although direct evidence for their effect on healing is limited (Shi et al., 2021).

TIME domain	Oncology modifiers to consider
T Tissue	Chemotherapy timing; cytopenias; previously irradiated tissue
I Infection / inflammati	Neutropenia; potentially blunted inflammatory signs; febrile-neutropenia context
M Moisture	Fragile skin; bleeding tendency; mucositis; exudate and symptom burden
E Edge / goals	Prior radiotherapy; atypical morphology; malignant mimics; limited prognosis

Interpretation remains clinician-led; the oncology overlay contains no validated thresholds and is not a clinical algorithm.

Figure 1. Conceptual oncology-adapted TIME framework. Standard wound-bed domains are paired with oncology modifiers that may influence interpretation. The framework is educational and has not been clinically validated.

If pressure and shear continue at the injured site, local dressings or adjuncts are unlikely to compensate fully.

Wound-bed preparation through an oncology-adapted TIME lens

The established TIME framework (Tissue, Infection/inflammation, Moisture, and Edge) remains a useful organising model (Schultz et al., 2003). Figure 1 retains the standard domains while showing where oncology may alter their interpretation; the overlay is conceptual rather than algorithmic.

Tissue: debridement

Direct comparative evidence for pressure-injury debridement is sparse; mixed chronic-wound studies suggest that enzymatic agents can accelerate debridement relative to autolytic care in some settings, but populations and endpoints are heterogeneous (Amadeh et al., 2025; Shoham et al., 2024; Gethin et al., 2015). Cytopenias, chemotherapy timing, and the poor healing reserve of irradiated tissue can justify a more conservative procedural approach than would otherwise be chosen (Słonimska et al., 2024; Chakraborty et al., 2025) — an inference from mechanism and general wound practice, not evidence that a specific platelet threshold or chemotherapy day defines safe debridement. Decisions about sharp procedures are best linked to current blood counts, bleeding risk, local tissue urgency, and multidisciplinary input. Stable dry heel eschar without inflammatory change is generally managed according to standard pressure-injury principles rather than oncology-specific rules.

Infection and inflammation

Routine topical antimicrobials have limited evidence for accelerating pressure-injury healing, and prolonged indiscriminate use may contribute to resistance (Rayala, 2020); systemic antibiotics remain appropriate for clinically significant soft-tissue infection, osteomyelitis, or sepsis rather than for colonisation alone. Neutropenia can blunt local inflammatory signs and increase the consequences of infection, so wound management in a neutropenic patient with suspected infection should be integrated with the oncology service and the institution's febrile-neutropenia pathway. This does not support routine empirical antibiotics for every colonised pressure injury; it supports a lower threshold for systemic assessment when clinical concern exists.

Moisture, edge, adjuncts, and pain

Dressing selection can follow conventional exudate- and depth-based principles, with atraumatic silicone interfaces favoured when skin is fragile or bleeding risk is increased; moisture management is particularly important when incontinence, heavy exudate, or treatment-related skin fragility coexist. NPWT can be considered for selected stage III–IV pressure injuries, although the supporting evidence remains very weak and drawn from small trials (Shi et al., 2023). In oncology practice, exposed tumour, recurrent bleeding, friable tissue, or a comfort-focused goal may make NPWT less attractive; these are contextual clinical considerations rather than findings from oncology-specific trials. Pain should be assessed both at rest and during dressing changes. Topical local anaesthetic and pre-procedure systemic analgesia are commonly used options, and drug selection should take account of renal function, thrombocytopenia, and existing opioid therapy (Rayala, 2020).

Oncology-Specific Clinical Considerations

Several situations call for a different clinical question rather than a different protocol (Table 1). Previously irradiated tissue may heal more slowly because of fibrosis, microvascular loss, and persistent cellular injury (Chakraborty et al., 2025; Huang et al., 2025), which can justify a conservative approach to marginal tissue and earlier surgical review when reconstruction is being considered; hyperbaric oxygen can be considered for selected late radiation injury, though its routine use for pressure injury is not established (Brooks & Gross, 2023; Lin et al., 2023). A wound that behaves atypically also warrants diagnostic reconsideration, since cutaneous metastasis, primary cutaneous malignancy, and malignant transformation of a chronic wound can mimic or coexist with pressure injury (Starace et al., 2022; Fang et al., 2024). Biopsy should be considered when morphology is atypical, bleeding or pain is disproportionate, an exophytic or friable component develops, the lesion lies

in a prior radiation field, or an offloaded wound fails to progress as expected. The commonly used 4–6 week reassessment interval is a pragmatic trigger for this reconsideration, not a validated rule. Finally, when prognosis is limited or the burden of healing-oriented treatment exceeds likely benefit, the goal may appropriately shift from closure to quality of life. Palliative wound care focuses on symptom control (odour, exudate, bleeding, pain, dressing burden, and dignity) and on shared decisions about what the patient values most (Tilley et al., 2016), favouring simplified atraumatic dressings, odour-control strategies, and fewer painful procedures when comfort dominates. This shift reflects a change in goal, not a therapeutic failure.

Table 1. Oncology-specific modifiers and interpretive implications for pressure-injury care.

Clinical context	Why it may matter	Interpretive implication (not a validated rule)
Active chemotherapy	Potential impairment of cellular repair; treatment-related cytopenias or mucositis	Consider current treatment phase, blood counts when relevant, wound urgency, and tissue tolerance when planning procedures or dressing changes.
Neutropenia	Higher infection consequence and potentially blunted local inflammatory signs	Integrate suspected wound infection with oncology assessment and local febrile-neutropenia protocols; avoid treating colonisation alone.
Thrombocytopenia / bleeding tendency	Greater procedural and dressing-related bleeding risk	Favour atraumatic interfaces and individualise sharp procedures or NPWT according to bleeding risk and clinical need.
Previous radiation field	Fibrosis, hypovascularity, persistent senescence	Expect potentially slower healing; preserve marginal tissue where possible and consider earlier reconstructive input for complex wounds.
Cachexia / sarcopenia	Reduced tissue padding and anabolic reserve	Prioritise achievable nutrition and offloading; align targets with renal function, symptom burden, cachexia phase, and goals of care.
Atypical or unexpectedly non-healing wound	Possible malignant mimic or transformation	Consider biopsy or specialist review when morphology, symptoms, location, or clinical course is atypical.
Limited prognosis	Closure may be unrealistic or burdensome	Discuss whether comfort-focused care better matches patient goals; prioritise odour, exudate, pain, bleeding, and dignity.

Clinical Implications for Wound-Care Professionals

For wound-care professionals, these considerations translate into a few practical points: apply standard pressure-injury protocols by default, adapting rather than replacing them according to treatment phase, cytopenias, and radiation history; document oncology-specific variables alongside conventional risk scores (treatment phase, blood-count trends, prior radiation fields, cachexia); escalate support surfaces and individualise repositioning in the most immobile or frail patients; coordinate debridement, dressing changes, and suspected infection with the oncology team whenever cytopenias or neutropenia are present; reconsider the diagnosis in non-healing or atypical wounds; and shift explicitly toward comfort-focused care when prognosis is limited. The oncology-adapted TIME framework (Figure 1) and the modifiers in Table 1 can support this individualised decision-making and serve as prompts for local education and audit.

Conclusion

Standard pressure-injury principles, structured risk assessment, pressure redistribution, individualised repositioning, prophylactic skin protection, moisture control, nutrition, and systematic wound-bed preparation remain the foundation of care for bedridden oncology patients, even though much of the supporting evidence is extrapolated from non-oncology populations. Oncology mainly changes how these

principles are weighted rather than replacing them: chemotherapy may reduce repair reserve, previous radiotherapy can leave slow-healing hypovascular tissue, atypical wounds may warrant biopsy, and limited prognosis may make comfort a more appropriate goal than closure. These considerations should guide individualised clinical judgement, not a separate oncology protocol, pending dedicated prospective research in this population.

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