**Search results for 2019 International Pressure Injury Guideline: Individuals in the Palliative care**

- **Identified in pressure injury searches**
  - n=11,177

- **Excluded after screening title/abstract**
  - Duplicate citations
  - Included in previous guideline
  - Not related to pressure injuries
  - n=8,128

- **Identified citations**
  - n=3,085

- **Excluded based on key word searches**
  - Not related to the topic-specific questions
  - n=3,051

- **Identified in topic-specific key word searches for full text review and critical appraisal**
  - n=34

- **Identified as providing direct or indirect evidence related to topic and critically appraised**
  - n=9

- **Excluded after review of full text**
  - Not related to pressure injuries
  - Not related to the clinical questions
  - Citation type/research design not meeting inclusion criteria
  - Non-English citation with abstract indicating not unique research for translation
  - n=25

- **Total references providing direct or indirect evidence related to topic**
  - n= N/A*

* Recommendations related to all special populations are included in the topics to which the recommendation relates (e.g. support surfaces), and the references supporting these recommendations are included in the search reports for those topics.

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**Palliative care keywords**
Palliative, palliate, end of life, end-of-life, death, dying, skin failure, butterfly, Kennedy Terminal Ulcer, SCALE

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## Articles Reviewed for International Pressure Injury Guideline

The research has been reviewed across three editions of the guideline. The terms pressure ulcer and pressure injury are used interchangeably in this document and abbreviated to PU/PI. Tables have not been professionally edited. Tables include papers with relevant direct and indirect evidence that were considered for inclusion in the guideline. The tables are provided as a background resources and are not for reproduction.


<table>
<thead>
<tr>
<th>Ref</th>
<th>Type of Study</th>
<th>Sample</th>
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<th>Results</th>
<th>Limitations and comments</th>
<th>Level of evidence:</th>
<th>Quality:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carlsson &amp; Gunningberg, 2017 Retrospective cohort study exploring risk factors for pressure injuries in people who died</td>
<td>Data base of all patients in Sweden who died in 2014 and were recorded in a Register of Palliative Care(n=60,319 participants)</td>
<td>Inclusion criteria: • Aged over 17 years • Recorded in the Palliative care database</td>
<td>• Pressure injuries classified by doctor or nurse at time of death using EPUAP/NPUAP scale</td>
<td><strong>Prevalence at admission</strong> • 6.9% in nursing homes • 13.8% hospitals • 19% in specialized palliative care units • 11% home general palliative care</td>
<td><strong>Prevalence at death</strong> • 16.8% in nursing homes • 19.6% hospitals • 29.7% in specialized palliative care units • 18.6% general home palliative care</td>
<td>• Relied on retrospectively collected data • Specific to terminally ill individuals • Management strategies were not reported or considered as a confounding factor</td>
<td>3 (prognostic)</td>
<td>moderate</td>
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</tbody>
</table>
## Individuals in Palliative Care: data extraction and appraisals

<table>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>o age (OR 1.00, 95% CI 1.001 to 1.005, p&lt;0.05)</td>
<td>Also includes data adjusting for medical conditions, length of stay and symptoms</td>
<td></td>
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</tbody>
</table>
| Sternal, Wilczynski, & Szewiec, 2017 | Retrospective cohort study exploring risk factors for PU in palliative care setting | Consecutive participant records over one year from one palliative care ward in Poland were reviewed (n=329 participants) | Comprehensive PU prevention scale was in place that included regular daily assessment, best practice with respect to support surfaces, positioning, skin care, hydration and nutrition | Patients were evaluated daily during admission | Prevalence 
- 62.3% had no PU 
- 25.5% admitted with a PU 
- 11.8% HAPU |
|     |               |        |                 |  | Multivariable logistic regression (assessed at admission) |
|     |               |        |                 |  | Waterlow score at admission (odds ratio [OR] 1.140, 95% CI 1.057 to 1.229, p=0.001) |
|     |               |        |                 |  | mean Waterlow score (OR 1.194, 95% CI 1.092 to 1.306, p=0.001) |
|     |               |        |                 |  | admitted from another hospital (OR 2.938, 95% CI 1.339 to 6.448, p=0.007) |
|     |               |        |                 |  | hemoglobin level at admission (OR 0.814, 95% CI 0.693 to 0.956, p=0.012) |
|     |               |        |                 |  | systolic blood pressure at admission (OR 0.976, 95% CI 0.955 to 0.997, p=0.023) |
|     |               |        |                 |  | mean systolic blood pressure (OR 0.956, 95% CI 0.929 to 0.984, p=0.003) |
|     |               |        |                 |  | mean evening body temperature (OR 3.830, 95% CI 1.729 to 8.486, p=0.001) |
|     |               |        |                 |  | lowest recorded hemoglobin level (OR 0.803, 95% CI 0.672 to 0.960, p=0.016) |
|     |               |        |                 |  | lowest recorded sodium concentration (OR 0.880, 95% CI 0.814 to 0.951, p=0.001) |
|     |               |        |                 |  | Relied on retrospectively collected data |
|     |               |        |                 |  | Specific to terminally ill individuals |
|     |               |        |                 |  | Method of assessment and by whom conducted and any interrater reliability not reported |
|     |               |        |                 |  | Unclear if risk factors preceded PU for those assessed during hospitalization |
|     |               |        |                 |  | Level of evidence: 3 (prognosis) |
|     |               |        |                 |  | Quality: Low |

### Clinical question three: Assessment of pressure injuries in palliative care

<table>
<thead>
<tr>
<th>V. Maida, Ennis, &amp; Kuziems ky, 2009</th>
<th>Observational case series for development of Toronto Wound Assessment System for palliative care</th>
<th>Participants were all new referrals to a palliative care program in Canada between 2005 and 2006</th>
<th>Phase 1: All patients were examined within 24 hours Phase 2: TSAS-W scores were assessed at referral and 1 week later</th>
<th>Phase 1: wound class, % of patients who reported each symptom at least once at any assessment (period spanned 24 months)</th>
<th>The most prevalent wound-related symptoms included: pain, exudation, odor, itching, bleeding, aesthetic concern, swelling and mass and bulk effects from the wound and associated dressings</th>
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<tr>
<td></td>
<td><strong>Inclusion:</strong></td>
<td><strong>Limitations and comments</strong></td>
<td><strong>Level of evidence:</strong> 4</td>
<td><strong>Quality: low</strong></td>
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Data Tables: 2019 Guideline Update: Individuals in Palliative Care © EPUAP/NPIAP/PPPIA Page 3
**Individuals in Palliative Care: data extraction and appraisals**

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| Wounds (TSAS-W) | • Referral to the palliative care program  
• Cancer or noncancer advanced disease  
• Presenting with wounds or developing wounds during followup period | Phase 1: n=531 patients with 2,102 wounds  
Phase 2: n=83 patients with 103 wounds, 21 participants with PU | • Phase 2: TSAS-W global wound symptom distress score  
• TSAS-W included an 11-point numerical rating scale for: pain, exudate, cosmetic appearance, odor, itchiness, bleeding, mass effect (swelling or edema around wound, bulk effect from dressing), crusting, restricted movement  
• Findings were combined to give a mean global wound symptom distress scale (GWSDS) | • In Phase 2 (n=121 participants with PU) Mean GWSDS for participants with PU was 33.10 at baseline and 25.24 at 7-day follow up  
**Completion of tool**  
• 78.6% of assessments were carried out by participant alone  
• 14.6% of assessments were carried out by participant with caregiver  
• 6.8% carried out by the caregiver alone | number of clinical settings  
• Validity of patient self-assessment not reported |

**Clinical question three: Assessing prognosis of pressure injuries**

V. Maida, Ennis, & Kesthely, 2014

A cohort study exploring factors associated with complete healing of PUs in palliative care patients

Participants were recruited via referral over a 12 month period at a palliative care hospital in Canada (n=607 enrolled, n=245 Stage II PUs followed)

- Inclusion criteria:  
  • Anticipated life expectancy ≤ 6 months
- Exclusion criteria: Not reported

Participant characteristics:  
• Only 57 participants were not followed to death

- All wounds managed by a specialist wound management team and advanced practice nurse with intention to heal
- Serial clinical assessments using Palliative Performance Scale  
  Braden Scale
- Pressure injury s classified using NPUAP classification system  
  Complete healing defined as complete wound closure with restoration of complete epithelialization over wound site
- Analysis considered Stage II PUs only

Pressure injury rate and healing rate
- At referral 147 participants had a Stage II PU. Of these 16.3% had 5 or more PUs (any stage) from referral to death, 19% had 4 PUs, 17.7% had 3 PUs, 29.9% had 2 PUs and 17% had 1 PU
- Of 245 Stage II PUs, 23 (9.4%) fully healed

Univariate analysis  
Hazard of healing was significant for following factors:  
• Younger patients: HR 3.28 for age < 80 versus age 80+ years, p=0.031  
• Higher PPS score: HR 1.82 to 5.99, p<0.001

Multivariate analysis
- Single site  
- No information on management strategies  
- No consideration of wound size and depth, which are known prognostic factors  
- Inclusion criteria and recruitment were unclear

Level of evidence: 1 (prognostic)  
Quality: Moderate
### Individuals in Palliative Care: data extraction and appraisals

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| Ruggeri et al., 2016 | Case series report to validate a specialist team for managing pressure injuries in advanced cancer patients treated in their homes | All patients referred for home palliative services in one year period in one town in Italy (37 people recruited, 20 people with 26 pressure injuries analyzed) | **Participants were treated by an interdisciplinary team including nutritionist, doctor, oncologist, palliative doctor, nurses**  
**Pressure Injury Treatment Protocol was evidence-based validated in literature for each stage and used for consistent care**  
**Treatment protocol included local wound care, rehydration and nutritional supplements when required (10% of patients) and pharmacological management** | **Nutrition evaluation conducted by nutritionist including Karnofsky Scale Index, serum and urinary analysis, dietary questionnaire and calculation of food intake, BMI, calorie/protein balance**  
**Pressure injury evaluation conducted every week that included ulcer site and dimensions, ulcer stage using NPUAP classification, clinical appearance and photography**  
**Norton Scale conducted weekly by nurses** | **Nutritional status**  
- 90% of participants had a normal (BMI 22.6±2.3), 10% had moderate to severe malnutrition treated with oral nutritional supplementation**  
**Pressure injury outcomes**  
- 42.3% of pressure injuries were healed, including 6/26 stage II pressure injuries healed within 42 weeks, 3/26 stage II pressure injuries healed by 100 weeks and 2/26 stage III pressure injuries healed by 100 weeks  
- 46% of pressure injuries had a reduction of wound area of >25% (6 x stage II, 3 x Stage III and 3 x Stage IV)  
- 8% were unchanged  
- 4% had increase ulcer area of >25% | **Hazard of healing was significant for following factors:**  
- Higher PPS score: HR 1.49 to 3.34, p=0.003**  
**Author conclusions:** The Palliative Performance Scale is a key prognostic tool to evaluate likelihood of healing a Stage II pressure injuries in palliative care**  
**Clinical question three:** Standardized local pressure injury management protocols for palliative care  
**Level of evidence:** 4  
**Quality:** low |

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**Pressure Injury Treatment Protocol was evidence-based validated in literature for each stage and used for consistent care**  
**Treatment protocol included local wound care, rehydration and nutritional supplements when required (10% of patients) and pharmacological management** | **Nutrition evaluation conducted by nutritionist including Karnofsky Scale Index, serum and urinary analysis, dietary questionnaire and calculation of food intake, BMI, calorie/protein balance**  
**Pressure injury evaluation conducted every week that included ulcer site and dimensions, ulcer stage using NPUAP classification, clinical appearance and photography**  
**Norton Scale conducted weekly by nurses** | **Nutritional status**  
- 90% of participants had a normal (BMI 22.6±2.3), 10% had moderate to severe malnutrition treated with oral nutritional supplementation**  
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**Author conclusions:** The Palliative Performance Scale is a key prognostic tool to evaluate likelihood of healing a Stage II pressure injuries in palliative care**  
**Clinical question three:** Standardized local pressure injury management protocols for palliative care  
**Level of evidence:** 4  
**Quality:** low |

**Data Tables: 2019 Guideline Update: Individuals in Palliative Care**

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</table>
| Sankaran et al., 2015 | Prospective observational study reporting outcomes for pressure injuries in home care cancer patients in India | Convenience sample of patients recruited over a 3-year period from a homecare service in India (n=108). | • Trained nurse made a home care visit fortnightly to provide education on hygiene, nutrition and repositioning  
  • Existing pressure injuries dressed with boiled cotton cloth strips and home made saline  
  • Metronidazole tablets crushed and applied to wound if malodorous | • Incidence of new pressure injuries  
  • Time taken for pressure injuries to heal  
  • Influence of prognostic factors on healing of pressure injuries  
  • Trained nurses documented pressure injuries on a fortnightly basis using NPUAP staging system. | **Pressure injury rate**  
  21% had pressure injury on admission to home care, 0% developed a new pressure injury  
  **Pressure injury outcomes**  
  42.9% achieved completed healing, 23.8% achieved reduction in pressure injuries Category/Stage, 23.8% had no change to pressure injuries, 9.5% had increase in stage (from Category/Stage 1 to Category/Stage 2)  
  **Duration of pressure injury**  
  Mean persistence of pressure injuries was 56 days (95% CI 0 to 117)  
  Median survival of patient with Category/Stage 1-2 pressure injuries: 75 days  
  Median survival of patient with Category/Stage 3-4 pressure injuries: 37.5 days  
  **Factors influencing healing** (logistic regression)  
  Financial status (below versus above poverty line, p=0.006)  
  Paralysis (p=0.02)  
  Performance status (p=0.02)  
  Age (above versus below 65 years, p=0.03)  
  Cancer site, continence status, family type, gender did not influence healing | • Selection of participants is unclear and may be biased  
  • Patients did not receive care that would be considered standard in a contemporary Western society  
  • No reporting of pressure injury sizes | 4 | low |
## Clinical question three: Managing wound odor

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</table>
| Bale, Tebbie, & Prince, 2004 | RCT exploring effectiveness of metronidazole gel for decreasing wound odor in different types of chronic wounds | Participants were recruited in unknown facility and manner (n=41, n=26 completed) | • Participants were randomized to received either:  
  o Metronidazole gel (n=20 commenced, n=13 completed)  
  o Placebo gel (n=21 commenced, n=13 completed) | • Wound odor measured on a 10-point scale  
  • Patients, staff members and family members rated odor (blinded)  
  • Odor rated on days 0, 1, 3, and 7  
  • Also measured leakage, sleep and anxiety | Wound odor rated by patients  
 Metronidazole gel group had faster improvement in odor reduction than placebo group, reporting good resolution by day 1 (from median score of 8 at day 0 to 3.5 at day 1 versus placebo group: median score of 6 at day 0 to 5 at day 1; p<0.01)  
 Wound odor rated by nurses  
 Metronidazole gel group had faster improvement in odor reduction than placebo group, reporting good resolution by day 1 (from median score of 7.5 at day 0 to 3.5 at day 1 versus placebo group: median score of 7 at day 0 to 5 at day 1; p<0.01)  
 Wound odor rated by relatives  
 Metronidazole gel group had faster improvement in odor reduction than placebo group, reporting good resolution by day 1 (from median score of 6 at day 0 to 3 at day 1 versus placebo group: median score of 8 at day 0 to 6.5 at day 1; p<0.01) | • Unknown methods of recruitment  
 • Randomization and allocation concealment not reported  
 • Blinded outcome measurement |
| Kalinski et al., 2005 | Observational study exploring effectiveness of metronidazole gel for decreasing wound odor in malodorous wounds | Participants recruited in unknown location and manner (n=16) | • Participants all received 0.75% Metronidazole gel made by putting 3.6g metronidazole into 10mL propylene glycol to make a gel that was then added to hydroxypropyl methylcellulose | • Wound odor measured on a 10-point scale  
  • Patient and researcher rated odor  
  • Odor rated on days 0, and then daily for 2 weeks | Wound odor  
 Statistically significant decrease in odor at one day compared to baseline for patient ratings and researcher ratings (p<0.05 for both)  
 Statistically significant decrease in odor at one 7 and day 14 compared to baseline for patient ratings and researcher ratings (p<0.05 for both) | Indirect evidence: (fungating tumors) |

**Indirect evidence:** (mixed etiology wounds)
## Individuals in Palliative Care: data extraction and appraisals

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<tr>
<td>Newman, Allwood, &amp; Oakes, 1989</td>
<td>Observational study exploring effectiveness of metronidazole gel for decreasing wound odor in malodorous wounds</td>
<td>Participants recruited in unknown location and manner (n=68)</td>
<td>• Taking systemic antibiotics (prepared by a pharmacy) applied at 1.5mm thickness over entire wound surface on a daily basis • No wounds debrided • All wounds receiving saline cleanse, gel then an absorbent dressing</td>
<td>Wound odor measured on a 10-point scale</td>
<td>Cost analysis • Costs for compounded metronidazole gel was $0.028/gram ($US in 2005) • Costs of commercially prepared Metronidazole gel was $0.96/gram • Amount of product used in study suggests one dose was 38g</td>
<td>Wound odor: Gel completely controlled the odor of 50% lesions; had a reasonable effect on 46% of lesions and no effect on 4% of lesions Adverse events: One participant had skin irritation after 7 days of daily treatment</td>
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</table>

### Background information: Prevalence of pressure injuries

| Hoben et al., 2016 | Cross sectional exploring prevalence of pressure injuries and their burden and cost | A retrospective review of patient records in a stratified random sample of Canadian nursing homes (n=30, n=6007 residents) | • A literature review identified 20 symptoms described as common at the end of life, causing physical/psychologic al distress • Resident Assessment Instrument Minimum Data Set (RAI-MDS) 2.0 was collected from the last assessment before death for prevalence | Prevalence • Burden of symptoms categorized as low, medium or high as voted by survey participants • Financial Impact categorized as low, medium or high as voted by survey participants | Pressure injury prevalence • Prevalence of pressure injuries (Category/Stage 2 or greater) across the facilities was 10.8% • Pressure injuries represented the 14th most prevalent burdensome symptoms Pressure injury burden • Patient burden was ranked as medium by care staff • Financial burden was ranked as medium by care directors | • Very little information about the sample population provided • No information given on the care staff participating in the survey and their experience with symptoms • Relies on documentation for prevalence | Level of evidence: 4 Quality: low |
## Individuals in Palliative Care: data extraction and appraisals

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<tr>
<td>Queiroz, Mota, Bachion, &amp; Ferreira, 2014</td>
<td>Cross sectional study to identify prevalence of pressure injuries in people in home palliative care</td>
<td>Participants were recruited from one homecare service in a metropolitan area of Brazil (n=90 recruited, n=64 analyzed, 26 lost to follow up due to death or moving location)</td>
<td>Not applicable</td>
<td>The outcomes were measured by the Pressure Ulcer Healing Scale (PUSH), Karnofsky Performance Scale, the Katz Index, and the Lawton scale</td>
<td>The prevalence of pressure injuries was 18.8%, mean PUSH scale score 9.05±5.38</td>
<td>No analysis across multiple sites</td>
</tr>
</tbody>
</table>

Inclusion criteria:  
- Adults with advanced cancer at home

Limitations and comments:  
- No statistically significant differences were found in clinical variables (smoking and alcohol use, dependency levels, continence, cardiovascular problems, being underweight, received education) between those who had pressure injuries and those who did not
- No statistically significant differences were found in demographic variables (age, gender, race, education level, religion, living with partner) between those who had pressure injuries and those who did not
- The sample size is too little
- Management of pressure injuries is not reported
- Data collection and recruitment methods not reported in detail
- No detail on size of pressure injuries

Level of evidence: 4  
Quality: moderate

| Estabrooks et al., 2015 | A cross sectional study exploring the prevalence of burdensome symptoms in the last year of life in older adults | Participant records from 36 aged care facilities in Canada were reviewed (n=3647 participants) | No intervention | Data was taken for records and RAI-MDS 2.0 assessments  
Recorded data on 7 selected conditions including pressure injuries Stage II or higher  
Recorded data on organizational context including leadership | Results relevant to pressure injuries  
Pressure injury prevalence was not significantly different between individuals with or without dementia  
Residents who had 4 quarterly assessment before death were less likely to have a pressure injuries than those who were assessed for between 1 and 3 quarters before death (9.8% versus 12.1%, p=0.005) | Only peripherally related to topic and results do not support conclusions |

Inclusion criteria:  
- Inpatient in a participating facility

Exclusion criteria: Not stated

Author conclusions: author concluded that there were significantly more pressure injuries

Level of evidence: 4  
Quality: Low
## Individuals in Palliative Care: data extraction and appraisals

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| Aminoff, 2012 | Cohort study investigating 6-month outcomes for patients with end-stage dementia and PU | Participants were recruited over a 3-year period from a geriatric centre in Israel (n=200) | Comparison of two cohorts:  
  - Cohort one: no PU on admission (n=80)  
  - Cohort two: PU on admission (n=120) | Mini-Suffering State Examination (MSSE, validated tool) that assesses for presence of conditions associated with suffering, of which PU is one.  
  - Presence of PU (Stages I to IV) unclear how this was assessed | On admission participants with PU had a higher rate of:  
  - male gender (p<0.009)  
  - malnutrition (low albumin; p<0.0001)  
  - high cholesterol (p<0.0001)  
  - antidepressants (10.8% vs. 2.5%, p=0.028)  
  - analgesia (23.8% vs. 11.7%, p=0.032) | Participants with PU had a significantly higher 6-month mortality rate compared with those without PU (71.3% vs. 45.8%, p<0.0001)  
  - Participants with PU had a higher significantly higher MSSE score than those without PU (5.49±2.17 vs. 3.48±2.22, p<0.0001)  
  - On the MSSE, participants with PU had no significant differences for being not calm, screaming, pain, eating disorder, of suffering according to family opinion.  
  - On the MSSE, participants with PU were more likely to have malnutrition, invasive actions, suffering according to medical opinion and unstable medical conditions. | Unclear how outcome measures e.g. presence of PU was assessed  
  - It is unclear whether the overall significant difference in MSSE score is attributable to presence of PU being one question on the MSSE  
  - Study conclusions: People with end-stage dementia that have concurrent PU have a high 6-month mortality rate. It is unclear if PUs arise from their multiple medical conditions or contribute toward them. |

Participant characteristics:  
- Mean age 88 years  
- 65.8% female  
- Mean length of stay 24.8±31.4  
- 77.8% died in ward  
- 95.1% had cancer  

Limitations and comments:  
- Injurie injuries in individuals without dementia compared to those with dementia, although the data did not support this conclusion

Level of evidence: 3  
Quality: low
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| Hendrichova et al., 2010 | Retrospective records analysis of PU prevalence in cancer patients | Records were analysed from patients with cancer admitted within a 6-month in 2008 to a palliative care service in Italy (n= 414) | Individualized prevention strategies were used for all participants including:  
• higher specification foam mattress  
• an active support surface for patients with highest risk  
• regular turning and repositioning  
• observed skin regularly  
• used skin emollients to hydrate dry skin and reduce the risk of skin damage | Presence of PUs determined using European staging system | • Prevalence of PUs of 22.9%  
• Incidence of PUs of 6.7%  
• Karnofsky Performance Scale (KPS) Index scores, age and length of stay were significantly related to the pressure sore development (p<0.001)  
• Patients who developed PUs were significantly older than those who did not develop them (79.9±6.8 versus 73.4±11.5 days)  
• Patients who developed PUs were cared for a significantly greater number of days (57.2 versus 37.4 days, p=0.027) | • Retrospective design  
• Single site study  
• Lacks generalizability |
| V. Maida, Ennis, & Corban, 2012 | Prospective observational sequential case series cohort comparison of PU incidence in palliative care patients | Participants were sequential patients referred from a community and hospital based palliative care program in Canada (n=593 with 1036 wounds were assessed) | Participants were followed by serial clinical assessments every 24-48 hours throughout their palliative trajectory  
Performance status was measured at baseline and then weekly until death  
Risk was measured using the Braden Scale | Observational period spanned 24 months PUs were classified according to the National Pressure Ulcer Advisory Panel (NPUAP) | • During the 24 month assessment period 891 new wounds developed  
• PUs accounted for 60.6% of all wounds  
• Most common anatomical site for wounds was the coccyx/sacrum  
• non-cancer patients experienced a higher prevalence of PUs  
• cancer patients had a higher point prevalence of malignant wounds and iatrogenic wounds | Study conclusions: palliative care patients have a high rate of wound development, with PUs accounting for 60.6% of wounds and the most common site being the sacrum/coccyx region. Non-cancer patients have a higher risk of PU, with a lower mean Braden score and higher level of co-morbidity.  
• Participants all were recruited from a single health care organization in a single country  
• Reassessment occurs at 24 and 48 hour intervals resulting in some degree of error in assessing the onset date of particular wounds | Level of evidence: 4  
Quality: moderate |
### Individuals in Palliative Care: data extraction and appraisals

<table>
<thead>
<tr>
<th>Ref</th>
<th>Type of Study</th>
<th>Sample</th>
<th>Intervention(s)</th>
<th>Outcome Measures &amp; Length of Follow-up</th>
<th>Results</th>
<th>Limitations and comments</th>
</tr>
</thead>
</table>
| Vincent Maida, Ennis, Kuziemsky, & Corban, 2009 | Cohort study investigating the association between wounds and survival in cancer patients | Participants were cancer patients (n=418) of which 90% were followed to their death) | • Assessment on admission to study | • Cancer type classified per body system  
• Wound types were classified within 24 hours of admission | • Participants with wounds were less likely to have gastrointestinal cancer than those without wounds (37.4% versus 62.6%, p<0.0001)  
• PUs were the most common wound class observed (22.7%)  
• Participants with wounds at referral had a significantly worse prognosis (23 days versus 43 days, p<0.0001) | • Participants all were recruited from a single health care organization in a single country  
• Reassessment at 24 and 48 hour intervals leads to degree of error in assessing the onset date of wounds |
| V. Maida et al., 2012 | Prospective case series assessing potential for complete wound healing in patients with advanced illness. | Participants were recruited from a palliative care program in Canada. (n = 282 with 823 wounds of mixed aetiology) | | | | |
| Bonaldi, Parazzini, Corli, & Multicentre-observational study providing | Participants recruited from seven publically funded palliative care centres in Milan. (n=1081) | MD completed a 2-part questionnaire:  
• socio-demographic characteristics | | | | |
## Individuals in Palliative Care: data extraction and appraisals

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</tr>
</thead>
</table>
| **Lodetti, 2009** | Information on PU epidemiology across a range of people receiving palliative care | Inclusion:  
- Diagnosis of end-stage cancer where no curative treatment available  
- Did not require admission for intensive care  
- Not expected to live longer than 90 days. | Clinical data including  
- Information regarding presence and severity of PU | Self-evaluated pain and self-reported dyspnea using VAS with both outcomes assessed as moderate-to-severe where the VAS score was greater than 5.  
- Assessments twice weekly  
- Patients followed until death or withdrawal from the study | 67 withdrew from the study.  
PU prevalence:  
- 10.5% reported to have PU  
- Mean PU/participant 1.5±1.2  
- 1.3% reported stage III or IV PU  
- 9.6% males had PU  
- 11.4% females had PU | Of PU by cancer type and location at time of death  
Local variation in palliative care services across Italy perhaps limiting generalisation from the data to services in Italy and beyond. |
| **Masaki, Riko, Seiji, Shuhei, & Aya, 2007** | Retrospective cohort study investigating pressure injuries in cancer patients | Participants were 202 patients with cancer (n=202) and without malignant disease (n=217) recruited in a medical center in Japan over a 2-year period  
Inclusion criteria: Developed a pressure injury | All 419 individuals with pressure injury were treated until healed or patient died | Ohura Scale for pressure injury risk assessment | Healing times:  
There was no significant difference in mean healing time between the cancer group and non-cancer group (19 days versus 18.8 days, p=0.92)  
Pressure injury risk:  
Individuals with cancer had a significantly greater pressure injury risk (OH scale score 3.28 versus 3.84, p=0.04)  
Conclusions: Patients whose underlying disease is cancer more likely to develop pressure injuries but time to healing is not different | Retrospective format limited to accuracy & completeness of documentation  
Minimal reporting of methods including selection criteria  
Aim is not clear | Level of study: 3  
Quality: low |
### Background information: Relationship of pressure injuries to other outcomes

<table>
<thead>
<tr>
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<th>Level of evidence</th>
<th>Quality:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dincer et al., 2016</td>
<td>Retrospective study exploring factors influencing duration of stay in palliative care</td>
<td>Participant records from one geriatric palliative care center in Turkey over a 30-month period were reviewed (n=120 participants, n=111 included)</td>
<td>No intervention</td>
<td>Palliative Performance Scale (PPS) indicating level of dependency</td>
<td>Median duration in facility was 24 days (range 6 to 212)</td>
<td>• Sacrum was site for 76 to 77% of pressure injuries</td>
<td>4</td>
<td>moderate</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Demographics and prevalence of various conditions</td>
<td>Factors influencing length of stay</td>
<td>• Pressure injury assessment methods not reported</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Length of stay</td>
<td>• Individuals with pressure injuries had a significantly longer length of stay (38 IQR 64 days versus 20 IQR 22 days, p=0.001)</td>
<td>• Severity and duration of pressure injuries not reported</td>
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<td></td>
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<td>• Nutrition problems was the only other factor associated with length of stay</td>
<td>• Management strategies not reported</td>
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<td></td>
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<td>• Gender, marital status, cancer, neurological disease, infection, chronic systemic disease and pain were not associated with length of stay</td>
<td>• Pressure injuries present on admission and may not have been assessed thereafter</td>
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<td>• Individuals with pressure injuries were also less likely to express willingness to be discharged (p&lt;0.001)</td>
<td>• Retrospective study</td>
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<td></td>
<td>Author conclusions: Individuals with pressure injuries have longer duration of stay in palliative care facilities and are less likely to be willing to be discharged</td>
<td>It was unclear how death during admission was managed</td>
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<td>Level of evidence: 4</td>
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<td></td>
<td></td>
<td>Quality: moderate</td>
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</tbody>
</table>
| Gozalo et al., 2011  | Retrospective observational study investigating association between burdensome health care transition and outcomes indicating of poor quality in end-of-life care | Participants were retrospective record reviews of Medicare Minimum Data Set and claims from files 2000 to 2007 for deceased nursing home residents in USA (n= 474,829) | Authors examined whether there was an association between regional rates of burdensome transition and the likelihood of presence of a stage IV PU and hospice enrolment in the last 3 days of life | Burdensome transition defined as:  
  - Transfer in last 3 days of life  
  - Lack of continuity of nursing home facilities before and after hospitalization in last 90 days of life  
  - Multiple hospitalizations in last 90 days of life | Median duration in facility was 24 days (range 6 to 212) | • Burdensome transition  
  - 19% of participants had at least one burdensome health care transition (range 2.1% to 37.5% between regions)  
  - 5,176 (13.6%) had a stage IV pressure injury  
  - Adjusted risk ratio for a stage IV PU in last 30 days of life ranged from 1.48 (95% CI 1.31 to 1.66) in the region with the lowest quintile for burdensome transitions to 2.28 (95% CI 2.04 to 2.54) in regions in the highest quintile of burdensome transitions | 4 | moderate |
|                      |                                                                               |                                                                        |                                                                              |                                                                                   | Author conclusions: Individuals with pressure injuries have longer duration of stay in palliative care facilities and are less likely to be willing to be discharged | • Retrospective design relying on record entries                                                        |
|                      |                                                                               |                                                                        |                                                                              |                                                                                   | • No information regarding patient preferences for care or transfer       | • Large variability between USA states reduces generalizability within and                                   |                   |               |
## Individuals in Palliative Care: data extraction and appraisals

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</table>

**Background information: Experience of pressure injuries in palliative care**

Kayser-Jones et al., 2008

**Prospective, anthropological study reporting on the experience of terminally ill residents admitted with or acquiring PUs in a nursing home**

A purposive sample of residents receiving end-of-life care in two nursing homes in USA (n=117, n=64 with PU)

**Characteristics:**
- Of residents with PU, 37.5% had acquired PU whilst in facility and 59.4% had acquired them at home before admission.
- Mean age of residents with PU was significantly higher than those without PU (81 vs. 76 yrs, \( p=0.033 \))
- Mean length of stay was longer for residents with PU (112 vs.52 days, \( p=0.0033 \))
- Residents with PU had higher requirement for ADL support (\( p=0.022 \)) and were less likely to have cancer (\( p=0.01 \)).
- 64 residents had a total of 171 PU.

**Records review for quantitative descriptive statistics**

Interviews, events analysis for qualitative data (primarily a qualitative study)

Data were collected during a 30-month period spent in the research settings observing daily activities, asking appropriate questions, identifying and interviewing key informants, and taking detailed field notes.

- 81.3% of residents with PU at time of study still had a PU at time of death.
- 47.3% of the PUs were on lower extremities.
- Healed PU occurred in:
  - 17% stage I PU
  - 29.8% stage II PU
  - 20% stage III PU
  - 0% stage IV PU
  - 29.4% of all PUs
- A significant finding was that the residents with PUs had a mean weight loss of 30 pounds, whereas those without PUs had a mean weight loss of 6.9 pounds.
- Qualitative interviews identified organizational factors that led to the development of PU:
  - Inadequate staffing and lack of supervision led to inadequate assistance with meals, infrequent repositioning and inadequate incontinence care. These factors led to weight loss, unrelieved pressure and moist, irritated skin. As a result a high rate of resident who were dying developed PUs.
  - Absence of family advocates and inability to speak English were factors that contributed to the above model of PU development in residential aged care.

Limitations include the small sample and that data were collected in only two nursing homes. This study was not initially designed as an investigation of PUs, thus the data are not comprehensive for the PU experience.

Level of evidence: 4 Quality: moderate
## Individuals in Palliative Care: data extraction and appraisals

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<th>Level of evidence</th>
<th>Quality</th>
</tr>
</thead>
</table>
| Searle & McIerney, 2008 | Interpretative description qualitative study about nursing experiences in palliative care | Participants were nurses with recent experience in providing end-of-life care (n=12 nurses) | • Semi-structured interviews were used to collect data, including preventing for pressure injuries  
• Interviews were audio-taped, transcribed verbatim and imported into the software NVivo | Outcomes not assessed with qualitative design – looking for themes to emerge and data saturation | Themes that emerged:  
• Moral agency  
• Disagreements about best care between nurses  
• Disagreement between nurse, patient and family members on best end of life care  
• Disagreements about best care between nurses on difference shifts or wards  
• Moral distress | • Focuses on nurses in one setting  
• Restriction to health service  
• Small sample size with minimal contradictory data sought out of presented | 5 | moderate |

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Table 1: Level of Evidence for Intervention Studies

<table>
<thead>
<tr>
<th>Level</th>
<th>Experimental Designs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>Randomized trial</td>
</tr>
<tr>
<td>Level 2</td>
<td>Quasi-experimental design</td>
</tr>
<tr>
<td></td>
<td>• Prospectively controlled study design</td>
</tr>
<tr>
<td></td>
<td>• Pre-test post-test or historic/retrospective control group study</td>
</tr>
<tr>
<td>Level 3</td>
<td>Observational-analytical designs</td>
</tr>
<tr>
<td></td>
<td>• Cohort study with or without control group</td>
</tr>
<tr>
<td></td>
<td>• Case-controlled study</td>
</tr>
<tr>
<td>Level 4</td>
<td>Observational-descriptive studies (no control)</td>
</tr>
<tr>
<td></td>
<td>• Observational study with no control group</td>
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<tr>
<td></td>
<td>• Cross-sectional study</td>
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<tr>
<td></td>
<td>• Case series (n=10+)</td>
</tr>
<tr>
<td>Level 5</td>
<td>Indirect evidence: studies in normal human subjects, human subjects with other types of chronic wounds, laboratory studies using animals, or computational models</td>
</tr>
</tbody>
</table>

Table 2: Levels of evidence for diagnostic studies in the EPUAP-NPUAP-PPPIA guideline update

| Level  |                                                                                   |
|--------| Adamant                                  |
| Level 1| Individual high quality (cross sectional) studies according to the quality assessment tools with consistently applied reference standard and blinding among consecutive persons. |
| Level 2| Non-consecutive studies or studies without consistently applied reference standards. |
| Level 3| Case-control studies or poor or non-independent reference standard.               |
| Level 4| Mechanism-based reasoning, study of diagnostic yield (no reference standard). Low and moderate quality cross sectional studies. |

Table 3: Levels of evidence for prognostic studies in the EPUAP-NPUAP-PPPIA guideline update

| Level  |                                                                                   |
|--------| Adamant                                  |
| Level 1| A prospective cohort study.                                                        |
| Level 2| Analysis of prognostic factors amongst persons in a single arm of a randomized controlled trial. |
| Level 3| Case-series or case-control studies, or low quality prognostic cohort study, or retrospective cohort study. |

APPRAISAL FOR STUDIES PROVIDING DIRECT EVIDENCE (i.e. ELIGIBLE FOR SUPPORTING AN EVIDENCE-BASED RECOMMENDATIONS)

Each criteria on the critical appraisal forms was assessed as being fully met (Y), partially met or uncertain (U), not met/not reported/unclear (N), or not applicable (NA). Studies were generally described as high, moderate, or low quality using the following criteria: (please review full methodology for classification of risk factor studies)

- High quality studies: fully met above 80% of applicable criteria from each reviewer
- Moderate quality studies: fully met at least 70% of applicable criteria from each reviewer
- Low quality studies: fully met less than 70% of applicable criteria from each reviewer
### CROSS SECTIONAL/SURVEY/PREVALENCE STUDIES/OBSERVATIONAL

<table>
<thead>
<tr>
<th>Endnote ID</th>
<th>Author/year</th>
<th>Focussed question</th>
<th>Sampling method</th>
<th>Representative sample</th>
<th>States number invited</th>
<th>Participants considered</th>
<th>Clear outcome measures</th>
<th>Valid reliable outcome measurement</th>
<th>Comparable results for multiple sites</th>
<th>Confounders identified and accounted for</th>
<th>Minimal bias</th>
<th>Reliable conclusions</th>
<th>Level of evidence</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>8065</td>
<td>Sankaran et al., 2015</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>U</td>
<td>Y</td>
<td>NA</td>
<td>U</td>
<td>N</td>
<td>N</td>
<td>4</td>
<td>low</td>
<td></td>
</tr>
<tr>
<td>10652</td>
<td>Hoben et al., 2016</td>
<td>Y</td>
<td>N</td>
<td>U</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>U</td>
<td>U</td>
<td>4</td>
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<td>Dincer et al., 2016</td>
<td>Y</td>
<td>Y</td>
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<td>8544</td>
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<td>Y</td>
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<tr>
<td>2990</td>
<td>Queiroz et al., 2014</td>
<td>Y</td>
<td>U</td>
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<td>Y</td>
<td>U</td>
<td>Y</td>
<td>4</td>
<td>Moderate</td>
<td></td>
</tr>
</tbody>
</table>

### CASE SERIES

| Endnote ID | Author/year | Focussed question | Participant characteristics reported | Inclusion criteria defined | Participants entered at same disease stage | Intervention clearly reported | Outcomes relevant and defined a posteriori | Valid, reliable outcome measurement | Per cent drop out reported and acceptable | Estimates of random variability | Comparable results for multiple sites | Minimal bias | Reliable conclusions | Level of evidence | Quality |
|------------|-------------|-------------------|------------------------------------|--------------------------|------------------------------------------|-------------------------------|-------------------------------------|----------------------------------|---------------------------------|-----------------------------|-----------------|---------------------|-----------------|--------|
| 16431      | Ruggeri et al., 2016 | Y | Y | Y | U | Y | Y | Y | Y | N | NA | N | N | 4 | low |
PROGNOSTIC STUDIES

| Author/year | Adequate description of baseline characteristics | Satisfaction study attrition | Clear outcome measures/prognostic factors | Range of prognostic factors/confounders measured and identified | Method of measuring prognostic factor is reported, valid and reliable | Continuous variable or appropriate cut offs | Percent participants with complete data acceptable | Appropriate imputation method | Confounders/prognostic factors accounted for in analysis | Selective reporting avoided | Adequate sample size (10 PIs per factor) | Level of evidence | Quality |
|-------------|-------------------------------------------------|-----------------------------|------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------|---------------------------------------------|-----------------------------------------------|-------------------------------------------------|-----------------------------------------------|-------------------------------|---------|
| 2984 V. Maida et al., 2014 | Y | Y | Y | Y | Y | Y | Y | N | Y | Y | Y | 1 (prognostic) | Moderate |
| 14329 Carlsson & Gunningberg, 2017 | Y | NA | Y | Y | Y | U | Y | Y | U | Y | U | 3 (prognostic) | Moderate |
| 14320 Sternal et al., 2017 | Y | U | Y | Y | Y | N | Y | U | NA | U | N | U | 3 (prognostic) | Low |

References


