Prevention and Treatment of Pressure Ulcers: 
*Prevalence and Incidence* – an extract from the Clinical Practice Guideline
INTRODUCTION

Foreword

This document presents an extract of the full Clinical Practice Guideline. The methodology used to appraise research and develop the recommendations is presented in the Clinical Practice Guideline, the abridged Quick Reference Guide, and in the methodology report, all available on the International Pressure Ulcer Guideline website (www.internationalguideline.com).

The full Clinical Practice Guideline presents recommendations and summarizes the supporting evidence for pressure ulcer prevention and treatment. The first edition was developed as a four year collaboration between the National Pressure Ulcer Advisory Panel (NPUAP) and the European Pressure Ulcer Advisory Panel (EPUAP). In the second edition of the guideline, the Pan Pacific Pressure Injury Alliance (PPPIA) has joined the NPUAP and EPUAP.

The goal of this international collaboration was to develop evidence-based recommendations for the prevention and treatment of pressure ulcers that could be used by health professionals throughout the world. An explicit scientific methodology was used to identify and critically appraise all available research. In the absence of definitive evidence, expert opinion (often supported by indirect evidence and other guidelines) was used to make recommendations. Drafts of the recommendations and supporting evidence were made available to 986 invited stakeholders (individuals and organizations) around the world. The final guideline is based on available research and the accumulated wisdom of the NPUAP, EPUAP, PPPIA and international stakeholders. In this edition of the guideline, a consensus voting process (GRADE) was used to assign a strength to each recommendation. The strength of recommendation identifies the importance of the recommendation statement based on potential to improve patient outcomes. It provides an indication to the health professional of the confidence one can have that the recommendation will do more good than harm, and can be used to assist in prioritizing pressure ulcer related interventions. Printed copies of the English version of the full Clinical Practice Guideline are available through links provided on the following websites:

- NPUAP website: www.npuap.org
- EPUAP website: www.epuap.org
- Wounds Australia (previously Australian Wound Management Association) website: www.woundsaustralia.com.au
- New Zealand Wound Care Society (NZWCS) website: www.nzwcs.org.nz
- International Pressure Ulcer Guideline website: www.internationalguideline.com

Suggested Citation

The NPUAP, EPUAP and PPPIA welcome the use and adaptation of this guideline at an international, national and local level. We request citation as the source, using the following format for this extract:

Limitations and Appropriate Use of This Guideline

- Guidelines are systematically developed statements to assist health professional and patient consumer decisions about appropriate health care for specific clinical conditions. The recommendations may not be appropriate for use in all circumstances.
- The decision to adopt any particular recommendation must be made by the health professional with consideration to available resources and circumstances of the individual patient. Nothing contained in this guideline is to be considered medical advice for specific cases.
- Because of the rigorous methodology used to develop this guideline, the Guideline Development Group members believe that the research supporting these recommendations is reliable and accurate. Every effort has been made to critically appraise the research contained within this document. However, we do not guarantee the reliability and accuracy of individual studies referenced in this document.
- This guideline is intended for education and information purposes only.
- This guideline contains information that was accurate at the time of publication. Research and technology change rapidly and the recommendations contained in this guideline may be inconsistent with future advances. The health professional is responsible for maintaining a working knowledge of research and technology advances that may affect his or her clinical decision making.
- Generic names of products have been used. Nothing in this guideline is intended as endorsement of a specific product.
- Nothing in this guideline is intended as advice regarding coding standards or reimbursement regulations.
- The guideline does not seek to provide full safety and usage information for products and devices; however commonly available safety and usage tips have been included. Adverse events reported in the included research have been reported in the evidence summaries and caution statements. All products should be used according to manufacturer’s directions.

Abstract

The guideline is the result of a collaborative effort among the National Pressure Ulcer Advisory Panel (NPUAP), European Pressure Ulcer Advisory Panel (EPUAP) and Pan Pacific Pressure Injury Alliance (PPPIA). A comprehensive literature review was conducted on pressure ulcer prevention and treatment. A rigorous scientific methodology was used to appraise available research and make evidence-based recommendations for the prevention and treatment of pressure ulcers. Draft guidelines were made available to 986 invited stakeholder individuals and organizations/societies and stakeholder feedback was considered by the guideline developers. In the final development process, the guideline development team used a consensus voting process (GRADE) to assign strengths of recommendation. Strength of recommendations indicate the extent to which one can be confident that adherence to a recommendation will do more good than harm, and are intended to assist the health professional to prioritize interventions.

The full Clinical Practice Guideline includes 575 explicit recommendations and/or research summaries.

This extract focuses on the evidence presented on repositioning and mobilization for prevention and treatment of pressure ulcers. The extract also includes a chapter on repositioning to prevent heel pressure ulcers.
Strengths of Evidence and Strengths of Recommendations

Full explanation of the methodology is available in Appendix 1: Guideline Methodology. Individual studies were assigned a ‘level of evidence’ based on study design and quality. The body of evidence supporting each recommendation was given a ‘strength of evidence’. A consensus voting process (GRADE) involving all the experts formally engaged in the guideline development was used to assign a ‘strength of recommendation’ that indicates the confidence the health professional can have that the recommended practice will improve patient outcomes (i.e., do more good than harm). The overall aim of the ‘strength of recommendation’ is to help health professionals to prioritize interventions.

### Strengths of Evidence

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<th>Level</th>
<th>Description</th>
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<tr>
<td>A</td>
<td>The recommendation is supported by direct scientific evidence from properly designed and implemented controlled trials on pressure ulcers in humans (or humans at risk for pressure ulcers), providing statistical results that consistently support the recommendation (Level 1 studies required).</td>
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<tr>
<td>B</td>
<td>The recommendation is supported by direct scientific evidence from properly designed and implemented clinical series on pressure ulcers in humans (or humans at risk for pressure ulcers) providing statistical results that consistently support the recommendation. (Level 2, 3, 4, 5 studies)</td>
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<tr>
<td>C</td>
<td>The recommendation is supported by indirect evidence (e.g., studies in healthy humans, humans with other types of chronic wounds, animal models) and/or expert opinion</td>
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### Strengths of Recommendation

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<td>⬅</td>
<td>Weak positive recommendation: probably do it</td>
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<tr>
<td>⊗</td>
<td>No specific recommendation</td>
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<tr>
<td>⬅</td>
<td>Weak negative recommendation: probably don’t do it</td>
</tr>
<tr>
<td>☠</td>
<td>Strong negative recommendation: definitely don’t it</td>
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</table>

### Guideline Website

http://www.internationalguideline.com

The guideline website will remain accessible during the interim period until the next guideline revision. The Quick Reference Guideline, sponsor acknowledgement, and supportive documents to the guideline are available from the website.
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INTRODUCTION

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Janet Cuddigan, PhD, RN, CWCN, FAAN, Interim Methodologist (literature update, review and analysis during the interim between formal guideline development activities [2009 to 2012])

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**Translation**

The following experts from the Clinical Research Center for Hair and Skin Science, Department of Dermatology and Allergy, Charité-Universitätsmedizin Berlin, Germany completed translation and data extraction for papers in languages other than English:

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**Stakeholders**

Special thanks to the many stakeholders who reviewed the guideline processes and drafts. All stakeholder comments were reviewed by the Guideline Development Group and revisions were made based on the comments received. We appreciate the investment of health professionals, researchers, educators and manufacturers from all over the world who took time to share their expertise and thoughtful critique.
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PREVALENCE AND INCIDENCE OF PRESSURE ULCERS

Defining Prevalence and Incidence

Studies on pressure ulcer frequency have relied on describing the rates and proportions of pressure ulcer incidence and prevalence. Pressure ulcer prevalence is the proportion of individuals within a defined population (e.g., individuals within a specific geographic region, a facility or a ward) that have a pressure ulcer within a defined period of time.

Point prevalence is the number of individuals with a pressure ulcer at a specific point in time (usually on a specific day). The pressure ulcers may have developed recently, or over an extended period of time and for inpatients, they may have been present on admission to the facility.¹,²

\[
\text{Point prevalence (%) = \frac{\text{number patients with pressure ulcer at a specific point in time}}{\text{total number patients in the study population at a specific point in time}}} \times 100
\]

Pressure ulcer incidence is the proportion of pressure ulcer free individuals that develop a pressure ulcer over a specific period of time and therefore provides an indication of the rate at which new pressure ulcers occur in a specified population.

Cumulative incidence is the proportion of a specified population that develops a new pressure ulcer within a specified time period (usually weeks or months). In calculating cumulative incidence, a population free of pressure ulcers is identified and then followed for a specified time period, with periodic determinations of the presence of pressure ulcers for each individual.¹,²

\[
\text{Cumulative incidence (%) = \frac{\text{number patients developing pressure ulcer during a specific time period}}{\text{total number patients in the study population over a specific time period}}} \times 100
\]

Period prevalence is also commonly reported, often because of the time it takes to collect data for a pressure ulcer prevalence study. Period prevalence is the number of individuals who have a pressure ulcer over a specified period of time (usually days or weeks). It describes existing rather than new pressure ulcers identified during a specified time period rather than at a specific point in time, and is therefore a combination of prevalence and incidence.¹,²

Facility-acquired pressure ulcer rates measures the number of individuals with pressure ulcers at a specific point in time that were acquired at the facility (also referred to as nosocomial, hospital-acquired or healthcare-acquired pressure ulcers). Unlike point prevalence, it describes only those individuals with pressure ulcers that were acquired within the facility after admission. An accurate facility-acquired pressure ulcer rate requires an accurate, documented skin assessment on admission to the facility for individuals in the defined population in order to exclude pre-existing pressure ulcers.³

When interpreting pressure ulcer prevalence and incidence, consistency in the methods being compared is critical. While no particular method is more correct, facility-acquired pressure ulcer rates provide a better indication of the effectiveness of pressure ulcer prevention programs than raw prevalence rates. Incidence measures are even more suitable to measure effectiveness. Interpretation of prevalence and incidence studies is complicated by:¹⁻³
• the method used to calculate pressure ulcer rates (e.g., prevalence versus incidence);
• criteria used to define the study population (e.g., measurement setting, type of individual and their pressure ulcer risk);
• variations in time periods over which studies are conducted;
• definitions and classifications used for pressure ulcers (e.g., inclusion or otherwise of Category/Stage I pressure ulcers);
• strategies used to determine presence of a pressure ulcer (e.g., clinical assessment, patient report, documentation review); and
• random variation.

Included Literature

Pieper et al. (2012) recently published a comprehensive overview of pressure ulcer prevalence and incidence research published in peer review journals between January 1, 2000 and November 1, 2011 in a wide range of international clinical settings and populations. This information has been summarized throughout this chapter, with highlights reported, to provide a broad overview of trends in prevalence and incidence in a variety of health care settings. Studies reported in the review by Pieper et al. (2012) are listed following the references for this guideline section. In addition, prevalence and incidence studies published from November 1, 2011 to December 31, 2012 are reported as an update.

Prevalence and Incidence in Acute Care Settings

Sequential studies conducted in acute care settings and published since 2000 have reported pressure ulcer prevalence varying from 3.4% in one year of an eight year retrospective study conducted in 414 Dutch hospitals to 17.6% in a sample from 33 acute care units in a Swedish university hospital. In both cases, the point prevalence rate was attained following rigorous methods used for international and national benchmarking (i.e., the California Nursing Outcomes Coalition (CALNOC) hospitals methodology and the LPZ International methods). However, the study reporting lowest prevalence rates did not include Category/Stage I pressure ulcers in the reporting. The lowest prevalence rates since 2000 that included Category/Stage I pressure ulcers was reported by Gunningberg et al. (2012), who found a prevalence of 6.3% in a sample from over 1,000 US acute care units in hospitals registered for CALNOC national benchmarking. Goldberg (2012) noted a drop of 1.2% in prevalence between 2008 and 2009, and the more recent data indicates a continuing trend in declining pressure ulcer prevalence.

Other studies published since the review by Goldberg (2012) published in Pieper et al. (2012) report prevalence rates consistent with the range identified over the preceding decade. Inan et al. (2012) conducted a cross sectional study of 404 individuals admitted to a university hospital in Turkey that reported point prevalence rate of 10.4% (95% confidence interval [CI] 7.4 to 13.4), with the most severe pressure ulcers located on the sacrum (43.9%) and trochanter (17.9%). WoundsWest conducted prevalence surveys in 86 Western Australian public hospitals in 2007, 2008, 2009 and 2011 and reported 10.9%, 12.5%, 9.5% and 11.0% respectively.

Gunningberg et al. (2011) reported a point prevalence rate of 14.9% in a facility-wide survey of adults in two Swedish hospitals (n = 1,192) and Gunningberg et al. (2013) reported point prevalence rate of 16.6% in a larger 2011 survey (n = 14,466) that included hospitals in 29 Swedish municipalities. Consistent with the conclusions of Pieper et al. (2012) that Category/Stage I and II pressure ulcers represent the vast majority of acute care pressure ulcers, these two Swedish studies reported 50% to 55% of the pressure ulcers identified were Category/Stage I.

Overall, incidence rates of Category/Stage I to IV pressure ulcers in facility-wide acute care settings and published since the January 2000 of inclusion for the Goldberg (2012) review ranged from 2.8% in a small study (n=310) following participants for a period of four days length of stay to 9% reported in a national US survey following participants over five days length of stay. Both these studies were reported by Pieper et al. (2012), and newly published studies continue to report incidence rates within this range.
Molon et al. (2011) conducted a cross-sectional survey on an orthopedic unit in Brazil, including individuals over 19 years expected to be confined to chair or bed for at least five days and without pre-existing pressure ulcers (n = 43). The cumulative incidence of facility-acquired pressure ulcers within eight weeks of admission was 20%, with a median time to pressure ulcer development of seven days from admission. A major limitation of this study was the small sample size and that individuals who were not expected on admission to be confined to a bed or chair were excluded from the study. In their cross-sectional survey conducted in medical/surgical units, Gunningberg et al. (2012) reported facility-acquired pressure ulcer rates for Category/Stage III and IV pressure ulcers of 2.0% in general Swedish hospitals, 2.7% in university hospitals and 0.5% in CALNOC hospitals. In surveys conducted over four years in 86 Australian public hospitals, facility-acquired pressure ulcer rates reported in 2007, 2008, 2009 and 2011 were 7.8%, 9.3%, 6.3% and 7.4% respectively.3

Goldberg (2012) noted that incidence of deep tissue injury is a new area of study, and reported an incidence rate ranging from 0.3% established in 56 German facilities in 2008 to 9% in two national US surveys.16, 17 Most recently, Gunningberg et al. (2012) highlighted that the US hospitals in their study categorized deep tissue injury slightly differently to the Swedish hospitals; however, the facility-acquired rates reported for Category/Stage III and IV pressure ulcers in both countries appear to include deep tissue injury.

Prevalence and Incidence in Aged Care Settings

Pieper (2012) included 34 prevalence and incidence studies conducted in long term care/nursing homes. Pressure ulcer incidence rates ranged from 3.6% to 59% and prevalence rates ranged from 4.1% to 32.2%. Four more recent studies conducted in aged care settings reported narrower ranges, with pressure ulcer prevalence rates reported from 9% to 14.5% 11, 19, 20 and incidence rates of 1.9% to 5%.19, 21

Igarashi et al. (2013) used a random selection of 135 long term care hospital wards in Japan to conduct a clinical audit of pressure ulcer incidence and prevalence. Incidence was reported at 1.9% ± 3.1%, and point prevalence was 9.5% ± 7.9%. The majority of pressure ulcers were Category/Stage II (40%) or Category/Stage III (38%). Prevalence of Category/Stage IV pressure ulcers was 7.3%. The majority of pressure ulcers were sacral (60.5%) or trochanteric (15.7%).

Moore et al. (2012) conducted a cross-sectional clinical audit in 12 long term aged care facilities in Ireland and reported a pressure ulcer prevalence of 9%. More of the pressure ulcers in this study were classified as Category/Stage IV (24%) than in the study by Igarashi et al. (2013), which may relate to the different type aged care setting (long term care versus short term care). Moore et al. (2012) found the sacrum (58%) and heel (25%) were the most common anatomical locations.

Gunningberg et al. (2013) reported a point prevalence of 14.5% in nursing homes in Sweden. They also reported different prevalence rates according to type of nursing homes, with a prevalence rate of 12.3% in dementia-specific facilities and 21.9% in nursing homes specializing in short term care. In addition, 61.5% of the pressure ulcers occurring in the dementia care setting were classified as Category/Stage I compared with 47.7% of those occurring in the short term aged care setting.

Barba et al. (2011) highlighted that age of participants is a confounding factor to be considered in the analysis of prevalence and incidence rates of pressure ulcers in aged care settings. Their large database review that included over 1 million medical records of older adults discharged from internal medical departments in Spain reported a cumulative incidence of 5.0% in individuals aged over 90 years and 2.8% in those aged from 65 to 90 years. Moore et al. (2012) also suggested that the “older old” experience a higher rate of pressure ulcers, with 56% of pressure ulcers identified in their audit occurring in the 80 to 89 year age group. The study by Igarashi et al. (2013), which reported a relatively low incidence rate of 1.9%, reported that the mean age of participants was only 50.2 ± 6.8 years despite being an aged care setting.

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Prevalence and Incidence in Critical Care Settings

Cuddigan (2012)\textsuperscript{22} examined 23 prevalence, incidence and/or facility-acquired pressure ulcers studies published from 2000 to 2011 that included American, European and Pan-Pacific settings. Prevalence rates ranged from 13.1% in US intensive care units (ICUs) with less than 100 beds\textsuperscript{23} to 45.5% in a study conducted in teaching hospitals in China.\textsuperscript{24} No additional studies published following the Cuddigan (2012)\textsuperscript{22} review and reporting prevalence in critical care settings were identified.

Cuddigan (2012)\textsuperscript{22} reported incidence or facility-acquired rates in critical care settings ranging from 3.3% in a sample from two German hospitals\textsuperscript{25} to 53.4% in Chinese teaching hospitals.\textsuperscript{24}

The data reported by Cuddigan (2012)\textsuperscript{22} indicated that facility-acquired pressure ulcer rates vary depending on the type of critical care setting (e.g., surgical ICU versus medical ICU) but are higher than rates observed in general acute care. One study published more recently confirmed this finding, reporting an average facility-acquired pressure ulcer rate of 5.0 per 1,000 patient days in the critical care unit compared with 1.1 per 1,000 patient days in the general acute care units in the same US hospital.\textsuperscript{26}

Prevalence and Incidence in Operating Room Settings

Ganos et al. (2012)\textsuperscript{27} identified an incidence rate ranging from 5% in a sample of 498 individuals undergoing urological surgery in the US who were followed for 72 hours\textsuperscript{28} to 53.4% in a sample of 109 patients undergoing cardiothoracic surgery in the Netherlands who were followed for 48 hours.\textsuperscript{29} However, Ganos et al. (2012)\textsuperscript{27} highlight that there is a significantly lower incidence rate (e.g., 0% to 1.4%) cited in studies investigating the effectiveness of pressure ulcer prevention interventions in this clinical setting, suggesting that significant and substantial reduction in pressure ulcers associated with surgery is a plausible aspiration.

Two more recently published studies were identified. Scarlatti et al. (2011)\textsuperscript{30} conducted a longitudinal study including 199 surgery patients undergoing surgery of longer than two hours’ duration in a hospital in Brazil. They reported a 20.6% incidence (95% confidence interval [CI] 15.2% to 26.9%). Pressure ulcers were primarily Category/Stage I or II (98.6%) and occurred most frequently on the trunk region (56.7%). Bulfone et al. (2012)\textsuperscript{31} followed a sample of 102 patients who underwent surgery of at least two hours’ duration in an Italian teaching hospital. Overall pressure ulcer incidence was 12.7%, with higher rates observed in general surgery compared with vascular surgery (38.4% versus 15.3%).

Prevalence and Incidence in Pediatric Care

Baharestani (2012)\textsuperscript{32} reported the results from 24 pediatric pressure ulcer prevalence rate studies conducted in US, Europe and Pan-Pacific settings. The review cites prevalence rates ranging from 0.47% in a national US survey of hospitalized pediatric patients\textsuperscript{33} to 72.5% in a small survey of a US pediatric outpatient service.\textsuperscript{34} The highest prevalence reported in an inpatient setting was in a US survey of infants and children with spinal cord injury, 55% of whom had pressure ulcers of Category/Stage II or greater.\textsuperscript{35}

Only one pediatric prevalence study published since the review by Baharestani (2012)\textsuperscript{32} was identified. Schluer et al. (2012)\textsuperscript{36} conducted a study in 14 pediatric hospitals in Switzerland (n = 412 children aged 24 hours to 18 years). The overall pressure ulcer prevalence was 35%, which is higher than quoted in previous literature. Eighty percent of the pressure ulcers were categorized as Category/Stage I. Prevalence rate was highest in the pediatric intensive care unit (PICU; 44%) and neonatology (43%).

Incidence of pressure ulcers in pediatric populations from 2000 to 2012 ranged from 0.25% in a study reporting Category/Stage III or greater pressure ulcers in a PICU in Ireland\textsuperscript{37} to 27% in a multisite study set in US PICUs.\textsuperscript{38} Medical device related pressure ulcers were reported in numerous pediatric studies cited by Baharestani (2012)\textsuperscript{32}. Surveys of neonates receiving continuous positive airway pressure have reported ulcer rates from 32%\textsuperscript{39} to 42.5%.\textsuperscript{40} Most recently, the Swiss study by Schluer et al. (2012)\textsuperscript{36} reported a medical device associated pressure ulcer rate of 40%.
As with other care settings, pediatric pressure ulcer prevalence and incidence rates vary significantly depending on population characteristics (e.g., chronic illness, disability or acute illness) and the care setting (e.g., community care, medical/surgical acute care or PICU). It is clear from this review that pressure ulcers are a significant concern in the pediatric population and preventive initiatives are very much needed, especially related to medical device related pressure ulcers.

**Summary**

Variations in methodological design and rigor continue to confound analysis of prevalence and incidence studies. There is a strong need for consistency in design and reporting in order to enable more reliable international benchmarking. Particularly where the effectiveness of pressure ulcer prevention programs is being investigated, facility-acquired pressure ulcer rates should be reported.

Table 1 provides a summary of the prevalence and incidence rate ranges reported in the literature from January 2000 to December 2012.

**Table 1: Ranges of pressure ulcer prevalence and incidence reported in selected peer-reviewed literature published between 2000 and 2012.**

<table>
<thead>
<tr>
<th>Setting or Population</th>
<th>Prevalence Rates</th>
<th>Incidence &amp; Facility-Acquired Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute care</td>
<td>0% to 46%</td>
<td>0% to 12%</td>
</tr>
<tr>
<td>Critical care</td>
<td>13.1% to 45.5%</td>
<td>3.3% to 53.4%</td>
</tr>
<tr>
<td>Aged care</td>
<td>4.1% to 32.2%</td>
<td>1.9% to 59%</td>
</tr>
<tr>
<td>Pediatric care</td>
<td>0.47% to 72.5%</td>
<td>0.25% to 27%</td>
</tr>
<tr>
<td>Operating room setting</td>
<td>—</td>
<td>5% to 53.4%</td>
</tr>
</tbody>
</table>

An ongoing decline in pressure ulcer prevalence continues to be seen in the general acute care setting. Goldberg (2012) noted a declining trend in prevalence rates over the previous decade, and this trend continued in the most recent publications. In other clinical care settings, trends are less clear because significant variations in the study designs, specific setting descriptions, and population differences confound analyses.

In all clinical settings and populations, partial thickness pressure ulcers are more commonly observed than full thickness pressure ulcers. For example, in one recent operating room study, Category/Stage I pressure ulcers accounted for 98.6% of those observed. With growing international health policy focus on the prevention of full thickness pressure ulcers, prevalence and incidence studies should clearly report pressure ulcers by Category/Stage.

In studies that reported anatomical location of pressure ulcers, the sacrum and heels were cited as the most common location and the location of the most severe pressure ulcers respectively. This pattern was observed in most clinical settings; however, variation was seen in pediatric populations. In children and neonates, occipital and other head (including facial) pressure ulcers were commonly observed. The full Clinical Practice Guideline chapter Repositioning to Prevent and Treat Heel Pressure Ulcers discusses specific interventions for preventing heel pressure ulcers, and sacral pressure ulcers receive noteworthy attention in the Emerging Therapies for Prevention Ulcers in the full Clinical Practice Guideline that includes the most recent research on prophylactic dressings. The Special Populations: Pediatric Individuals section of the full Clinical Practice Guideline addresses specific strategies for preventing and managing pressure ulcers in younger individuals.

The impact of medical devices is a growing concern, particularly in pediatric populations. Medical devices have been associated with up to 34.5% of pressure ulcers in the acute care setting and are estimated to account for 43% of pediatric pressure ulcers. With minimal variation in rates of medical device related pressure ulcers reported over the past decade, this is a significant area for focus on prevention. The guideline chapter Medical Device Related Pressure Ulcers from the full Clinical Practice Guideline provides recommendations and timely guidance on prevention and management of device associated pressure ulcers.
Recommendations

Pressure ulcer prevalence and incidence studies provide valuable data to drive:

- quality improvement on a facility level;
- policy decisions on a national level; and
- research agendas on an international scale.

Unfortunately, significant variations in study methods and methodological rigor limit the value of these data in directing quality, policy and future research. These recommendations are based on sound epidemiological principles and are designed to guide greater consistency and rigor in the design, implementation and reporting of pressure ulcer prevalence and incidence studies in clinical settings.

1. Use a rigorous methodological design and consistent measurement variables when conducting pressure ulcer prevalence and incidence studies. (Strength of Evidence = C; Strength of Recommendation = ★★★)

   Prevalence and incidence studies should clearly report their methodological design. Attempts should be made to use a standardized methodology to allow risk adjustment and benchmarking. A rigorous study should include:

   - clear definition of the study population prior to collecting data;
   - provision of surveyor education,
   - establishment of interrater reliability,
   - skin inspections to categorize/stage pressure ulcers, and
   - two surveyors per skin inspection.

   Prevalence rates based on audit of medical records may be less reliable than data obtained from skin inspections conducted by qualified health professionals.

2. Compare results against organizational, national and/or international data sets (using a similar methodology) to develop a clearer understanding of pressure ulcer prevalence and incidence. (Strength of Evidence = C; Strength of Recommendation = ★★★)

3. Use facility-acquired pressure ulcer rates (rather than prevalence rates) to evaluate pressure ulcer prevention programs. (Strength of Evidence = C; Strength of Recommendation = ★★★)

   Prevalence rates include all individuals in the facility/health service with pressure ulcers, including those with pressure ulcers that were present on admission to the health service. Facility-acquired pressure ulcer rates identify individuals with pressure ulcers that developed after admission; therefore these rates provide a better estimate of the adequacy of pressure ulcer preventive care within the facility. Prospective incidence measures would provide an even more accurate evaluation of prevention; however, this methodology is often too resource intensive for facilities to implement.

4. Present results by pressure ulcer risk level when reporting prevalence and incidence studies. (Strength of Evidence = C; Strength of Recommendation = ★★★)

   A simple description of pressure ulcer rates within various pressure ulcer risk levels may help refine quality improvement initiatives. It allows for more accurate comparison between facilities and may serve as a basis for risk adjustment. It is useful to distinguish population features that relate to pressure ulcer risk (e.g., mean age) in clinical settings that incorporate varying population profiles (e.g., critical care, aged care and pediatric units). A description of the population serviced by the facility can also assist in comparison (e.g., specifying the type of ‘aged care facility’, such as community dwelling older adults versus high level aged care).
5. Include the common anatomical locations of pressure ulcers when reporting prevalence and incidence studies. (Strength of Evidence = C; Strength of Recommendation = \*
)

Reporting pressure ulcer prevalence by anatomical location (e.g., sacrum, heels and occiput) can assist in identifying components of a pressure ulcer prevention program that may require more intensive resources and/or education.

6. Present results by Category/Stage and clearly indicate whether Category/Stage I pressure ulcers were included or excluded in the final calculation of prevalence and incidence rates. (Strength of Evidence = C; Strength of Recommendation = \*
\*)

Additionally, clearly indicate whether suspected deep tissue injuries are included in the reported prevalence and incidence rate, and how they were considered (e.g. combined with another Category/Stage).

7. Include, but do not categorize/stage mucosal membrane pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = \*)

References


Additional References

General Acute Care Studies

The following studies were included in the analysis by Goldberg (2012). Pressure ulcer rates are taken from data extraction tables by Goldberg (2012). As discussed in this section of the guideline, a wide variety of factors influence reported prevalence and incidence rates. For context, please refer to the primary studies.

Prevalence: 3.4% to 8.5%
Incidence in acute care units: 7% to 12%; Prevalence in acute care units: 9% to 15%
HAPU: 0% to 4.2%; Prevalence: 4.7% to 9%
Annual incidence (2 years): 4% to 12%; Monthly prevalence (4 months): 0% to 9.5%
HAPU medical device related: 5.4%; Prevalence medical device related: 8.3% to 9.7%
Incidence Category/Stage I: 42.1%; Prevalence: 8.3% to 22.9%
Hospital-wide prevalence: 10.3% to 11.4%
Incidence: 8.1%; Prevalence: 19.2%
Point prevalence: 18.5%
Hospital-wide prevalence: 10.9% to 14.1% (excluding Category/Stage I)

**Incidence: 6.6% to 9.2%; Prevalence in acute care units: 0% to 16%**


**Incidence: 6.6%; Prevalence: 10%**


**Prevalence: 22.9%**


**Facility-wide prevalence: 26.7%**


**Incidence: 2.8%; Prevalence: 15.8%**


**Monthly HAPU: 1% to 3.3%**


**Prevalence: 6.6%**


**Incidence of DTI only in acute care: 0.3% to 0.5%; Prevalence: 6.4% to 7.1%**


**Annual prevalence: 6.7% to 13.9%**


**Prevalence in nursing homes and hospitals: 11.7%**


**Incidence in acute care units: 0% to 2%; Prevalence in acute care units: 0% to 4.1%**


**Prevalence: 5.8%**


**Prevalence: 15% to 46% (explained reason)**


**HAPU: 0.07% to 0.05%**


**Incidence 9% to 14%**


**Aged Care Studies**
The following studies were included in the analysis by Pieper (2012)18. Pressure ulcer rates are taken from data extraction tables by Pieper (2012)18. As discussed in this section of the guideline, a wide variety of factors influence reported prevalence and incidence rates. For context, please refer to the primary studies.

**Incidence: 10% to 13.6%; Prevalence: 26.9% to 32.2%**

**Mean adjusted incidence: 1%:**

**Prevalence within 2 days of admission 10.3%**

**Prevalence on admission: 9.7%**

**Prevalence in high risk residents: 14.5%**

**Prevalence: 9.2% to 12.7%**

**Prevalence: 8.52% to 8.54%**

**Odds ratio: 0.9**

**Incidence: 11.6% to 11.7%**

**Incidence: 39.4%**

**Incidence: 42.4% to 47.6%**

**Mean prevalence: 8.58%**

**Prevalence among deceased patients: 47%**

**Prevalence Stage II to IV: 7.6% to 12.1%**

Sitting induced incident: 50% to 59%


Incidence: 11.09%


Incidence stage II to IV: 3.4% to 4.7%


Incidence in those who were PU free on admission: 37.5%


Prevalence on admission: 66%


Prevalence: 4.3% to 5.1%


Nursing home acquired pressure ulcer: 60.2% of all PU


Prevalence Stage I to IV: 11.8%; Prevalence Stage II to IV: 6.1%


Prevalence in high risk groups: 9.6% to 16.8%


Cumulative incidence: 28.5% to 42%; Prevalence on admission: 32%


Prevalence: 26.3%


Prevalence: 6.4% to 7.3%


Prevalence: 42.5%


Prevalence on admission: 18.4%


Prevalence: 6.4% to 31.4%

**Prevalence:** 8.3% to 30.8%


**Incidence:** 8.9% to 32.7%; **Prevalence:** 4.8% to 11.3%


**Average incidence:** 0.73% to 5.19%


**Prevalence:** 9.2% to 15.2%


**Prevalence:** 4.1% to 6.2%

**Critical Care Studies**

The following studies were included in the analysis by Cuddigan (2012)\(^\text{22}\). Pressure ulcer rates are taken from data extraction tables by Cuddigan (2012)\(^\text{22}\). As discussed in this section of the guideline, a wide variety of factors influence reported prevalence and incidence rates. For context, please refer to the primary studies.


**Incidence:** 5.2%


**Incidence:** 5.9%


**Incidence:** 17.3%


**ICU prevalence:** 32.7%


**Incidence:** 12.4%


**Incidence:** 35.2%


**Incidence:** 11.2%


**HAPU:** 0% to 2.8%; **Prevalence:** 0% to 13.1%

Incidence: 16%

Cumulative incidence: 20.1%

Incidence: 8.5%

ICU acquired: 53.4%

Incidence: 3.3%; Prevalence on admission: 13.2%

Prevalence including Stage I: 25.1% to 28.6%

Prevalence: 27.2%

HAPU: 23.9%

Prevalence: 28.4%

Incidence: 7.8% to 8.5%

HAPU: 4.3% to 12.1%; Prevalence: 11.2% to 20.7%

HAPU: 7.3% to 15.3%; Prevalence: 14.6% to 25.9%

Prevalence: 13.7%

Incidence: 26.7%

HAPU: 1.54%; ICU prevalence: 45.5%
Studies in the Operating Room

The following studies were included in the analysis by Ganos et al. (2012). Pressure ulcer rates are taken from data extraction tables by Ganos et al. (2012). As discussed in this section of the guideline, a wide variety of factors influence reported prevalence and incidence rates. For context, please refer to the primary studies.

Incidence: 20.9%; Prevalence: 0.5%

Incidence: 0% to 21%; Prevalence: 21%

Incidence: 5%

Incidence: 11.1% to 17.6%; Prevalence: 2.3%

Incidence: 49%

Incidence: 0%

Incidence: 0% to 31.3%; Prevalence: 9%

Incidence: 15.6%; Prevalence: 10.3%

Incidence: 15.5%; Prevalence: 3.8%

Incidence: 7%; Prevalence in a cardiac surgery step down unit and ICU: 10% to 40%

Incidence: 2% to 7%

Incidence: 53.4%

Incidence: 5% to 13.7%
Incidence: 14.4%

**Pediatric Care Studies**

The following studies were included in the analysis by Baharestani (2012)\(^2\). Pressure ulcer rates are taken from data extraction tables by Baharestani (2012)\(^2\) and are indicative only. As discussed in this section of the guideline, a wide variety of factors influence reported prevalence and incidence rates. For context, please refer to the primary studies.

Incidence: 0.29%; Prevalence: 0.47%

Device-related incidence: 40%

Incidence: 27%

Prevalence: 3% to 4%

Device related incidence: 42.5%

Cumulative incidence: 16%

Prevalence: 13.1%

Device-related incidence: 9.5%

Prevalence: 21.6% to 55%

Incidence: 13.2%

Incidence: 7%; PICU incidence: 26% Prevalence Stage I to IV: 2% to 28%

Device-related incidence: 6%
Prevalence: 4% (26% of these were in neonates); HAPU prevalence rate 2.7%

Incidence: 0.25% to 0.9%

Prevalence: 1.6%

Prevalence: 5.9%

Device-related incidence: 27% to 32%

Prevalence: 72.5% (44% of these were device-related)

Incidence: 18%

Aggregate incidence: 0.8% to 17.5%

Prevalence: 27.7%

Prevalence: 23%; PICU prevalence: 42%

50% of identified PU were device-related

Device-related incidence: 33%
# GLOSSARY OF TERMS – PREVALENCE AND INCIDENCE EXTRACT

**Deep tissue injury (DTI):** See **Suspected deep tissue injury**.

**Facility-acquired:** The proportion of pressure ulcer free individuals on admission that develop a pressure ulcer during admission to a facility, indicating that the pressure ulcer was acquired at the facility (also referred to as nosocomial, hospital-acquired or healthcare-acquired pressure ulcers).

**Incidence:** The proportion of pressure ulcer free individuals that develop a pressure ulcer over a specific period of time.\(^1\) Because measuring true incidence is resource intensive, often a facility-acquired prevalence rate is reported (also referred to as nosocomial, hospital-acquired or healthcare-acquired pressure ulcer rate). Also, see **Prevalence, Facility-acquired**.

**Pressure injury:** see **Pressure ulcer**.

**Pressure ulcer (pressure injury):** a localized injury to the skin and/or underlying tissue, usually over a bony prominence, as a result of pressure or pressure in combination with shear. A number of contributing or confounding factors are also associated with pressure ulcers; the significance of these factors has yet to be elucidated. (See the Etiology of Pressure Ulcers section of the full Clinical Practice Guideline). Previously referred to as decubitus ulcer, bedsore and pressure sore.

**Prevalence:** The proportion/percentage of individuals in a defined population who have a pressure ulcer at a specified point in time.

- **Point prevalence:** Measures the proportion of a defined population (e.g., individuals in a hospital) who have a pressure ulcer at a specific moment in time (e.g., on a specific day).\(^2\)

- **Period prevalence:** Measures the proportion of a defined population (e.g., individuals in a hospital) who have a pressure ulcer over a period of time (e.g., over a week).

**Suspected deep tissue injury:** Purple or maroon localized area of discoloured, intact skin or blood-filled blister due to damage of underlying soft tissue from pressure and/or shear. The area may be preceded by tissue that is painful, firm, mushy, boggy, or warmer or cooler than adjacent tissue. Deep tissue injury may be difficult to detect in individuals with dark skin tones. Evolution may include a thin blister over a dark wound bed. The wound may further evolve and become covered by thin eschar. Evolution may be rapid exposing additional layers of tissue even with treatment.

**Unstageable pressure ulcer:** Full thickness tissue loss in which actual depth of the ulcer is completely obscured by slough (yellow, tan, gray, green, or brown) and/or eschar (tan, brown, or black) in the wound bed. Until enough slough and/or eschar is removed to expose the base of the wound, the true depth cannot be determined, but it will be either a Category III or IV pressure ulcer. Stable (dry, adherent, intact, without erythema or fluctuance) eschar on the heels serves as a natural (biological) cover and should not be removed.

**References**
