Prevention and Treatment of Pressure Ulcers: Medical Device Related Pressure Ulcers – 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 support surfaces for prevention and treatment of medical device related pressure ulcers.
**Strengths of Evidence and Strengths of Recommendations**

Full explanation of the methodology is available in *Appendix 1: Guideline Methodology* in the *Full Clinical Practice Guideline*. 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.

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<td><strong>A</strong></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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<td><strong>B</strong></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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<td><strong>C</strong></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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**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 (e.g. data extraction tables) to the guideline are available from the website.
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Translation

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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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MEDICAL DEVICE RELATED PRESSURE ULCERS

Introduction

Medical device related pressure ulcers are pressure ulcers that result from the use of devices designed and applied for diagnostic or therapeutic purposes. The resultant pressure ulcer generally closely conforms to the pattern or shape of the device. Potential sources of device related pressure ulcers include but are not limited to:

- Respiratory devices including:
  - tracheostomy faceplates and securement devices;
  - masks used to deliver non-invasive positive pressure ventilation (NIV) (e.g., biphasic positive airway pressure [Bi-PAP], continuous positive airway pressure [CPAP]);
  - endotracheal (ET) and nasotracheal tubes;
  - oximeter probes, and
  - oxygen tubing/nasal cannulas;
- Orthopedic devices including cervical collars, halo devices, helmets, external fixators, immobilizers, plaster casts;
- Foley catheters;
- Fecal containment devices;
- Surgical drains;
- Central venous and dialysis catheters;
- Intra-aortic balloon pumps;
- Intermittent pneumatic compression device sleeves;
- Graduated compression stockings; and
- Restraints.

Risk for medical device related pressure ulceration may increase as a result of impaired sensation, moisture under the device, poor perfusion, altered tissue tolerance, poor nutritional status and edema.

Medical device related pressure ulcers develop due to prolonged and unrelieved pressure on the skin from a medical device. They can also result from poorly positioned or ill-fitting devices or incorrect device use. They may also develop due to poorly fitting or improperly positioned fixation devices used to secure medical equipment. In some instances, the design of the medical equipment can contribute to pressure ulcer development. In certain settings (e.g., adult and pediatric critical care), the heavy burden of technology and equipment utilized in the environment renders the individual particularly vulnerable to the risk for device related pressure ulcers.

Mucosal pressure ulcers are pressure ulcers found on mucous membranes. Mucous membrane is the moist lining of body cavities that communicates with the exterior. These tissues line the tongue, oral mucosa, gastrointestinal (GI) tract, nasal passages, urinary tract, tracheal lining and vaginal tract. Pressure applied to this tissue can render it ischemic and lead to ulceration. Mucosal tissues are especially vulnerable to pressure from medical devices, such as oxygen tubing, endotracheal tubes and tube holders, bite blocks, orogastric and nasogastric tubes, urinary catheters, and fecal containment devices. As outlined in the Classification of Pressure Ulcers section of the full Clinical Practice Guideline, the International NPUAP/EPUAP Pressure Ulcer Classification System should not be used to categorize mucosal pressure ulcers.

Whenever a pressure ulcer occurs due to a medical device, removal or changing the device should be considered when clinically feasible, and strategies to relieve pressure should be implemented if removing or changing the device is not possible. Assessment and treatment for medical device related pressure ulcers follows the current guidelines for pressure ulcer management.
Risk for Medical Device Related Pressure Ulcers

1. Consider adults with medical devices to be at risk for pressure ulcers. (Strength of Evidence = B; Strength of Recommendation = )

In a secondary analysis of data from eight quarterly point prevalence studies conducted in a US medical center (n = 2,500) Black et al. (2010)\(^4\) investigated risk factors for facility-acquired pressure ulcers. In a sub-population of adults in medical, surgical and step-down units who did not have a pressure ulcer on admission (n = 2,079), 1.4% of individuals had a medical device related pressure ulcer. For individuals in intensive care who had a facility-acquired pressure ulcer(s) (n = 83 with n = 113 pressure ulcers), 34.5% of the pressure ulcers were deemed to be medical device related. Individuals with a medical device were significantly more likely (\(\chi^2 = 6.98, p = 0.008\)) to develop a pressure ulcer than those who had no medical device. Presence of a medical device indicated the individual would be 2.4 times more likely (95% confidence interval [CI] 1.2 to 4.8, p = 0.10) to develop a pressure ulcer.

Turjanica et al. (2011)\(^5\) found a similarly high rate of medical device related pressure ulcers in a convenience sample of individuals receiving oxygen via nasal cannula recruited in a medical/surgical unit (n = 100). In this sample, 37% of individuals experienced skin breakdown, predominantly classified as a Category/Stage I pressure ulcer. In a multivariate analysis, lack of oxygen use prior to hospital admission was the only factor significantly associated with increased likelihood of developing a pressure ulcer of the ear (\(\chi^2 = 6.113, p = 0.013\)).

1.1. Consider children with medical devices to be at risk for pressure ulcers. (Strength of Evidence = B; Strength of Recommendation = )

Medical device related pressure ulcers are also an important consideration in children. In a retrospective review of children (aged 45 months ± 8.7 months) who underwent a tracheostomy over a 15 month period in a US pediatric medical center (n = 65), Jaryszak et al. (2011)\(^6\) reported the rate of tracheostomy related pressure ulcers as 29.2%. Multivariate analysis found that the type (design) of tracheostomy tube (p = 0.003) and lower age groups (under 12 months versus over 12 months) were significant risk factors for a device related pressure ulcer.

In a prospective cohort study conducted in seven neonatal intensive care units (n = 81; mean age 32.5 weeks gestation), Fujii et al. (2010)\(^7\) reported that 86% of pressure ulcers were associated with CPAP or nasal direction positive airway pressure (DPAP). A multivariate analysis showed an odds ratio (OR) of 4.0 (95% CI 1.04 to 15.42, p = 0.047) for pressure ulcers in children undergoing ET intubation. In this study most of the neonates were extremely underweight, which is also a factor associated with increased pressure ulcer risk.

Schindler et al. (2011)\(^8\) conducted a multivariate analysis of risk factors for pressure ulcers from retrospective data collected in seven pediatric intensive care units and trauma centers (n = 5,346). A number of factors associated with medical devices were significantly associated with an increased risk of pressure ulcers including mechanical ventilation (OR = 1.334, 95% CI 1.031 to 1.726, p = 0.03); BPAP or CPAP (OR = 2.004, 95% CI 1.509 to 2.661, p < 0.001); high frequency oscillatory ventilation (OR = 2.057, 95% CI 1.208 to 5.134, p = 0.01) and extracorporeal membrane oxygenation ( OR = 2.490, 95% CI 1.208 to 5.134, p = 0.01).

In a prospective point prevalence study conducted in children hospitalized for at least 24 hours (n = 412; aged 24 hours to 18 years) Schluer et al. (2012)\(^9\) reported that 40% of children with an external medical device were assessed as having a pressure ulcer related to the device.
Recommendations for Selecting and Fitting a Medical Device

1. **Review and select medical devices available in the facility based on the devices’ ability to induce the least degree of damage from the forces of pressure and/or shear.** (Strength of Evidence = B; Strength of Recommendation = ★★★)

   Facilities, with the input of the health professional, should provide medical devices that will minimize skin damage. This may include selection of softer, more flexible devices. In one large \( n = 6,103 \) quality improvement study conducted in a US trauma center, the number of mucosal pressure ulcer occurrences associated with ET tubes decreased with an institutional change in the brand of ET tube securement device (Level 4 study).\(^{10}\)

   Boesch et al. (2012)\(^ {11}\) investigated a multifaceted intervention to reduce tracheostomy related pressure ulcers in 834 pediatric individuals. Interventions included the introduction of a hydrophilic foam dressing, in addition to the incorporation of a moisture and pressure free device interface and an extended tracheostomy tube. Significant reductions in tracheostomy related pressure ulcer rates \( (p = 0.007) \) and in the number of days with an existing tracheostomy related pressure ulcer \( (p < 0.0001) \) were associated with the introduction of the extended tracheostomy tube (Level 4 study).

   Skillman et al. (2011)\(^ {2}\) conducted a quasi-experiment of postoperative Category I pressure ulcer development (and ankle pain) associated with the use of an intermittent compression therapy device used during the perioperative period. The rate of postoperative ankle pain and discomfort decreased for 15% \( (3/20 \text{ individuals}) \) to 5% \( (1/20 \text{ individuals}) \) after changing to a compression device with a flatter surface at the point of contact with the ankle. It was unclear from the report if the original device had been applied and used in accordance with the manufacturer’s instructions (indirect evidence).

2. **Ensure that medical devices are correctly sized and fit appropriately to avoid excessive pressure.** (Strength of Evidence = C; Strength of Recommendation = ★★★)

   This recommendation is based on expert opinion. Ill-fitting devices can contribute to device malfunction and to an increase in pressure at the device-skin interface resulting in pressure ulceration. Masks used to deliver NIV should be fitted sufficiently tight that air leaks are prevented without creating pressure ulcers. In one moderate quality, retrospective, observational study in 410 children, the presence of an ill-fitting helmet was reported to be a contributory factor to pressure ulcer development in 10.5% of children wearing helmets.\(^ {12}\)

   In some cases, medical devices may need to be adjusted or modified in order to prevent pressure ulcers. In one study of complications associated with halo use in children \( n = 68 \), the authors found that cutting or trimming the offending portion of the halo vest reduced discomfort and relieved pressure in most cases (Level 5 study).\(^ {3}\)

3. **Apply all medical devices following manufacturer’s specifications.** (Strength of Evidence = C; Strength of Recommendation = ★★★)

   This recommendation is based on expert opinion. Failure to follow the manufacturer’s application instruction can result in harm (e.g., skin damage) to the individual and can be a source of liability. Faulty medical devices should be returned to the manufacturer.\(^ {1}\)

4. **Ensure that medical devices are sufficiently secured to prevent dislodgement without creating additional pressure.** (Strength of Evidence = C; Strength of Recommendation = ★★★)

   This recommendation is based on expert opinion. In situations in which simple repositioning does not relieve pressure, it is important not to create additional pressure by placing excessive dressings beneath tight devices.\(^ {1}\) Consideration for the placement of a prophylactic dressing to protect the skin is further discussed in this section.
Recommendations for Assessment of the Skin and Medical Device

1. Inspect the skin under and around medical devices at least twice daily for the signs of pressure related injury on the surrounding tissue. (Strength of Evidence = C; Strength of Recommendation = —)

   This statement is based on expert opinion. Frequently inspect the skin beneath adjustable medical devices and continue to lift and/or move the medical device for pressure relief. When prophylactic dressings such as hydrocolloids are used, consider the fragility of the individual’s skin and the ease of removal of the dressing when performing routine skin assessments. Detrimental effects such as epidermal stripping may occur with frequent removal of adhesive-based dressings. Be aware of tubes and medical devices that can become entrapped in skin folds resulting in skin damage, especially in the bariatric population.

1.1. Conduct more frequent (greater than twice daily) skin assessments at the skin-device interface in individuals vulnerable to fluid shifts and/or exhibiting signs of localized or generalized edema. (Strength of Evidence = C; Strength of Recommendation = —)

   This statement is based on expert opinion. Changes in fluid volume status, or hypoproteinemic states can result in localized or generalized edema causing a medical device that initially fits properly to exert external pressure to the skin that leads to pressure ulcer formation. The health professional should apply any type of medical device cognizant of the potential for tissue expansion and worsening edema. Depending on the type/purpose of the device, loosening, replacement or removal (i.e., compression stockings) may be advised.

2. Classify medical device related pressure ulcers using the International NPUAP/EPUAP Pressure Ulcer Classification System, with the exception of mucosal pressure ulcers. (Strength of Evidence = C; Strength of Recommendation = —)

   Pressure ulcers related to medical device use are not a new category of pressure ulcer, and should be classified according to level of tissue loss using the International NPUAP/EPUAP Pressure Ulcer Classification System outlined in the Classification of Pressure Ulcers section of the full Clinical Practice Guideline. As outlined in the Classification of Pressure Ulcers section of the full Clinical Practice Guideline, the classification system for pressure ulcers of the skin cannot be used to categorize mucosal pressure ulcers.

3. Educate the individual with a medical device in the community setting and his/her caregivers to perform regular skin inspections. (Strength of Evidence = C; Strength of Recommendation = —)

   This statement is based on expert opinion. Individuals in the home setting fitted with a medical device should continue to perform routine skin assessments under or around the device between visits to the health professional.

Recommendations for Prevention of Medical Device Related Pressure Ulcers

1. Remove medical devices that are potential sources of pressure as soon as medically feasible. (Strength of Evidence = C; Strength of Recommendation = —)

   This recommendation is based on expert opinion. In order to reduce pressure ulcer risk associated with the use of a medical device, individuals should be routinely reassessed for the continued need for the medical device, and the device should be removed as soon as it is no longer clinically indicated. Extrication cervical collars should be removed and replaced with acute care rigid collars as soon as feasible (see the Special Populations: Individuals With Spinal Cord Injury section of the full Clinical Practice Guideline).
2. **Keep skin clean and dry under medical devices.** (Strength of Evidence = C; Strength of Recommendation = \(\bigcirc\)\(\bigcirc\))

   This statement is based on expert opinion. Diaphoresis or excessive secretions underneath a device can cause tissue maceration and contribute to pressure ulcer development.\(^1\) Moisture underneath a medical device creates an environment in which the skin is more vulnerable to alterations in skin integrity, including irritant dermatitis and ulceration.

3. **Reposition the individual and/or the medical device to redistribute pressure and decrease shear forces.** (Strength of Evidence = C; Strength of Recommendation = \(\bigcirc\)\(\bigcirc\))

   This statement is based on expert opinion.

   3.1. **Do not position the individual directly on a medical device unless it cannot be avoided.** (Strength of Evidence = C; Strength of Recommendation = \(\bigcirc\)\(\bigcirc\))

   3.2. **Reposition the individual to redistribute pressure and shear forces created by the medical device.** (Strength of Evidence = C; Strength of Recommendation = \(\bigcirc\)\(\bigcirc\))

   These statements are based on expert opinion. Pressure ulcers may develop under medical devices that have been compressed under the individual causing a localized area of pressure. Where positioning an individual on a medical device cannot be avoided, regularly reposition the individual to redistribute pressure from the device.

   Repositioning strategies may vary depending on the individual and the medical device. Simple changes in degree of lateral rotation, head of bed elevation, knee elevation and placement of positioning devices may be used to minimize pressure and shear created by medical devices. For example, ensuring a device is not dependent after repositioning may minimize its gravitational pull on skin and other tissues.

   3.3. **Rotate or reposition medical devices when possible.** (Strength of Evidence = C; Strength of Recommendation = \(\bigcirc\))

   **Caution: always validate that the depth of an ET tube does not change with tube manipulation.**

   Wherever possible, a medical device should be regularly repositioned or rotated. Oximetry probes can be repositioned to a different finger, or positioned on the ear lobe every four hours. Endotracheal tubes can be moved laterally to redistribute pressure over different parts of the oral cavity and lips.

   3.4. **Provide support for medical devices as needed to decrease pressure and shear forces.** (Strength of Evidence = C; Strength of Recommendation = \(\bigcirc\))

   For example, an ET tube can be supported with the use of a towel under the chin.

4. **Consider using a prophylactic dressing for preventing medical device related pressure ulcers.** (Strength of Evidence = B; Strength of Recommendation = \(\bigcirc\))

   **Caution: Avoid excessive layering of prophylactic dressings that may increase pressure at the skin-device interface.**

   The role of prophylactic dressings in the prevention of device related pressure ulcers is supported by five moderate quality Level 3\(^{19,21}\) and Level 4\(^{22,23}\) studies.

   Kuo et al. (2013)\(^{23}\) reported findings from a retrospective cohort study investigating effectiveness of a soft silicone foam dressing used for preventing skin breakdown. The study showed that the use of the
soft silicone foam dressing was significantly associated with a reduction in tracheostomy site pressure ulcers in a sample of 134 pediatric individuals undergoing tracheotomies in a tertiary care pediatric hospital. The dressing was applied beneath the tracheostomy and ties. No skin breakdown developed in the dressing group as compared to the 11.8% of the comparison cohort group (p = 0.02) (Level 4 study).

In a controlled clinical trial Forni et al. (2011) reported a significant difference in the development of Category/Stage I heel pressure ulcers (defined as “sore skin” in the study) between a group with foam dressing applied under the heel pad of a casted limb (n = 71) and a control group with no foam dressing under the heel pad of a casted limb (n = 85). Less than 4% of the participants receiving the foam pad to the heel developed a Category/Stage I heel pressure ulcer compared to almost 43% (p < 0.0005) in the control group, equating to a relative risk of 0.08 (95% CI 0.02 to 0.33) of developing a heel pressure ulcer when a prophylactic polyurethane foam dressing was applied. The duration for cast wearing was not reported and it was unclear if it was equivalent between the groups (Level 4 study).

The use of a silicone gel sheeting in one study was found to be effective in reducing the occurrence of nasal injuries in preterm infants receiving nasal CPAP. One randomized, controlled trial (RCT) investigated the effectiveness in preventing nasal injuries (bleeding, crusting, excoriation and columella necrosis) of using a silicone gel sheeting applied to the nares of premature neonates during nasal CPAP. Compared to no intervention (n = 97), the prophylactic gel sheeting (n = 92) was associated with significantly fewer nasal injuries (14.9% versus 4.3%, OR = 3.43, 95% CI 1.1 to 10.1, p < 0.05) and fewer cases of columella necrosis at one month follow up (1.08% versus 6.8%, OR = 6.34, 95% CI 0.78 to 51.6, p < 0.05). Infants that developed a nasal injury had a much longer mean duration of ventilation (19.6 ± 10.6 days versus 4 ± 3.3 days), but injuries developed more rapidly in those without gel sheeting. Methods of randomization, allocation concealment and blinding were not clearly reported and the disparate duration of therapy between groups confounded the findings (Level 2 study).

In a study by Weng (2008), individuals requiring NIV received a hydrocolloid dressing to the nasal bridge prior to application of the NIV face mask. Time to occurrence of a Category/Stage I pressure ulcer was significantly increased and device related pressure ulcers were significantly reduced in individuals treated prophylactically with a hydrocolloid semipermeable dressing compared to controls (no dressing covering). In this study 40% of those treated with the prophylactic hydrocolloid dressing developed a Category/Grade I pressure ulcer compared with 96.7% in the group receiving no prophylactic dressing (p < 0.01), demonstrating an absolute risk reduction of greater than 50% (Level 3 study).

In a quasi-experimental study conducted in a pediatric unit (n = 40), Chidini et al. (2010) compared CPAP delivery using a face mask (various models selected as appropriate to each child) compared with an infant helmet secured with a soft neck collar. Significantly more Category/Stage I pressure ulcers were associated with the use of a face mask as compared to the helmet (75% versus 0%, p = 0.002) despite significantly shorter wear times for those in the facial mask group (6.4 ± 1.8 hours versus 10.8 ± 2.0 hours, p = 0.001) and despite the use of a prophylactic hydrocolloid dressing applied to facial pressure points beneath masks. However, of 97 potential participants, only 20 children met the selection criteria to use the CPAP helmet, indicating that practical use of the device may be limited (Level 3 study).

In a quasi-experimental study conducted in 18 nasally intubated participants undergoing head/neck surgery, the use of a hydrocolloid dressing in combination with a soft liner made from a composite conformable material used for denture cushioning was found to be effective in reducing the rate of pressure ulcers associated with nasal intubation (60% versus 100%, p = not reported) (Level 3 study).

A study by Weng (2008) comparing a hydrocolloid semi-permeable dressing to a transparent film dressing yielded no significant differences in preventive properties between the two dressings types with respect to mean duration of time until pressure ulcer occurrence (3.6 days versus 4.5 days). Both
dressings significantly increased the time to develop a Category/Stage I pressure ulcer associated with a NIV device and decreased the occurrence of these injuries compared to no prophylactic dressing. A potential mechanism for this effect is that the dressing reduced sliding of the mask on the individual’s skin and reduced skin irritation caused by pressure from tight restraining straps (Level 3 study).

4.1. When selecting a prophylactic dressing consider:

- ability of the dressing to manage moisture and microclimate, especially when used with a medical device that may be in contact with bodily fluids/drainage (e.g. percutaneous endoscopic gastrostomy tube);
- ease of application and removal;
- ability to regularly assess skin condition;
- thickness of the dressing under tightly fitting devices;
- anatomical location of the medical device; and
- type/purpose of the medical device. (Strength of Evidence = C; Strength of Recommendation =  )

Prophylactic dressings differ in their qualities;¹³, ²⁵ therefore it is important to select a dressing that is appropriate to the individual and the clinical use.

A transparent film dressing is less able to contain discharge, and may not adhere to the skin as effectively as a hydrocolloid dressing.²¹ Foam dressings have greater ability to absorb moisture than film or hydrocolloid dressings.¹ Some dressings are more able to manage humidity and moisture at the skin surface than others. One laboratory study found that for some dressings, accumulation of moisture reduced the ability of the dressing to transpire.²⁵

Some dressings are designed to adhere well to the skin; however if they are not removed carefully there is increased risk of damage to fragile skin.¹³, ²⁶, ²⁷ Dressings with a soft silicone border may be more easily lifted for regular skin assessment, and appear to absorb shear forces more efficiently.¹³

Further discussion of the properties of prophylactic dressings is in the Emerging Therapies for Prevention of Pressure Ulcers section of the full Clinical Practice Guideline.

References


GLOSSARY OF TERMS – MEDICAL DEVICE RELATED PRESSURE ULCERS EXTRACT

**Intertrigo:** An erythematous skin eruption that occurs on opposing surfaces of skin (e.g., the creases of the neck, folds of the groin and armpit, or beneath pendulous breasts) from moisture, warmth, friction, and/or infectious agents. It occurs more commonly in bariatric individuals.

**Microclimate:** The local tissue temperature and moisture (relative humidity) level at the body/support surface interface.¹

**Necrosis:** The death of tissue.

**Necrotic tissue:** Tissue that has died, also called devitalized or non-viable tissue.

**Pressure:** Normal force per unit surface area.

**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.

**Prophylactic dressing:** A dressing that is placed onto the skin before any skin damage is evident with a goal of preventing skin breakdown due to pressure, shear and alternations in the skin’s microclimate. Features such as an elastic adhesive type (e.g. silicone), the number of dressing layers and their construction, and the size of the selected dressing all contribute to its ability to protect the skin.²

**Standard (usual) care:** A term most often used in research studies to describe usual care delivered within a facility that is often the comparator intervention when pressure ulcer prevention interventions are being investigated. Standard care varies according to the setting and historical context. Within the context of this guideline, a description of the standard care is provided when available.

**Tissue ischemia:** The reduction of oxygen levels to below normal.

References
