

# Guide to the use of barrier protectants on neonatal and paediatric nappy rash

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**N**eonatal skin has approximately 60% of the epidermal and dermal thickness of adult skin, making it more fragile and more vulnerable to damage and infection (Campbell and Banta-Wright, 2000). Compared with older children and adults, differences in pH, transepidermal water loss rates and the structure of the stratum corneum in neonatal and preterm infant skin increase the risk of damage from moisture, irritants and/or infection (Oranges et al, 2015; Visscher and Narendran, 2014). The fragile skin of neonates and preterm infants makes them vulnerable to nappy-associated dermatitis (NAD). This guide describes the causes of NAD and how to prevent and manage it.

### What is nappy-associated dermatitis?

NAD occurs as a result of damage to the normal barrier function of the skin. It is a complex disorder resulting from inflammatory changes that occur when skin under a nappy is in contact with urine and/or faeces (Coughlin and Eichenfeld, 2014) or other irritants. It occurs mostly on the buttocks, but in severe cases can extend to the thighs, genitalia and perineal areas, and even the abdomen (Stevenson, 2011).

### How does it occur?

NAD is primarily a form of irritant contact dermatitis. Irritants damage the surface of the skin faster than the skin can repair it. They remove oils and moisture from the outer layer of the skin. Chemical irritants can then penetrate more deeply, triggering an inflammatory response. Soap-based products can raise the pH, compromising the skin's barrier function.

### Why are neonates and preterm infants at increased risk?

Factors that increase the risk of skin breakdown in preterm babies and neonates are:

- Fragile or immature skin: neonates of <30 weeks' gestation have only two to three layers of stratum corneum cells

### Box 1. Key irritants associated with nappy-associated dermatitis

- Urine
- Faeces
- Alcohol
- Fragrance
- Essential oils
- Talcum powder
- Chlorhexidine gluconate
- Detergents such as sodium lauryl sulphate

Source: *DermnetNZ*, 2019

- Preterm infants have a thinner epidermis, a poorly formed stratum corneum and are deficient in dermal structural proteins (Visscher and Narendran, 2014)
- It takes longer for the acid mantle, which protects the skin from harmful bacteria, to develop in preterm infants, making them more vulnerable to infection (Blincoe, 2006).

### Causes of irritation and skin breakdown

Principal irritants associated with NAD are listed in *Box 1*. Exposure to ammonia in urine and digestive enzymes in faeces causes skin irritation. The frequency of nappy changes will greatly influence the effects of urine/faecal matter on the skin—the longer the skin is in contact with it, the higher the risk of damage.

Baby wipes (many of which may contain alcohol) or perfumed soaps and lotions may contain skin irritants, causing contact dermatitis. If the skin integrity has already been compromised, alcohol contained within products can cause unnecessary pain and discomfort on application (Ryan and Hall, 2016).

Other factors that can impair the skin barrier function and predispose neonates and preterm infants to NAD (Shin, 2014) are:

- Prolonged exposure to moisture. Fluid from urine and/or faecal matter is absorbed into the epidermis, overhydrating the cells. This disrupts their structure and manifests as maceration (Beeckman et al, 2015)

- Increased friction. Aggressive washing techniques, such as using a harsh wash cloth, can cause friction and skin damage
- Changes to skin pH. Normal skin has a slightly acidic pH of 5.5 (the acid mantle). Increased contact with dampness, friction and enzymes in faeces causes damp skin to become alkaline, potentially resulting in microbial colonisation. This can impair the underdeveloped stratum corneum (Shin, 2005) and lead to cutaneous infection (Beeckman et al, 2015).

In summary, the impaired barrier function of skin in neonates and preterm infants makes it susceptible to chemical or local irritation, potentially resulting in skin breakdown, contamination and localised, or even, systemic infection (Oza et al, 2015). Other factors, such as overhydration, friction and increased pH, can exacerbate this.

## Prevention

Characteristics of mild, moderate and severe NAD are outlined in *Box 2*. Maintaining skin integrity is essential for the prevention of NAD in newborns. It involves good skin care and appropriate use of nappies, emollients and barrier products. The National Institute of Health and Care Excellence (NICE) provides guidance on the fundamentals of good skin care for newborns (NICE, 2018).

## Nappies

The type of nappy used can determine how much moisture comes into contact with the skin. Traditional cloth nappies do not wick moisture away from the skin, thereby increasing the risk of skin damage. Disposable nappies are designed to prevent overhydration. They have a superabsorbent polymer core, as well as a top sheet that wicks urine and faeces into the inner polymer layer (Blume-Peytavi and Kanti, 2018). Many also have a breathable, microporous, outer layer that enables moisture vapour evaporation (Blume-Peytavi and Kanti, 2018).

## Cleansing

When possible, babies should be fully bathed once daily only, as anything more frequent can dry the skin, predisposing it to irritation and breakdown (NICE, 2018).

If the skin is healthy or the neonate/infant is at low risk of NAD, the skin should be cleansed with water; wipes should only be used if they do not contain alcohol, fragrance and/or other irritants (Burdall et al, 2019).

If there is a moderate or high risk of skin breakdown, consider cleansing with an emollient. In high-risk cases, apply the emollient with a syringe to avoid damage from rubbing.

When drying skin, be careful to avoid damaging the delicate outer layers; if the skin is healthy or the neonate/preterm infant is at low risk, gently pat dry (avoid vigorous rubbing). Skin of high-risk babies can be left to air dry.

## Emollients

These aim to rehydrate the skin, thereby preventing or managing dryness. They increase the hydration of the top layer of the epidermis by creating a barrier that traps moisture; modern emollients can also help replenish skin barrier lipids (the ‘mortar’ holding the skin cells together) (Voegeli, 2010).

## Barrier products

The main function of barrier creams and films is to protect/prevent skin damage from shear, and/or friction and irritants (Fletcher, 2015). Skin barrier products provide a waterproof barrier, which, when supplemented with the use of nappies, minimises exposure to urine and faeces (Dykes and Bradbury, 2016). Barriers are indicated for all degrees of NAD (mild to severe) and/or those at high risk of it.

Barrier products traditionally consisted of a lipid-water emulsion base, with the addition of metal oxides such as zinc or titanium (Lloyd Jones, 2017). More recently, a water-repellent

silicone, such as dimethicone, and antiseptic agents such as cetrimide or benzalkonium have been added (Voegeli, 2010). Newer products use a synthetic polymer science, which allows a thin semi-permeable protective coating to be applied to the skin (Voegeli, 2010).

Creams can be applied in a thin layer to unbroken skin, whereas films (spays, wipes and foam applicator preparations) can be used on broken skin (Fletcher, 2015).

### Barrier creams and ointments

Barrier creams and ointments are available in various formats and sizes (eg. tubes, sachets). In the main, they are used on intact skin. Ointments are thicker and more occlusive than creams, so may provide a better moisture barrier, but they can be harder to apply; particular care is needed when applying ointments to delicate skin, to avoid dragging and thus causing more damage (Fletcher, 2015).

### Barrier films

Available as wipes, sprays and foam applicators, films create a transparent, water-repellent barrier. They can usually be used on broken and intact skin, but always check the manufacturer's product information first.

## Box 2. Characteristics of nappy associated dermatitis

### Moderate

Superficial skin damage on the buttocks and/or genitals and upper thighs

### Severe

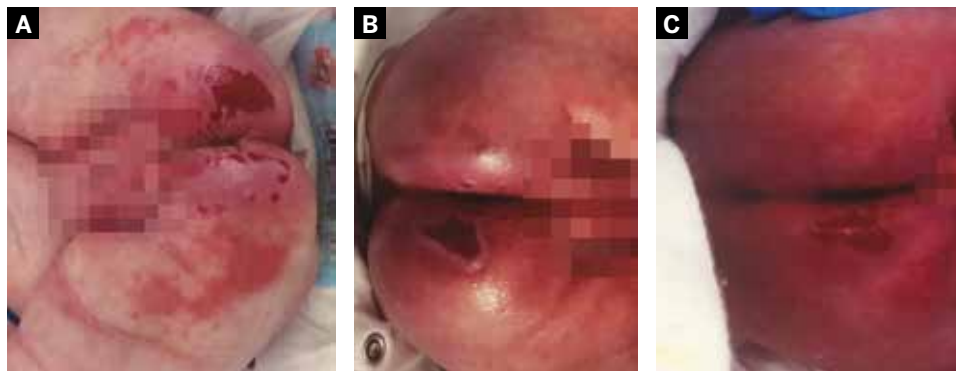
Severe redness with areas of breakdown and possible swelling or bleeding

Both traditional and more modern barrier products are designed to be applied as a thin layer on the skin (Lloyd Jones, 2017), but in practice we have observed that barrier products are applied as a thick layer. Characteristics of barrier products are summarised in *Box 3*.

### Steroids and medications

The severity of NAD will determine when it is necessary to use barriers and when corticosteroids or prescribed medication are needed instead.

- In neonates/infants aged over one month with severe NAD and inflamed skin, a mild steroid, such as hydrocortisone 0.5–1%, can be applied daily until symptoms settle or for a maximum of 7 days (NICE, 2018). A low dose must be used as moisture and the occlusive nature of nappies can enhance the



A 2-week old neonate with severe nappy-associated dermatitis (NAD): before receiving treatment as recommended by the MedicarePlus NAD pathway (a); the NAD one week after starting treatment (b); after 2 weeks' treatment

### Box 3. Characteristics and application of barrier products

#### Barrier creams and ointments

- Should be applied as a thin layer
- These are mainly applied to unbroken skin
- Ointments are thicker and more occlusive than creams, so can provide more of a moisture barrier
- Ointments can be harder to apply than creams

#### Barrier films

- Available as wipes, sprays and foam applicators
- Can be used on broken and intact skin
- Usually applied in a thin layer

potency of the steroid (Shin, 2014). A barrier product should also be used: the steroid cream should be applied first and the barrier a few minutes later

- Recurring or unresponsive NAD may be associated with bacterial infection. Consider requesting a further medical evaluation as well as advice from a dermatologist or similar professional, plus possible antibiotic treatment.

#### Conclusion

NAD is a common occurrence in neonates and preterm infants. Good skin care practice is vital for maintaining skin function. This can involve the use of a pH-neutral cleanser and a barrier product that does not impair the nappy's ability to absorb faeces and urine. However, if the neonate/preterm infant develops diarrhoea, a barrier product should be applied without delay. When NAD fails to improve following good skin cleansing and use of barrier products, a differential diagnosis should be performed to consider the possibility of a *Candida albicans* or bacterial infection, or a dermatological cause.

In summary, maintaining skin integrity is an essential part of care of the newborn due to the underdevelopment and fragility of their

skin. The pathway (*overleaf*), developed by MedicarePlus, provides step-by-step guidance on how this can be implemented into practice.



#### References

- Beeckman D, Campbell J, Campbell K. Proceedings of the Global IAD Expert Panel. Incontinence-associated dermatitis: moving prevention forward. Wounds International, 2015. <https://tinyurl.com/yvcvunuz> (accessed 17 October 2019)
- Blincoe AJ. Caring for neonatal skin and common infant skin conditions. *Br J Midwifery*. 2006; 14(4): 213–16
- Blume-Peytavi U, Kanti V. Prevention and treatment of diaper dermatitis. *Paediatr Dermatol*. 2018; 35(Suppl. 1): s19–23. <https://doi.org/10.1111/pde.1345>
- Burdall O, Willgress L, Goad N. Neonatal skin care: developments in care to maintain neonatal barrier function and prevention of diaper dermatitis. *Paediatr Dermatol*. 2019; 36(1):31–35 <https://doi.org/10.1111/pde.13714> (accessed 31/1/19)
- Campbell JM, Banta-Wright SA. Neonatal skin disorders: a review of selected dermatologic abnormalities. *J Perinat Neonatal Nurs*. 2000; 14(1):63–83
- Coughlin CC, Eichenfield LF, Frieden IJ. Diaper dermatitis: clinical characteristics and differential diagnosis. *Paediatr Dermatol*. 2014; 31(Suppl. 1):19–24
- DermnetNZ. Contact dermatitis. <https://tinyurl.com/ycojhjyv> (accessed 17 October 2019)
- Dykes P, Bradbury S. Incontinence pad absorption and skin barrier creams: a non-patient study. *Br J Nurs*. 2016; 25(22): 1244–8
- Fletcher J. Appropriate selection and use of barrier creams and films. *Wounds Essentials*. 2015; 10(2): 61–8
- Lloyd Jones M. Fundamentals of tissue viability, 1.4. Skin care: barrier products. *Br J Healthcare Assistants*. 2017; 11(4): 166–8
- National Institute of Clinical Excellence. Nappy rash. 2018. <https://tinyurl.com/y2gpusu4> (accessed 30 January 2019)
- Oranges T, Dini V, Romanelli M. Skin physiology of the neonate and infant: clinical implications. *Adv Wound Care (New Rochelle)* 2015; 4(10): 587–95
- Oza S, Lawn JE, Hogan DR, Mathers C, Couzens SN. Neonatal cause-of-death estimates for the early and late neonatal periods for 194 countries: 2000–2013. *Bull World Health Organ*. 2015; 93(1): 19–28
- Ryan E, Hall S. The standardisation of treatment for napkin-associated dermatitis with paediatric oncology. *Wounds UK*. 2016; 12(1): 52–58
- Shin HT. Diagnosis and management of diaper dermatitis. *Pediatr Clin North Am*. 2014; (61)2:367–82. <https://doi.org/10.1016/j.pcl.2013.11.009>
- Shin HT. Diaper dermatitis that does not quit. *Dermatol Ther*. 2005; 18(2): 124–35
- Stevenson J. Getting to the bottom of nappy rash: skincare advice and treatment. *Nurse Prescribing*. 2011; 9(1): 25–27
- Visscher MO, Narendran V. The ontogeny of skin. *Adv Wound Care (New Rochelle)*. 2014; 3(4):291–303
- Voegeli D. Care or harm: exploring essential components in skin care regimens. *Br J Nurs*. 2010; 19(13): 810–4

# Nappy-associated dermatitis (NAD)

- Nappy-associated dermatitis (NAD), also known as nappy rash, is caused by prolonged exposure of urine and faeces to the skin (Health Direct Australia, 2015)
- The pH of the skin alters and damages cells, causing dermatitis or irritation (Schmid-Wendtner and Korting, 2006)

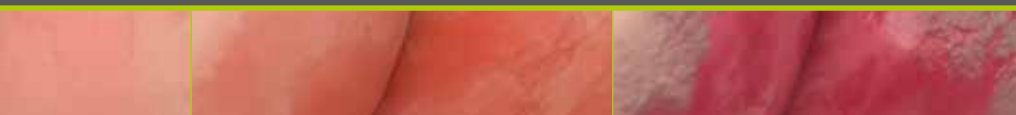
## Prevention and treatment in neonates and

	<p><b>Neonatal skin barrier:</b></p> <ul style="list-style-type: none"> <li>• Skin barrier properties depend on the thickness and integrity of the stratum corneum</li> <li>• Full-term infants have a 30% thinner stratum corneum than adults and</li> <li>• Premature infants, particularly those of very low birth weight, are at increased risk</li> </ul>	
<p><b>Skin condition</b></p>	 <p><b>Intact skin</b> Intact skin at risk of skin damage</p>	 <p><b>Mild skin dermatitis</b> Irritated skin at risk of bacterial infection</p>
<p><b>Cleansing</b></p>	<ul style="list-style-type: none"> <li>• Change frequently or as needed</li> <li>• Cleanse with warm water and mild soap</li> <li>• Pat dry (no rubbing)</li> </ul>	
<p><b>Skincare regimen</b></p>	<p>Apply <b>MEDI DERMA-S Total Barrier Cream</b></p> <ul style="list-style-type: none"> <li>• A pea-sized amount to a palm-sized area</li> <li>• To the bottom, groin and genitalia</li> <li>• Apply twice daily</li> </ul>	
<p><b>Nursing recommendation</b></p>	<p><b>Assessment:</b></p> <ul style="list-style-type: none"> <li>• Observe and document changes in skin integrity</li> <li>• Assess frequency and consistency of stools on a daily basis</li> <li>• Consider differential diagnosis and dermatological referral</li> <li>• Look for features that may indicate bacterial secondary infection             <ul style="list-style-type: none"> <li>• Anticipate increased NAD risk from antibiotics, immunosuppression treatment or neonatal abstinence syndrome (NAS)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Encourage breastfeeding</li> <li>• Use barrier cream</li> <li>• In case of severe NAD, refer to a paediatric dermatologist</li> </ul>

**References:** Health Direct Australia. Baby rash. 2015. <https://tinyurl.com/yx6vrz9z> (accessed 15 January 2020); Schmid-Wendtner MH, Korting HC. The pH of the skin surface and its impact on the barrier function. *Skin Pharmacol Physiol.* 2006; 19(6): 296–302. Telofski LS, Morello AP 3rd, Mack Correa MC, Stamatias GN et al. The infant skin barrier: can we preserve, protect and enhance the barrier? *Dermatol Res Pract.* 2012; 2012: 198789. Stamatias GN, Nikolovski J, Mack MC, Kollias N. Infant skin physiology and development during the first five years of life: a review of recent findings based on in vivo studies. *Int J Cosmet Sci.* 2011; 33(1): 17–24. Blume-Peytavi U, Hauser M, Stamatias GN, Pathirana D, Garcia Bartels N. Skin care practices for newborns and infants: review of the clinical evidence for best practices. *Pediatr Dermatol.* 2012; 29(1): 1–14.

## paediatrics

stratum corneum (Telofski et al, 2012)  
are less resilient (Stamatas et al, 2010; Blume-Peytavi et al, 2012)  
Increased risk of skin damage and infection



### Damage

skin  
breakdown

### Moderate skin damage

Moderate erythema and small areas  
of damaged skin (<50% of affected area)

### Severe skin damage

Intense erythema and large areas  
of damaged skin (>50% of affected area)

Change nappies  
as soon after soiling  
as possible. Use  
an emollient and wet gauze  
to clean. Pat dry  
or allow to air dry

- Change frequently or soon after soiling
- Cleanse with **MEDI DERMA-PRO Foam and Spray Incontinence Cleanser** (no rinsing required)
- Pat dry (no rubbing) or allow to air dry

### Apply **MEDI DERMA-S Total Barrier Film**

- To the bottom, groin and genitalia
- Apply every 24–72 hours

### Apply **MEDI DERMA-PRO Skin Protectant Ointment**

- A thin layer
- To bottom, groin and genitalia
- After every nappy change

### Good practice:

Encourage regular nappy-free time as much as possible  
Use skin barrier products that do not interfere with the  
absorbency of nappies

- Encourage use of disposable gel core nappies

Reassess the skin-care regimen every 48 hours  
In the event of skin deterioration, **contact a tissue viability nurse**

### Avoid:

- Baby wipes of any kind for neonates
- Perfumed soaps and moisturisers
- Powders, such as talcum powder
- Thickly applied creams that can block the absorbency of nappies



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