

The standardisation of treatment for napkin-associated dermatitis with paediatric oncology

KEY WORDS

- ▶ Early intervention
- ▶ Napkin-associated dermatitis
- ▶ Nappy rash
- ▶ Prevention
- ▶ Treatment

Napkin-associated dermatitis (NAD) affects is common in children, however the risks of deterioration in skin integrity and increased severity of this condition are greater in those who are ill, particularly in those with cancer. This paper reviews the causes of NAD in high-risk paediatric patients and how University Hospitals Bristol addressed the surrounding issues, such as the effects of different chemotherapy drugs, diarrhoea, immunosuppression, modes of action of NAD treatment and parental anxiety, in its effort to reduce the impact of this condition. Barriers to care were identified and addressed, a treatment protocol was devised and assessment tools created for the general paediatric population and oncology patients.

Napkin-associated dermatitis (NAD), most commonly referred to as nappy rash, is caused by the prolonged exposure of urine and faeces to the skin (Health Direct Australia, 2015). Our skin works optimally at pH 5. Exposure to urine and faeces, which are alkaline, alters the pH of the skin and damages cells, causing dermatitis or irritation (Schmid-Wendtner and Korting, 2006; Ali and Yosipovitch, 2013).

Nappy rash is estimated to affect around a third of the nappy-wearing population at any one time (National Institute for Health and Care Excellence [NICE], 2013) and affects the well child as well as the ill child. There are certain factors that increase the risk of developing NAD, including prolonged nappy wear time, diarrhoea, underlying skin conditions, surgery, chemotherapy and immunosuppression (MediResource, 2015).

A review of paediatric referrals to the tissue viability team (TVT) at University Hospitals Bristol highlighted that approximately 80% were for NAD when viewed over a 6-month period. The paediatric oncology ward had a high incidence where the deterioration in skin integrity was very pronounced and the acuity more severe than for other paediatric patients. Historically, in extreme cases skin grafts have been required. With paediatric patients it is essential to consider that the parent/guardian will also be very involved

and anxious. Everyone is looking for a quick and effective treatment. Due to the associated anxiety and desire for immediate positive results, recommended treatments were not followed and treatments were changed if a treatment was not instantly beneficial, impeding good patient outcomes, and increasing the anxiety levels of all involved. To address this re-occurring problem, the TVT and specialist oncology nurses worked together to form a protocol for the prevention and treatment of NAD in oncology patients.

WHY ARE ONCOLOGY PATIENTS AT HIGHER RISK?

It is important to understand why those undergoing oncology procedures are at a higher risk than other paediatric patients of developing NAD. Of the known causative factors, the following are often exacerbated in oncology patients:

- ▶ Medication, affecting skin condition/integrity
- ▶ Medication/nutritional supplements increasing urine output and/or diarrhoea frequency
- ▶ Faecal/urine matter containing more caustic elements secondary to treatments
- ▶ Increased pain and less frequent nappy changes due to pain associated with movement
- ▶ Immunosuppression
- ▶ Prolonged periods of treatment, not allowing respite for skin to recover

EBONY RYAN
Tissue Viability Specialist Nurse
University Hospitals Bristol

SIMON HALL
Tissue Viability Lead Nurse,
University Hospitals, Bristol

Diarrhoea and increased stool production

Children on the oncology ward commonly suffer from diarrhoea or a change in stool pattern. It is a common side effect of chemo- and radiotherapy. Antibiotics disrupt the gut flora, affecting absorption, which in turn increases the incidence of loose stool/diarrhoea. Chemotherapy plays a similar role, indiscriminately destroying cells, thereby affecting absorption. The body naturally excretes waste products through urine and faeces, and therefore the by-products of the chemotherapy can be found in children's stools. Children receiving radiotherapy to the abdomen region may have severe diarrhoea until treatment stops. As the radiation is directed towards the bowel, this can cause severe irritation, disturbing gut flora and increasing the incidence and severity of diarrhoea (Ali and Yosipovitch, 2013).

Children in the oncology ward often receive supplementary nasogastric feeds to increase their nutritional intake and allow their bodies to recover as quickly as possible. This increased volume of food and fluids may exacerbate the volume of faecal and urinary output. As to the feeds have a liquid consistency, it increases the likelihood that stools produced will be more watery. This consistency and viscosity can cover a larger area of skin, increase maceration, weaken the cell structure and allow greater tissue damage compared to formed stool.

Increased exposure to urine and stools causes an increase in the pH to 7–10, which reduces the skin's natural barrier function (Wounds UK, 2014). In nappy-wearing children, this in time can cause the skin to become dry, vulnerable and sore (Schmid-Wendtner and Korting, 2006).

Immunosuppression

Acute myeloid leukaemia affects the body's ability to develop mature white blood cells (Leukaemia and Lymphoma Research, 2013). White blood cells are the body's defence against infections. Chemotherapy kills immature blood cells, causing the patient to become immunosuppressed, leaving them at a greater risk of developing infections (Cancer Research UK, 2014). The number of neutrophils, a type of white blood cell that in particular fights off infection, is also reduced (Bonatto et al, 2010). Neutrophils combat common colds and viruses such as norovirus (which

causes diarrhoea and vomiting). While a patient's neutrophils are low, they often develop NAD as incontinence can occur due to treatment, the skin becomes irritated quickly, and the patient's ability to heal is weakened. When the neutrophils increase after chemotherapy, the body begins to heal and the nappy rash improves. This often causes the child to have fluctuation in nappy rash, reflecting cycles of chemotherapy and their blood results.

DIFFERENT CHEMOTHERAPIES LEAD TO DIFFERENT TREATMENTS

There are many different types of chemotherapy available that can be given. The actions of some of these drugs need to be taken into account when creating a care protocol. Busulfan, treosulfan and thiotepa are excreted through the skin, and therefore require a slightly different treatment to other types of chemotherapy. As with any waste product, sweat is a way for the body to excrete toxins. Some cream and liquid barrier products can block the skin pores and risk trapping chemotherapy-related toxins under the skin, which may cause further damage. Thiotepa can cause severe skin irritation and pigmentation if it is not removed regularly. Bathing (at least five times a day) and changing nappies regularly to dispose of the chemicals is therefore necessary (Seattle Cancer Care Alliance, 2009).

Treatment for patients receiving these therapies should be considered from the planning stages. The Trust found patients would commonly receive no preventative intervention until several days post therapy, when the excreted waste was very caustic to the skin. At this point the nappy rash may be established and difficult to treat. It was therefore decided to have two stages of care in the protocol.

TREATMENT PROTOCOL

Stage 1: Prevention

The best and easiest NAD prevention is good nappy care. This includes:

- » A good gel core nappy as opposed to natural nappies. The better the core of the nappy, the quicker the faeces and urine are moved away from the skin and the less time they spend in contact with it.
- » Avoiding wet wipes (fragranced or unfragranced). Wipes are strong on the skin

and can change its pH, causing the skin to become more vulnerable. We recommend the use of warm water, soap substitute (emollient) or olive oil to cleanse with instead of wet wipes.

- ▶▶ Frequent nappy changes after soiling to avoid the stool being in contact with the skin for long periods of time. If a patient has loose stools, we would also recommend regular checks for any episodes of incontinence.
- ▶▶ Considering an emollient. If the patient has dry skin or is at high risk of developing NAD, we recommend considering an emollient to wash in and cleanse the sacrum with. This will improve skin integrity, help maintain pH and help reduce the likelihood of developing NAD.
- ▶▶ No-nappy time. This is dependent on the child, but when they are asleep, if it is possible open the nappy slightly or lay them on an incontinence sheet to allow the skin to breathe slightly as this can both prevent and help treat NAD (Morris, 2012).

Prophylaxis for those deemed high risk of developing nappy rash was made the first line of treatment. This involves good nappy care, including all of the above points, and commencing a daily barrier cream.

By commencing good nappy care, the overall skin integrity is being improved prior to coming into contact with toxins, reducing the chances of NAD developing and its severity if NAD does occur. Despite there being little research into the effectiveness of barrier creams in paediatric patients and NAD, their use in irritant contact dermatitis has been well documented in many experimental environments (Zhai and Maibach, 2002).

Daily application of a barrier cream creates a long-lasting, waterproof barrier (Stephen-Haynes and Stephens, 2013) preventing urine and faeces coming into contact with the skin. This allows the natural pH to be maintained in healthy skin and re-established in skin that is already red and/or sore. These creams do not effect the absorbance of the nappy and will continue to allow the toxins to be locked into the core, away from the skin. The cream should be used on unbroken skin and the film on broken skin as it has a non-sting formula.

Stage 2: Treatment

There are various treatments available for NAD. Barrier creams can be used but there is very little evidence supporting their effectiveness in the treatment of NAD (NICE, 2013). The lack of evidence is due to the sensitivity of the subject and the inability to run blind studies. Furthermore, some creams affect the absorbency and effectiveness of a nappy. It is important that users are aware of the mode of action of the creams being applied, while being mindful that although the skin has a natural ability to heal itself, while a patient is unwell this can take longer (James et al, 2011).

A review of the barrier products available led the Trust to select certain barrier products, with a step-up step-down approach to provide appropriate protection for different stages of NAD. This ranged from prophylactic treatment, to mild nappy rash, to severe cases. Of the barrier products selected, all had key themes: there was no minimum age restriction, none affected the absorbency of the nappy and none occluded skin pores.

When discussed with family members, common reasons given for selecting creams were that the products had been used on them as children, were well-known brands, or friends had recommended them. Of the parents involved in the review, none stated that selection was made on mode of action. Many of the creams used advertise a mixture of properties, from reduction of dryness to forming a water-repellent skin barrier. On closer inspection, it was noted that some products contained alcohol, which acts as a local anaesthetic (Sudocrem, 2015). Alcohol can also cause pain and stinging on application, however, and is not beneficial in NAD. It is questionable whether creams containing alcohol alter the skin's natural pH and whether they do indeed help with treatment. A common ingredient in many products is zinc oxide, which has anti-inflammatory and antiseptic properties, but is also a mild astringent. As it is not water-soluble it is not washed away, and thus has a longer mode of action. This by its nature can therefore build up in layers, occluding skin pores, if not used correctly (The Dermatology Review, 2016).

In the Trust, as a second-line treatment for those who have worsening nappy rash or

much excoriated skin, a step-up barrier cream (Proshield) is instigated, and the former barrier cream stopped. Proshield is a silicone-based cream that is applied thickly after every episode of incontinence, being soothing and painless on application. It creates a layer between toxins and the skin, reducing any irritation (H&R Healthcare, 2013). It helps by improving dryness and moisturising skin, while not blocking up the nappy (MA Healthcare, 2015). At University Hospitals Bristol, Proshield is the first-line treatment for patients receiving busulfan, treosulfan and thiotepa. When commencing Proshield, both staff and relatives were informed of the importance of using the product correctly and persevering for 5 days even if no improvement was seen straight away.

Honey-impregnated barrier creams are also available. Medihoney by Dermasciences was used when no improvement or deterioration was seen with the use of Proshield cream. This brand was trialled because, in our opinion, it can be used on both broken and unbroken skin and has been used in several paediatric situations with positive feedback. It is specially formulated with natural ingredients that maintain the skin's pH rather than altering it. Honey has been scientifically proven to reduce the bacterial load in wounds while aiding healing (George and Cutting, 2007; MA Healthcare, 2015).

We introduced the use of dressings to the area, as skin damaged by NAD is susceptible to further damage, such as shear and friction. Nonadherent dressings were recommended as they reduce friction that may be caused by rubbing against the nappy or other external surfaces in direct contact with the skin on movement. This also helped reduce shear on nappy removal, where the nappy could stick to the damaged skin, pulling the skin away on removal.

While the Trust has access to various Nonadherent dressings, Urgotul was suggested as the primary product due to its flexibility, low profile, and impregnation with hydrocolloid, which enhances optimal conditions for tissue regeneration. Urgotul is a mesh, allowing for urine to run straight through into the nappy rather than keeping it in contact with the skin.

Another dressing trialled was ActiFormCool.

This hydrogel dressing creates an exothermic reaction, which cools the skin. As nappy rash is a form of burn, this action can soothe skin and significantly reduce patient pain and anxiety, while delivering water to the open areas and hydrating them. This does, however, increase the risk of maceration to intact skin. For children suffering from increased pain and becoming increasingly distressed at nappy changes, ActiFormCool is an alternative to applying creams until pain has subsided sufficiently, allowing the re-application of barrier creams. The tackiness of the hydrogel enables it to stay where applied, reducing friction and ensuring application can be area-specific.

IDENTIFYING AND REDUCING BARRIERS TO CARE

While developing a protocol for the prevention and management of NAD for paediatric patients, including oncology patients, there were several barriers to address. Parents were anxious, looking for a treatment that resolved the NAD after only a couple of applications and would request an alternative as they felt the problem had not resolved. Creams were being changed daily when there was no improvement seen, and sometimes mixtures of creams were being used. In these situations we are unable to determine which, if any, cream was having a positive effect, and which was not. As NAD develops and deteriorates over a period of time, and invariably the cause of the damage is still an active problem, no one action will immediately resolve the skin damage. A key principle was embedded that any treatment should be used for a period of at least 5 days to quantify and observe for signs of improvement unless clear deterioration or adverse effects were noted when implementing a care regimen.

It was commonly seen that the nursing staff were not observing skin integrity, or delivering care on a regular basis, leaving parents or guardians to provide and deliver care. While this may be suitable, for quality and safe practice parents required sufficient support and supervision from nursing staff before continuing care independently. A parent's natural role is to protect and look after their child; when a child is admitted to hospital, much of this role is reduced

and therefore the parent feels uninvolved. When it comes to things such as nappy changes, parents naturally want to be involved so NAD may be picked up at a later stage.

In addition to supporting parents, the improvement of skin integrity with treatment needs to be checked at given intervals by the nurse so a regular bottom check was introduced. All staff were to check their patients' bottoms at least once a shift to detect early signs of NAD and expedite treatment (reducing deterioration and severity) and to monitor the regimen's effectiveness.

A parent leaflet was developed and made available in all clinical areas (see *Figure 1*), explaining NAD, how we treat it and the importance of sticking to one cream for at least 5 days and not mixing creams. This formed another medium by which to provide parent education, increase their knowledge, and insight into the causation of NAD, treatment aims and options. It also aimed to include parents/family members in the ongoing care of their child.

ASSESSMENT TOOLS

University Hospitals Bristol TVT has created a generalised paediatric skin assessment tool for NAD (see *Figure 2*). It uses a green to red traffic light system so it is easy to read and understand for nursing staff, students and care assistants. It was adapted from the adult skin assessment tools for consistency within the Trust.

The assessment tool highlights good nappy care and how to prevent NAD from developing. It then explains which patients are at high risk, *Candida* and excoriated skin, with accompanying images. It also includes the treatment plan that should be instigated based on skin presentation.

A specialised oncology tool was created to focus on this high-risk patient group (see *Figure 3*). The principles of the traffic light system were maintained but it provides greater detail on depth and breadth of treatment and nursing involvement in the management of NAD, due to the nature of the patient group, and indicates when a change in nursing care is advocated.

A new training and education programme was instigated with the launch of these new tools to ensure staff had greater understanding and knowledge of NAD and how to follow the

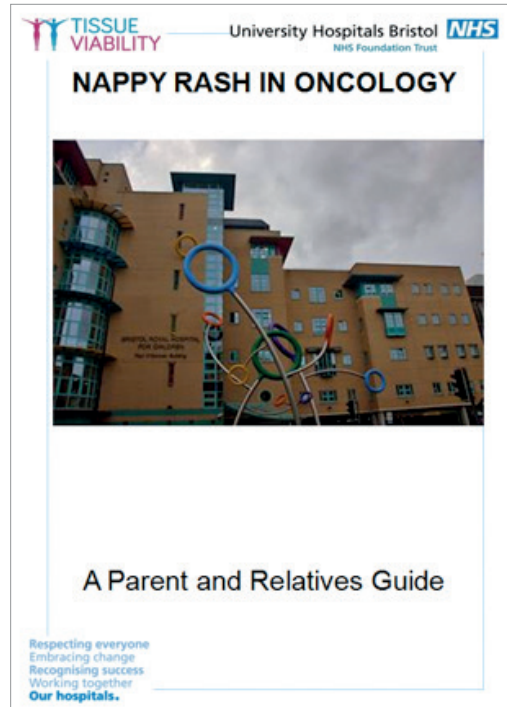


Figure 1. Leaflet created to educate parents/guardians about nappy rash and its treatment

guidance. The training was aimed at all registered and unregistered nursing staff and new starters, and was via various mediums, with electronic presentations, one-to-one teaching and ward-based sessions. The aim was to capture a large percentage of staff over a controlled period of time, ensure knowledge was current, and no older policies were being continued. Additional time was allocated to tissue viability link nurses based on every ward and clinical facility to cascade this to staff who had not been reached during the roll-out.

RESULTS

The implementation and standardisation of the treatment for NAD and NAD in oncology patients has generated a lot of positive feedback. Staff feel more confident in the detection, treatment and monitoring of NAD. Their increased knowledge has allowed them to instigate preventative and earlier active treatments, resulting in a reduction in the mean severity of skin damage, much more content patients, and reduced parental anxiety.

Feedback from patients' family members has been positive, with comments including "I feel I know what's going on and what I should look out

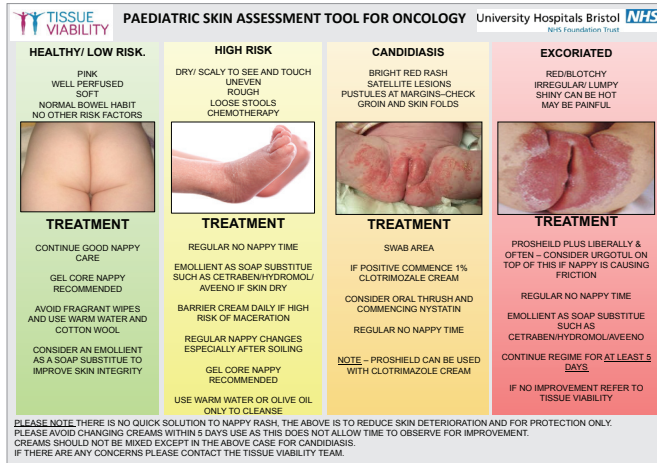


Figure 2. Paediatric skin assessment tool

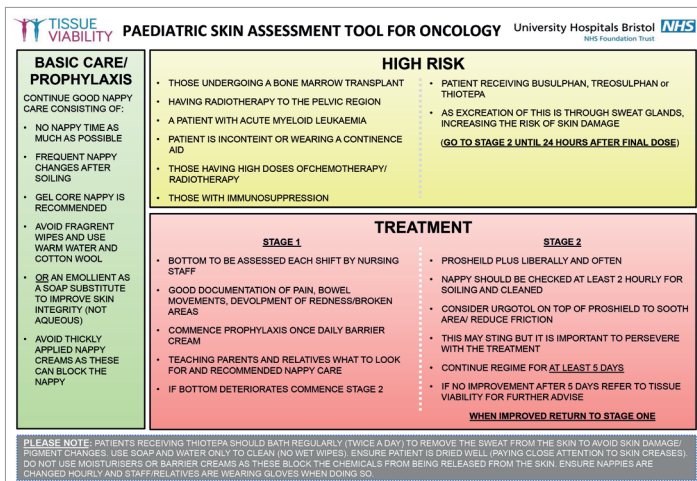


Figure 3. Paediatric skin assessment tool for oncology

for” and “when so much is happening that I don’t understand, at least I feel some control over this”.

The tissue viability service has seen benefits: referrals to the service for NAD are now made at an early stage when treatment is less problematic; and there has been a large reduction in the incidence of severe nappy rash being reported. Nursing staff now have a good knowledge of creams and dressings recommended by the TVT and have managed to reduce the range of dressings and creams that have historically been used.

CONCLUSION

Despite the standardisation of care, every patient is different and their NAD may react differently to certain treatments. The protocol allowed us to ensure all treatments were being used

for a reasonable amount of time before being discontinued and were also not being mixed. Some individuals required slightly different treatments to those suggested; however once a successful treatment was discovered we were able to start this straight away before the nappy rash deteriorated further.

WUK

REFERENCES

Ali SM, Yosipovitch G (2013) Skin pH: from basic science to basic skin care. *Acta Derm Venereol* 93(3):261–7

Bonato S, Oliveria H, Nunes E et al (2010) Fish oil supplementation improves neutrophil function during cancer chemotherapy. *Lipids* 47(4):483–9

Cancer Research UK (2014) *How Chemotherapy Works*. Available at: <http://www.cancerresearchuk.org/about-cancer/cancers-in-general/treatment/chemotherapy/about/how-chemotherapy-works> (accessed 13.01.2016)

George NM, Cutting KF (2007) Antibacterial honey (Medihoney®): in-vitro activity against clinical isolates of MRSA, VRE, and other multiresistant Gram-negative organisms including *Pseudomonas aeruginosa*. *Wounds* 19(9):231–6

H&R Healthcare (2013) *Proshield Plus Skin Protectant. Product Information*. Available at: <http://www.hrhealthcare.co.uk/proshield-plus.html> (accessed 13.01.2016)

James WD, Berger T, Elston D (2011) *Andrews’ Disease of the Skin* (11th edn). Elsevier, Philadelphia

Leukaemia and Lymphoma Research (2013) *Treatment and Side Effects*. Available at: <https://leukaemialymphomaresearch.org.uk/information/childhood-leukaemia/acute-myeloid-leukaemia/treating-childhood-aml> (accessed 13.01.2016)

Health Direct Australia (2015) *Baby Rash*. Available at: <http://www.healthdirect.gov.au/#/baby-rash> (accessed 13.01.2016)

MediResource (2015) *Condition Factsheets: Diaper Rash*. Available at: http://health.canoe.com/condition_info_details.asp?disease_id=320 (accessed 13.01.2016)

Morris H (2012) The bottom line on nappy rash. *Br J Midwifery* 20(9): 623–6

National Institute for Health and Care Excellence (2013) *Clinical Knowledge Summary: Nappy rash – summary*. Available at: <http://cks.nice.org.uk/nappy-rash/#!topicsummary> (accessed 13.01.2016)

The Dermatology Review (2016) Zinc oxide. *The Dermatology Review*. Available at: <http://www.thederreview.com/zinc-oxide/> (accessed 13.01.2016)

MA Healthcare (2015) *Wound Care Handbook 2015–2016*. MA Healthcare, London

Schmid-Wendtner MH, Korting HC (2006) The pH of the skin surface and its impact on the barrier function. *Skin Pharmacol Physiol* 19(6): 296–302

Seattle Cancer Care Alliance (2009) *Thiotepa (Thioplex®). Product Information*. Available at: https://healthonline.washington.edu/document/health_online_pdf/Thiotepa_Thioplex_2009.pdf (accessed 13.01.2016)

Stephen-Hyans J, Stephens C (2013) Barrier film: providing protection in continence care. *Nursing and Residential Care* 15(2):76

Sudocrem (2015) *Sudocrem FAQs*. *Actavis*. Available at: <http://www.sudocrem.co.uk/faq> (accessed 13.01.2016)

Wounds UK (2014) *Best Practice Statement: Principles of Wound Management in Paediatric Patients*. Available at: http://www.wounds-uk.com/pdf/content_11461.pdf (accessed 18.01.2016)

Zhai H, Maibach H (2002) Barrier creams – skin protectants: can you protect skin? *J Cosmetic Dermatol* 1(1):20–3