

Medical device-related pressure ulcers in premature babies

KEY WORDS

- ▶ Baby
- ▶ Documentation
- ▶ Injury
- ▶ Medical device-related pressure ulcers
- ▶ Prematurity
- ▶ Pressure ulcer

The prevention of pressure ulcers (PUs) has become a hot topic, with significant investment of both time and money being devoted to reducing the number of pressure-related injuries acquired within the NHS. A number of babies on our neonatal unit developed facial PUs that were caused by continued pressure from non-invasive ventilation. This led the unit to develop a team to review the causes, and formulate a plan for reducing PU incidence, focusing on premature babies of 25 to 30 weeks gestation. This article outlines the literature around neonatal pressure ulcers, and how the review team adapted practice on the unit.

Medical devices that are in continuous contact with patients are the cause of 34.5% of hospital-acquired pressure ulcers (PUs) (Black et al, 2010). Patients in contact with medical devices are 2.4 times more likely than those who are not, to develop a PU of any kind (Black et al, 2010).

Despite significant investment and the high-priority status of PU prevention within Aneurin Bevan University Health Board (ABUHB), small pockets of hospital-acquired pressure damage still remain. In the neonatal intensive care unit (NICU), the majority of pressure damage incidents are device related. Although the PUs are small in size, those that occur due to non-invasive ventilation (NIV), such as continuous positive airway pressure (CPAP) and high-flow nasal cannula, are significant in terms of depth of damage and their potential to scar babies for life.

The unit has taken a targeted approach to reducing pressure injuries, starting with investigating the device-related damage that has occurred. In the 6 months prior to the investigation, two significant device-related pressure ulcers occurred on NICU, both as a result of NIV. Following these incidents, a task group was developed to review the causes, and plan how to avoid such incidents in the future. The first step that the group explored was to review the literature and contact tissue viability networks to determine whether protocols for preventing mask damage exist. This initiative focused on premature babies, particularly those of 25 to 30 weeks gestation.

The group then examined how they could apply new protocols and documentation to reduce PU incidence.

OVERVIEW

Pressure ulcers

Pressure ulcers are localised injuries normally found over bony prominences and resulting from pressure, or pressure plus shear to the skin and/or underlying tissue. The significance of the contributing factors associated with pressure ulcers still needs to be clarified (European Pressure Ulcer Advisory Panel [EPUAP] and National Pressure advisory panel [NPAP], 2009).

Medical device-related pressure damage (MDRPU) is more specifically defined as a 'Localised injury to the skin or underlying tissue as a result of continuous pressure from a device (e.g. nasal cannulas, tubing, braces, splints, oxygen face masks, prosthesis)' (Baharestani and Ratliff, 2007). The National Institute of Health and Care Excellence (NICE, 2015) has developed a placeholder statement regarding MDRPUs; the Quality Standards Advisory Committee has prioritised this statement because no other source of guidance is available on MDRPU.

Effects of medical devices on premature babies

Visscher and Taylor (2014) performed a 2-year prospective study and considered aetiology, severity and influence of gestational age on PUs among

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“Safeguarding means protecting people’s health, wellbeing and human rights, and enabling them to live free from harm, abuse and neglect. It’s fundamental to high-quality health and social care” (Care Quality Commission, 2016).

hospitalised preterm babies. They reported that the number of device-related PUs was over 90% in premature babies and the number of grade 2 EPUAP PUs (EPUAP and NPAP, 2009) was high.

Aetiology

Premature infants have an underdeveloped epidermal barrier; and have thin, friable skin; this makes their skin particularly vulnerable to damage. The skin provides the first line of defence against the external environment by providing a physical barrier. It also prevents excessive water loss from the body (Voegeli, 2010).

The stratum corneum forms a barrier to protect the underlying tissue from infection, dehydration, UV light and chemicals (Apold and Rydrych, 2012). In mature skin, the stratum corneum is 10–20 layers of flattened cells in thickness; however, in babies of 30 weeks gestation or less, it may only be 2–3 layers thick (Vebrov, 2000).

It is not just the immaturity of the skin in preterm babies that contributes to their vulnerability. Oedema is also a significant risk to premature babies as the tissue becomes less tolerant and this makes it more prone to damage from sustained pressure, such as the pressure exerted from CPAP (Baharestani and Ratliff, 2007). The nasal septum comprises of adipose tissue and any pressure damage to this area develops rapidly. In addition, the altered microclimate and excessive moisture around the mask presents a challenge to skin, and may contribute to the development of a PU.

Facial damage

When considering facial pressure injury, Bonsell-Pons et al (2014) found that facial pressure ulcers are associated with the use of diagnostic and therapeutic devices, such as nasal prongs and NIV. The injuries occur directly under the diagnostic or therapeutic device (Moreiras-Plaza et al, 2010). The tissue injury typically mimics the shape of the device (Fletcher, 2012). This injury can cause scarring and the baby may require plastic surgery in the future.

Pain

In adults, PUs are known to cause pain, (McGinnis et al, 2015); therefore, we can assume that premature babies experience the same pain, although no research could be found to support the claim.

Classification of PUs

The present classification tool (NPUAP et al, 2014) is not appropriate for identifying damage in the nasal area. The guidelines specifically state that medical device-related pressure ulcers should be classified using the International NPUAP/EPUAP Pressure Ulcer Classification System, with the exception of mucosal pressure ulcers; that would include the nasal nares. Therefore, classifying the extent of damage in the nasal area is challenging (Fletcher, 2015).

Prevention

Preventing a MDRPU in premature babies is often more complicated than just relieving pressure, as the device is usually an essential component of their treatment. For example, CPAP relies on a seal of continuous positive pressure to keep the alveoli in the lungs open. Any disruption in the seal can cause the pressure to drop and the lungs to close. As a result of this, the baby’s oxygen saturations may drop and they may require higher pressures or a different form of ventilation to reopen the lungs (Fletcher, 2012).

Documentation and litigation

Good record keeping is an integral part of nursing and midwifery practice, and is essential for providing safe and effective care (Nursing and Midwifery Council, 2009). Accurate documentation improves communication and provides accountability, which allows a data trail aiding professional information, and is important in the event of complaints or litigation (Vowden and Vowden, 2015). Nurses working in NICU are vulnerable to litigation, due to the complexities of the care that is required. Cartwright-Vanzant (2010) suggested that ‘Knowing the ‘how,’ ‘what,’ and ‘when’ of documentation, can decrease exposure to litigation by strengthening the accuracy of medical record entries; this is the nurse’s best defence.’

CHANGING PRACTICE

Problem solving in a case of PU on NICU

Patient safeguarding is a high priority in the NICU. In September 2015 it was reported to the safeguarding team that a premature baby, of 26 weeks gestation, had developed full-thickness pressure damage to the nasal septum and bridge

of their nose; this damage had been caused by the mask and nasal prongs used during CPAP (Figure 1). The nasal prongs and mask were a vital part of treatment, and it was necessary for these devices to remain in place.

A clinical incident form was completed along with involvement of the medical photography team. This information was then discussed at a root cause analysis (RCA) meeting.

As part of this meeting, documentation was scrutinised and the medical illustration photographs were analysed. The group noted that despite the provision of regular pressure relief of the nasal prongs as part of routine premature baby care, very little structured documentation of this procedure existed. This useful process was the start of an exciting change to our practice, and it allowed us to consider lessons learnt.

Developing the task force and documentation

As PUs cause pain and potential facial scarring to a baby, the task force aimed to prevent such tissue damage. When considering and comparing both the adult and NICU documentation for preventing PUs, it was clear that the documentation on NICU was insufficient. Therefore, the knowledge gained from adult specialties could be customised and implemented for NICU.

The group studied examples of established adult PU reporting documentation, with the aim of improving patient care and attaining excellent quality documentation. Examples included:

- ▶▶ Clinical incident reporting (Dealey et al, 2012)
- ▶▶ Risk assessment (Willock et al, 2007)
- ▶▶ Skin assessment (Whitlock et al, 2011)
- ▶▶ Pain assessment (Williams and Hoggart, 2005)
- ▶▶ Nutritional assessment (NICE, 2012)
- ▶▶ Care plan and review of plan (NICE, 2014)
- ▶▶ Route cause analysis (National Patient Safety Association, 2004)
- ▶▶ Classification of PUs (NPUAP, EPUAP, PPIA, 2014).

This exercise led the group to the conclusion that documentation of such incidents in NICU could be customised and improved.

Two specific risk assessment tools were identified from other organisations who kindly shared them. Both tools had been developed for adult intensive care units. Working with



Figure 1. Pressure ulcer caused by the use of continuous positive airway pressure (permission from medical illustration ABUHB)

NICU staff, the team made adaptations to the PU reporting tools to suit the needs of the unit. Once the new tool was developed, teaching was incorporated within the NICU teaching module. With the support of the NICU staff, the pressure ulcer prevention tool was implemented in practice, along with a guide to assessing babies receiving nasal CPAP (Figure 2).

When devising the documentation, a number of factors were considered. The group discussed hourly intervals in pressure relief; however, due to the nature of the device, it was decided that a maximum of 3-hour intervals should be given between pressure relief. It was left to the nurse's discretion to judge how stable the baby was, and whether to give pressure relief more often. The group decided that patients with PUs that were category 1 or above (NPUAP et al, 2014) should be referred to tissue viability nurses to ensure action is taken before further damage occurs.

Another aspect of documentation is patient information. The thought that the baby's acquired facial scarring may need plastic surgery at a later date is especially alarming for parents, as is the thought of the pain the baby experiences when the ulcer is developing. As part of family-centred care, and responding to parent requests, the action group produced an information leaflet about preventing the development of device-related pressure damage in their babies. Although

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the group aimed to prevent any further pressure damage to babies, the leaflet explained to parents what may happen if a pressure ulcer did develop. Provision of this leaflet aimed to create an open and honest environment to help prepare parents for the possibility that their baby may develop a pressure ulcer.

The equipment, including masks and prongs, were examined and found to be rather rigid. Various suppliers of the equipment were contacted and an improved version was sourced. Consequently, the group worked with NICU and was able to introduce the new, softer, more pliable masks and prongs. Switching between mask and prongs was promoted, along with the use of a dressing and padding for the pressure points of the device, and a secure hat to hold the CPAP in place.

CONCLUSION

The distressing occurrence of skin damage from MDRPU in preterm babies is becoming a high-priority topic. Such skin damage triggers a substantial emotional response for all involved. The increase in awareness and the implementation of a customised document, suggests that preventative measures and early detection of injury are beginning to make a difference for the babies in NICU. The engagement of the staff on the unit has been immense, and the enthusiasm to continue their innovative ideas is reassuring. This is the beginning of a journey towards further improving documentation and looking forward to continued safeguarding of our vulnerable babies. **WUK**

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ADDRESSOGRAPH



Bwrdd Iechyd Prifysgol
Menter in Bwrdd
University Health Board

Date

Non-Invasive Ventilation Pressure Ulcer Prevention

PLEASE REFER GRADE I AND ABOVE TO TISSUE VIABILITY

CHECK UNDER THE MASK

| TIME | COMMENTS | PRONGS | MASK | GRADE | SIGNATURE |
|--------------------------------|--|--------|------|-------|-----------|
| Max. Of 3hrs between checks | i.e. skin intact, red, indentation, painful to touch etc | | | | |

Figure 2. Specific pressure ulcer prevention documentation for NICU

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