The challenge of caring for premature warrior babies: educating healthcare professionals on preventing difficult injuries

Guido Ciprandi
Paediatric and Plastic Surgeon, Rome, Italy; President of the Pediatric Wound Care MasterClass Foundation

Nash Keen is with us! Born at exactly 21 weeks, 133 days ahead of his mother's due date; the most premature lovely baby ever born (Millward, 2025).

If this stirs emotion in you, continue reading and witness how tenaciously attached he is to the life we wish to protect together, starting with respect for his skin.

Nash is a true modern gladiator. On World Prematurity Day, November 17th, we want to raise awareness about premature babies. According to the World Health Organization (WHO), 15 million babies are born preterm every year, at least 3 weeks before their due date and, heartbreakingly, one million of them die (Ohuma et al, 2023; WHO, 2023a, 2023b). The leading causes of death in preterm infants are underdeveloped brains, skin and lungs.

Unfortunately, technology cannot replace a mother's natural skin-for-touch (Zimmerman, 2014), where the warmth, smell and tepid scent of the breast stimulate the brain axis and support complex maturation and development in the years to come. Over the last five years, a growing number of premature infants who had early skin-to-skin contact with their mothers were breastfed at hospital. Early skin-to-skin contact boosts breastfeeding in premature babies (Kristoffersen et al, 2025). In addition, colostrum, a nutrient-rich fluid produced immediately after birth, plays a key role in skin immunity. It is rich in antibodies (e.g. IgG, IgA, IgM), growth factors and proteins that strengthen the skin barrier, reduce inflammation and promote wound healing.

Topical application of colostrum protects the skin from infections and reduces exuberant scarring. We hope that more hospitals will adopt practices ensuring premature infants are not separated from their mothers during the first hours after birth. In this way, the second skin, the skin microbiome, influenced and strengthened by the gut microbiota at a very early age, can reach full maturity by the end of the third year of life (Eisenstein, 2020; MacGibeny et al, 2025).

Shaped and supported by the gut microbiota from a very early age, it can achieve full maturity by the end of the third year of life (Piazzesi et al, 2024). Extremely premature infants exhibit severe thermoregulation difficulties so incubators and special blankets keep them warm while maintaining surface humidity and pH (Nitzan et al, 2025; Stoll et al, 2025). Modern neonatology prevents skin lesions from the outset by delaying the removal of vernix caseosa until the third day of life and using every precaution typical of the most elegant and complex skin tear protocols.

Therefore, skin fragility represents the fragility of the entire preterm organism. It reflects the immaturity of the stratum corneum of fetal skin, which appears non-lamellar, devoid of intracorneal desmosomes and highly hydrated, containing around 80% water.

Premature infants continue to highlight the critical need for early skin protection. Their corneocytes are small, fragile, single-layered cells that are particularly prone to damage (Zhou et al, 2025). Many concepts applied to adult skin fragility come directly from studies on the ontogeny of preterm infant skin and must be part of the foundational knowledge of anyone who studies and applies the principles of wound care.

Mimicking the uterus and its conditions to complete skin and lung development represents the first technological step of incubators projected into the future: an artificial sac containing amniotic fluid (Heyer et al, 2024).

Bioengineered uterus and placenta that keep the umbilical cord intact are being tested to promote lung, skin and brain development. We are moving toward ectogenesis, the development of an embryo in an artificial uterus from implantation through delivery. It all starts with the protection and prevention of primitive skin.

Special measures are taken to prevent complex retinopathies and skin injuries caused by compression and friction. In some cases, early pressure ulcers are unavoidable and are classified as congenital, particularly when foetal skin is exposed to prolonged compression by the maternal pelvis, as seen

Submission date
3 Aug 2025
Accepted date
11 Sep 2025
Published date
29 Sep 2025

Declarations:
GC is on the *Global Wound Care Journal* editorial board; this did not influence acceptance.

Corresponding author:
Guido Ciprandi, former Responsible Pediatric Wound Care, Bambino Gesu' Children's Hospital, Division of Plastic and Maxillofacial Surgery – Rome, Italy. Email: guidociprandi@gmail.com

in conditions like oligohydramnios. This natural water-based cushion is unique, possessing antibacterial and lubricating properties, especially in combination with vernix caseosa. No artificial solution has been created that biology has not already designed to protect against bone exposure and prevent future pressure injuries.

The clinic introduces unique pressure ulcer prevention criteria in preterm infants, significantly different from laboratory observations, although those remain interesting. Micromovements, spontaneous and continuous micro-repositioning and still-immature psychomotor skills, reconditioned by the presence of parents can diminish the benefits of prophylactic dressings alone. The ongoing benefits of parental touch, the natural aromatherapy induced by contact with maternal skin and music therapy represented by a reassuring voice, both in tone and phonetics, are essential complements in minimising neonatal stress and the constant microfrictions, sometimes imperceptible but harmful due to their continuity. Severe prematurity teaches us that only an interdisciplinary and interprofessional team can address this enormous fragility.

The main specialists involved are neonatologists and paediatricians, gynaecologists and obstetricians, psychiatrists, psychologists and neurologists, all of whom are only rarely involved in the prevention of pressure ulcers. This calls for a profound reflection: the hegemonic concept of wound care, traditionally carried out by selected professional categories, must be replaced by the action of a culturally integrated and shared team.

The training of medical and nursing staff in paediatric ICUs represents the highlight of a new concept: "newborn-centered-continuous-care" (NC^3). There are four fundamental elements in preventing pressure ulcers in newborns and infants. First is the study of micromovements, based on the understanding that immobility is dynamic rather than static. Second is the consistent and active presence of parents, even in settings that once had limited visiting hours. Third is the use of natural therapeutic distraction techniques, which support neurophysiological development and help increase pain thresholds. Lastly, clinical preparation for perceptually guided wound care should be tailored to the infant's activities and sensory experiences.

Therefore, we focus on education, understanding families and their fundamental contribution and cultivating the human ability to perceive and interpret every small sign of stress or skin disorder, even when "voiceless" patients make interpretation difficult. Anticipating painful stimuli and knowing how to recognise them supports prevention as much as technology does. Similarly, this applies to older individuals unable to communicate pain or discomfort in the early stages of a pressure injury, which could otherwise lead to delayed intervention and worsening conditions.

In its true essence, neonatal and paediatric skin care represents a continuum of care, from the critical first moments of life to the developmental milestones of childhood and adolescence. A newborn like Nash's great desire to live will make the difference, we just have to protect his/her skin, his/her envelope, his/her vital shell. Please, let's do it. ●

References

Eisenstein M (2020) The skin microbiome. *Nature* 588(7838): S209. doi: 10.1038/d41586-020-03523-7

Heyer J, Schubert F, Seitz AL et al (2024) A volume-adjustable artificial womb for extremely preterm infants. *Transpl Int* 37: 12947. doi: 10.3389/ti.2024.12947

Kristoffersen L, Støen R, Bergseng H et al (2025) Immediate skin-to-skin contact in very preterm neonates and early childhood neurodevelopment: a randomized clinical trial. *JAMA Netw Open* 8(4): e255467. doi: 10.1001/jamanetworkopen.2025.5467

Kusari A, Han AM, Virgen CA et al (2019) Evidence-based skin care in preterm infants. *Pediatr Dermatol* 36(1): 16–23. doi: 10.1111/pde.13725

MacGibeny MA, Adjei S, Pyle H et al (2025) The human skin microbiome in health. *J Am Acad Dermatol* 93(2): 329-36 doi: 10.1016/j.jaad.2024.07.1498

Millward A (2025) 'Nash is pure joy in a tiny package: most premature baby born 19 weeks early turns one'. Guinness World Records, 5 July. Available at: https://www.guinnessworldrecords.com/news/2025/7/nash-is-pure-joy-in-a-tiny-package-most-premature-baby-born-19-weeks-early-turns-one (accessed: 24.09.2025).

Nitzan I, Kasirer Y, Mimouni FB et al (2025) The Skincubator: a novel incubator for skin-to-skin care (SSC) of premature neonates, enables SSC within humidified environment and may improve thermoregulation during SSC. *Am J Perinatol* 42(13): 1721–28. doi: 10.1055/a-2526-5064. Epub 2025 Jan 31.

Ohuma EO, Moller A-B, Bradley E et al (2023) National, regional, and global estimates of preterm birth in 2020, with trends from 2010: a systematic analysis. *Lancet.* 402(10409): 1261–71 doi: 10.1016/S0140-6736(23)00878-4

Piazzesi A, Scanu M, Ciprandi G, Putignani L (2024) Modulations of the skin microbiome in skin disorders: a narrative review from a wound care perspective. *Int Wound J* 21(10): e70087. doi: 10.1111/iwj.70087

Stoll CM, Jani PR, Ågren J et al (2025) Approaches to incubator humidification at <25 weeks' gestation and potential impacts on infants. *J Perinatol* [epub ahead of press]. doi: 10.1038/s41372-025-02294-1

World Health Organization (2023a) Preterm birth. Geneva: WHO. Available at: https://www.who.int/news-room/fact-sheets/detail/preterm-birth (accessed 12.09.2025)

World Health Organization (2023b) Births, preterm, rate per 100 live births. Geneva: WHO. Available at: https://www.who.int/data/gho/data/indicators/indicator-details/GHO/preterm-birth-rate-per-100-live-births (accessed 12.09.2025)

Zhou J, Ying L, Zhao M, Wang Z (2025) Considerations regarding pressure injuries of prematurity in neonatal intensive care unit. *J Adv Nurs* 81(8): 5220–1. doi: 10.1111/jan.16437

Zimmerman A (2014) The gentle touch receptors of mammalian skin. *Science* 346(6212): 950–4. doi: 10.1126/science.1254229