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Evidence-based guidelines for infant bathing

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About the Expert



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Neonatal Skin Care Evidence-Based Clinical Practice Guideline. 4th edition

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Bathing is a regular occurrence for all newborn infants. While bathing practices and skin care have traditionally been based on culture, regional customs and anecdotal experience, recent evidence-based recommendations for newborn infant bathing have been made and will be presented in this review.

Skin structure and function

The skin is the largest organ of the body, with responsibility for several key functions. It acts as a protective barrier against microbes and radiation, maintains hydration, regulates body temperature and aids in tactile sensation.^{1,2} At birth, newborn skin emerges from the aquatic environment of the uterus to dry, aerobic conditions, with skin function gradually maturing throughout infancy.^{1,2} Therefore, during the first days and month of life, skin care practices that focus on protection and integrity of the skin's barrier is an essential component of care.³ The overall goal of skin care is to prevent skin alterations that may lead to dehydration and infection.³ Furthermore, an infant's early exposure to skin irritants and toxins may be linked to the development of atopic skin events in later life.³

The skin contains three separate layers.⁴ The uppermost layer is the stratum corneum. This provides the important barrier function of the skin and has 10-20 layers in adults and full-term newborns. However, the stratum corneum is not fully mature during the first year of life and is approximately 30% thinner than that of adult skin⁵ leading to a higher risk of trans-epidermal water loss and microbial infection.⁶ Directly under the stratum corneum is the basal layer of the epidermis. This is approximately 20% thinner in newborns compared to adults.⁷ Next is the dermis, which is also thinner and underdeveloped in newborns compared to adults.⁷

The skin undergoes a process of development from 0 to 40 weeks gestation (Figure 1 and Table 1).⁸ At term gestation, the skin has structural and functional weakness vs. adult skin with further deficiencies noted in premature neonates.⁸

The skin of the full-term newborn is covered with vernix caseosa which is comprised of water (80.5%) and proteins, lipids and antimicrobial peptides.⁹ Vernix protects the foetus from water exposure and helps formation of the stratum corneum.⁴ Vernix also contributes to creation of the acid mantle of the skin surface, which prevents the growth of pathogenic microorganisms and affords immunologic properties to the skin.¹⁰

At birth, full-term newborns have an alkaline skin surface (pH >6.0) but this becomes acidic within 96 hours of birth.⁴ Newborn skin has a pH of 6.0 during the first 15 days of life, reducing to 5.1 at 5-6 weeks of age and remaining acidic at pH 5.5 in adulthood.¹¹

Figure 1. Skin development from 0 to 40 weeks gestation⁸

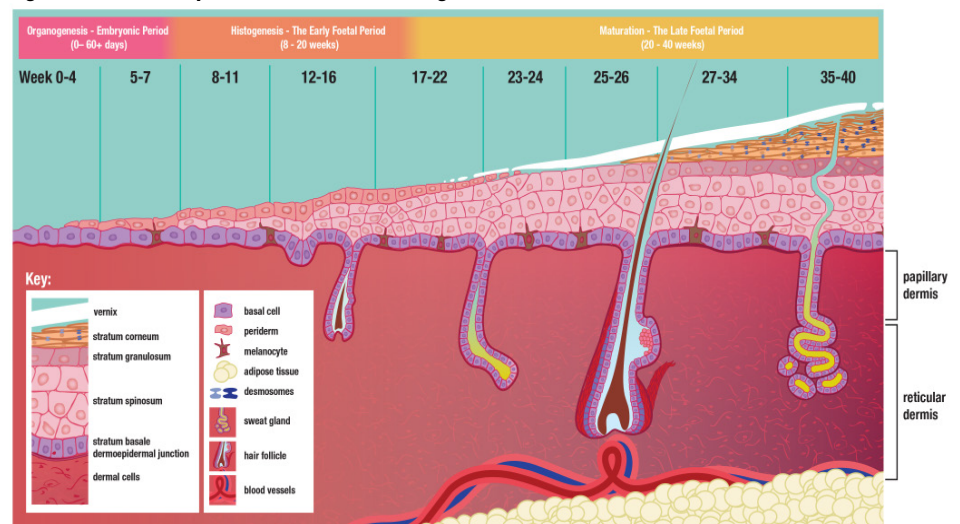


Table 1: Key development features and considerations by gestational weeks⁸

0-4	5-7	8-11	12-16	17-22	23-24	25-26	27-34	35-40
Single layer of ectoderm	Melanocytes emerge	Spinous cell layer emerges	Periderm, basal cells, desmosomes, hair follicles emerge	Four-five layers of epidermis	Epidermal layer begins to proliferate	Epidermis keratinised (cornified)	Vernix and stratum corneum thicken	Thick vernix covers the skin and then by 40 weeks remains only in creases
Periderm and basal layer emerges			Two layers of spinosum	Vernix begins to form	Periderm deteriorates (finished by 24 weeks), adds to vernix	Multiple layers of stratum corneum		



The AWHONN Neonatal Skin Care Guideline

The purpose of the Neonatal Skin Care Evidence-Based Clinical Practice Guideline is to provide nurses, midwives, and other health care workers with clinical practice recommendations for neonatal skin care based on the best available evidence. The first edition of the guideline (2001) was produced by a collaboration between the Association of Women's Health, Obstetric, and Neonatal Nurses (AWHONN) and the National Association of Neonatal Nurses (NANN).¹² This review is based on the fourth edition of the guideline, published in 2018.³ The AWHONN review includes recommendations from a 2009 European Roundtable Meeting on bathing newborns.¹³ The guideline is endorsed by the Australian College of Neonatal Nurses (ACNN) and NANN.

Evidence-based recommendations for infant bathing

The rationale for these recommendations is discussed below and includes supporting evidence from two recent reviews from the UK and the US.^{1,14} as well as updated recommendations from a second European Roundtable Meeting.¹⁵

The quality of evidence supporting clinical practice recommendations was determined by team consensus and is described at the beginning of the reference list with the evidence rating noted after the relevant references.

Table 2. Evidence-based recommendations for neonate bathing³

General bathing principles
<ol style="list-style-type: none"> Implement safety principles when bathing newborns: <ul style="list-style-type: none"> Use standard precautions, including wearing gloves until after the newborn's first bath (which ideally should be between 6-24 hours after birth). Ensure bath equipment is not a source of cross contamination among newborns. Implement environmental controls to create a neutral thermal environment and to minimise heat loss. Bathe according to facility protocols and include measures to reduce stress and prevent heat loss associated with bathing. Bathing techniques include: <ul style="list-style-type: none"> Immersion (tub) bathing (recommended). Swaddled (tub) bathing (recommended to reduce stress). Sponge bathing (least recommended).
First bath - applies to all newborns, but additional considerations for preterm infants given below
<ol style="list-style-type: none"> Provide the first bath once cardiorespiratory and thermal stability have been achieved. <ul style="list-style-type: none"> Ideally, the first bath should occur between 6 and 24 hours of life. For infants born to an HIV-positive mother, the first bath should occur as soon as possible after birth. Use warm tap water and a minimal amount of pH neutral or slightly acidic cleanser to assist with removal of blood and amniotic fluid. Leave vernix intact as much as possible. Keep bath time as short as possible. Use appropriate rewarming measures after bathing, including skin-to-skin contact.
Routine bathing
<ol style="list-style-type: none"> Frequency of bathing and time of day should be based on individual need. Until crawling, bathing does not need to be more than every few days/twice a week. Appropriate safety measures should be used. Shampooing once or twice a week is usually adequate. Ensure skin and eyes do not become irritated.
Bathing preterm infants
<ol style="list-style-type: none"> Consider weight, gestational age, and severity of illness when bathing preterm infants. For infants less than 32 weeks of gestation, consider the use of warm water only bathing during the first week of life due to skin irritation risk with cleansers. Use warm sterile water when areas of skin breakdown are evident.
Considerations for water and cleansers
<ol style="list-style-type: none"> Use warm tap water with a mild, gentle cleanser. <ul style="list-style-type: none"> Select mild cleansing bars or liquid cleansers that have a neutral or mildly acidic (pH 5.5-7.0) or have minimal impact on the baby's skin surface pH. Some cleansers pose risks to newborn skin including skin and eye irritation, and disruption of normal skin pH or microbiome. If eczema family history (atopic dermatitis), bathing products and emollients will need special consideration. Choose products containing preservatives that have demonstrated safety in newborns. Avoid the use of antimicrobial soaps or chlorhexidine. Use of herbal therapies can result in allergic contact dermatitis or eczema. Check ingredients/product and whether it can be used on newborn skin.

General bathing principles

Standard safety precautions should be used when bathing infants. Such practices include wearing gloves until after the infant's first bath, because neonates may be contaminated with blood-borne pathogens until after removal of blood and secretions.^{3,15-18} In hospitals, ensure bath equipment is not a source of infection transmission by cleaning and disinfecting tubs.^{3,15,17,19,20}

Newborns are unable to regulate and maintain their own body temperature without thermal protection²¹ and bathing is a significant factor affecting thermoregulation in newborns.²² To lessen infant heat loss, ensure bath water ranges from 38°C to less than 40°C²² and create a warm room temperature (26°C to 28°C).³ Close the door to the room where bathing takes place to minimise air currents and convective heat loss.³

Ideally, infants should be bathed with immersion (tub) bathing or swaddled immersion bathing.^{1,3,18} Compared with infants who were sponge bathed, infants who were tub bathed experienced significantly less variability in body temperature and were warmer at 10 and 30 minutes after bathing.^{22,23} Infants bathed in a tub also cried less and were calmer and quieter²³ and their mothers experienced greater pleasure and confidence, compared to infants who were sponge bathed. It is thought that the greater heat loss associated with sponge bathing may lead to increased crying and agitation.²² Furthermore, infants who were tub bathed had no delay in umbilical cord healing²⁴ and, compared with infants who were sponge bathed, no difference in rates of umbilical cord infection or nappy rash.^{22,23,25} Swaddled bathing was more effective at maintaining body temperature, oxygen saturation levels and heart rate compared to tub bathing.²⁶ Infants may have uncontrolled motor activity when placed in a bathtub, therefore swaddled immersion bathing may contain the infant leading to reduced infant²⁶ and parental²⁷ stress.

The first bath

The first bath should be given only once the infant has achieved cardiorespiratory and thermal stability.^{1,3,15,18,28} AWHONN guidelines recommend that the first bath occurs between 6 and 24 hours after birth.^{3,22,29-32} For infants born to a mother who is HIV positive, the first bath should occur as soon as possible after birth in order to prevent transmission of maternal infection to the newborn.³³

While there is worldwide variation in the timing of the first bath,³⁴ the primary aim is to maintain thermoregulation of the infant. Cold stress can increase the infant's metabolic rate resulting in increased use of glucose and oxygen which may lead to hypoglycaemia and hypoxaemia.¹⁸ Bathing too early may also unnecessarily interrupt breastfeeding and skin-to-skin contact.^{15,35}

Leave vernix on the skin for at least 6 hours.^{29,36} Blood and meconium should be gently removed and not vigorously scrubbed as doing so will also remove vernix.³ Removal of vernix is not recommended as the vernix helps acid mantle formation and has thermoregulatory, moisturizing, antioxidant, and antimicrobial properties.^{1,3,15,18,28,37}

The first bath should be as short as possible – a limit of 5 minutes is recommended to avoid cold stress^{13,26} – and appropriate rewarming measures should be used afterwards, such as skin-to-skin contact.³⁸



Routine bathing

Infants should be bathed only every few days using appropriate safety measures,^{1,15} for a duration of 5 to 10 minutes.¹⁵ Daily bathing is not recommended because water interaction with the stratum corneum may make the skin drier.^{1,39} Furthermore, daily washing with liquid baby cleansers and moisturising with oils may delay the natural skin barrier maturation.⁴⁰ Routine bathing may begin before the umbilical cord has fallen off.^{1,15,18} Decisions about the frequency of bathing and time of day should be based on the infant's needs, family beliefs and values of the local culture.^{3,15,41} Evening bathing may help to calm the infant and improve sleep,¹⁵ as well as provide enjoyment and tactile stimulation, improve maternal mood, and promote infant-caregiver bonding.¹⁵

Shampoo once or twice a week by massaging the entire scalp gently, including the area over the fontanelles.³ Shampoos should meet the same safety requirements as those of a baby wash and should not cause eye irritation.¹³

Bathing preterm infants

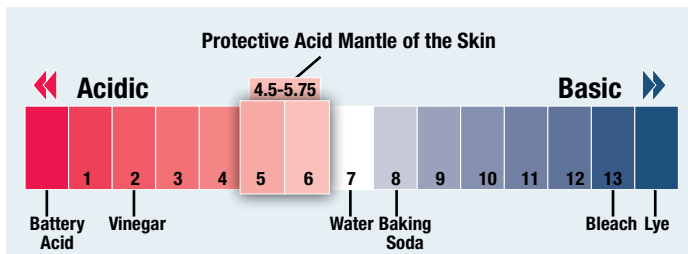
Special care should be exercised during bathing preterm infants.^{1,3} Preterm infants are at higher risk for heat loss and stress,^{42,43} therefore consider strategies such as swaddled immersion bathing, and hand containment and positional support.^{1,3,42,44} Furthermore, the structural integrity of the stratum corneum depends on gestational age at birth, therefore preterm infants may have a defective skin barrier, increasing the risk of exposure to irritants.³ For infants less than 32 weeks of gestation consider the use of warm water only during the first week to reduce the risk of skin irritation with cleansers.^{1,3,5} Use soft cotton cloths or cotton balls so as not to tear the skin – if areas of skin breakdown are noted, use warm sterile water.^{1-3,5,45,46}

Considerations for water and cleansers

Use warm tap water with a mild, gentle cleanser for bathing.³

Current evidence suggests that water alone may not be the best cleanser for infant skin.^{13,47-49} This provides a challenge when parents ask for guidance about caring for their baby's skin. Water also increases skin pH (from 5.5 to 7.5, see Figure 2), and therefore may modify the physiological function of the skin.⁵⁰

Figure 2. Skin pH: protective acid mantle versus water



Select mild cleansing bars or liquid cleansers that have a neutral or mildly acidic pH (5.5-7.0) or those that have minimal impact on the infant's skin surface pH.^{1,3,15}

A mild liquid baby cleanser with water is more effective than water alone at removing damaging substances such as faeces, urine and food residues from the skin surface.^{1,3,13,15,24,43,48} Only around 65% of oil and dirt on the skin surface can be removed with water alone.⁴³ Surfactants in cleansers emulsify oil, dirt, and microorganisms on the skin so they can be easily removed with water.³ Unlike soap, liquid cleansers specially formulated for baby skin cause less disruption of the skin barrier, skin-surface pH, and acid mantle, and they rinse more easily.^{1,3,51}

A randomised controlled trial showed that skin moisture and pH were not negatively affected when a cleanser was used rather than water alone for infant bathing.⁵² Another randomised controlled trial showed no difference in trans-epidermal water loss between infants bathed with a baby wash or in water alone.⁵³

Ideal properties of liquid cleansers from the 2016 European Roundtable Meeting on Best Practice Healthy Infant Skin Care is shown in Table 3.¹⁵

Table 3. Recommendations on properties of ideal cleansers for infant skin¹⁵

Cleanser should maintain infants' skin at pH 5.5
Cleanser should not interfere with normal skin microbiome development
Cleanser and all its ingredients should have undergone extensive programme of safety testing; only use ingredients approved for use on infants by regulators
Only use regulator approved preservatives
Any fragrances should be regulator approved to reduce risk of adverse events
Safety and efficacy should be evaluated in high-quality clinical trials
Cleanser should contain a complex of mild emulsifiers and surfactants to effectively cleanse or hydrate infants' skin with no negative effects on skin barrier
Formulation should effectively cleanse infants' skin to remove damaging substances, e.g. faeces, urine, and food residues
Cleanser should not contain damaging ingredients, e.g. harsh surfactants, in particular sodium lauryl sulphate
Cleanser should not irritate babies' skin or eyes

Recognise that some agents in cleansing products may have a negative impact on newborn skin, including skin irritation, disruption of the normal pH of the skin, irritation or stinging of the eyes and disruption of the microbiome.³

Skin dryness and irritation and weakening of the skin barrier have a higher likelihood of occurring if soap-based cleansers are used,⁵⁴ particularly under hard water conditions. Water hardness, determined by dissolved minerals such as calcium and magnesium in water, can affect how skin reacts to cleansing products. In fact, the pH of the skin surface and the degree of water hardness has been linked to development of atopic dermatitis in children.¹³ Baby cleansers can bind dissolved minerals and soften the hardness of bath water, reducing the impact of hard water on skin.⁵⁵

Soap is typically alkaline,⁵² which, along with the presence of certain surfactants such as sodium lauryl sulphate,^{15,43} has been shown to increase the pH of skin and disturb the acid mantle, thereby lowering antimicrobial properties of the skin, and reducing hydration leading to dry and irritated skin – therefore soap should be avoided.^{1,3,14,15,56}

It is important to select cleansing products that do not disturb the skin microbiome.^{3,15} The microbiome is essential to the immunological functioning of the skin⁵⁷ and maintaining a skin-surface pH between 4.0 and 4.5 facilitates the attachment of 'good' commensal bacterial to the surface of the skin.⁴³

Infant bathing products that are non-irritating to the eyes should be selected.^{13,15} While an infant's blink reflex is present at birth, it is much slower than that of adults. Defensive blinking is required to protect the eye from injury and is not fully developed until about 4 months of age.⁵⁸

Choose products containing preservatives that have demonstrated safety and tolerability in newborns.³

Preservatives are necessary in liquid cleansers to prevent bacterial growth introduced during manufacture and routine use, however, these may be the cause of allergic irritant or contact dermatitis.^{13,59} Microbial contamination has been reported in products that are preservative-free.⁴³ Therefore, choose products with preservatives that have been safety tested on infants.^{3,15}

Avoid the use of antimicrobial soaps or chlorhexidine products.³

Antimicrobial soap is not recommended for infant bathing due to the harshness of the soap and potential negative effect it may have on normal skin colonisation.¹⁶



TAKE-HOME MESSAGES

- The infant skin barrier continues to mature during the first year of life and is vulnerable.
- Suboptimal routine skin care may transform the healthy skin into one associated with skin barrier dysfunction.
- The first bath
 - Wear gloves until after the first bath.
 - Bathe the newborn once cardiorespiratory and thermal stability have been achieved.
 - The first bath should occur between 6 and 24 hours of life or according to local culture.
 - Leave vernix on the skin.

- Routine bathing (term infants; additional considerations needed if preterm infants)
 - Bathe the infant only every few days/twice a week.
 - Use warm tap water with a mild, gentle cleanser.
 - Select cleansers that are free of irritants and that are neutral or mildly acidic (pH 5.5–7.0) or have minimal impact on the infant's skin pH.
 - Appropriately designed cleansers can be used without impairing skin maturation.
 - Products supported by robust clinical data should be selected over those that are not similarly developed.
 - As part of an evening routine, bathing may improve sleep.

EXPERT'S CONCLUDING COMMENTS

The skin, as the body's largest organ, could be seen as the 'poor cousin' to the other essential organs such as the heart and lungs. Yet, the skin has essential roles, particularly during the neonatal period, in protecting the neonate from infection and maintaining thermoregulation.

As the skin development diagram depicts, the skin and its functions mature as the foetus grows. For those neonates born preterm, the skin can be quite immature and therefore prone to injury in the extra-uterine neonatal environment. Breaks in skin integrity then pose additional risk for infection and thus potentially survival.

Research is beginning to demonstrate that the skin is not fully developed and mature until around two years of age. This is important as we consider care of newborns' skin from birth into toddlerhood. Eczema and other forms of dermatitis (e.g. nappy) are prevalent and may be exacerbated by exposure to contact and inhalant allergens and irritants.

While bathing may seem innocuous, water can be drying to the skin, as are soap bars. It is important that consideration is given around product selection and it is recommended that liquid cleaners (preferred) or mild cleansing bars that are neutral or mildly acidic are used, to minimise the skin becoming dry, which can lead to the skin becoming cracked, resulting in a break in skin integrity. Therefore, the use of emollients to protect the integrity of the skin and enhance skin barrier function is encouraged to become a part of daily skin care. Additionally, the use of water alone for bathing has limits in removing faeces and urine, specifically faecal enzymes, from the skin. Surfactants in cleansers allow cleansing to occur more easily as they emulsify oils, dirt, faeces and microorganisms. Bathing should be gentle, and rubbing avoided to prevent irritation of the skin. Furthermore, the effects of water-alone bathing on the long-term capacity of the pH mantle is poorly understood for neonates born preterm.

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Quality-of-Evidence Rating used in the AWHONN Guideline

- I Evidence obtained from at least one properly designed randomised, controlled trial or meta-analysis of randomised, controlled trials.
- II-1 Evidence obtained from well-designed controlled trials without randomisation.
- II-2 Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one centre.
- II-3 Evidence from multiple time series with or without the intervention. Dramatic results in uncontrolled experiments could also be regarded as this type of evidence.
- III Opinions of respected authorities, based on clinical experience, descriptive studies or reports of expert committees.
- M/A Evidence obtained by statistical analysis that combines the results of multiple studies. The combined information leads to higher statistical power than is possible from any individual study.
- SR Systematic review that collects and critically analyses multiple studies, using methods that are selected before one or more research questions are formulated, and then finding and analysing those questions in a structured methodology.

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