

REVIEW ARTICLE

Bathing and cleansing in newborns from day 1 to first year of life: recommendations from a European round table meeting

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Abstract

Background Development of the skin barrier continues up to 12 months after birth; therefore, care must be taken when cleansing and bathing infants' skin. Available guidelines for skin care in newborns are, however, limited. In 2007, the 1st European Round Table meeting on 'Best Practice for Infant Cleansing' was held, at which a panel of expert dermatologists and paediatricians from across Europe aimed to provide a consensus on infant bathing and cleansing.

Outcomes Based on discussions at the meeting and a comprehensive literature review, the panel developed a series of recommendations relating to several aspects of infant skin care, including initial and routine bathing, safety while bathing, and post-bathing procedures. The panel also focused on the use of liquid cleansers in bathing, particularly relating to the benefits of liquid cleansers over water alone, and the criteria that should be used when choosing an appropriate liquid cleanser for infants. Alkaline soaps have numerous disadvantages compared with liquid cleansers, with effects on skin pH and lipid content, as well as causing skin drying and irritation. Liquid cleansers used in newborns should have documented evidence of their mildness on skin and eyes, and those containing an emollient may have further benefits. Finally, the panel discussed seasonal differences in skin care, and issues relating to infants at high risk of atopic dermatitis. The panel further discussed the need of clinical studies to investigate the impact of liquid cleansers on skin physiology parameters on newborns' and infants' skin.

Conclusions Bathing is generally superior to washing, provided basic safety procedures are followed, and has psychological benefits for the infant and parents. When bathing infants with a liquid cleanser, a mild one not altering the normal pH of the skin surface or causing irritation to skin or eyes should be chosen.

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Keywords

bathing, cleansing, consensus, epidermal skin barrier, Infant, newborn

Conflicts of interest

M.J. Cork and F. Vanaclocha are advisors to Johnson and Johnson. U. Blume-Peytavi is a member of the advisory board of the 'Penaten Beirat', Johnson & Johnson, Germany. J. Faergemann, C. Gelmetti, J. Szczapa declared to have no conflict of interest.

Introduction

The skin barrier plays a vital role in maintaining internal homeostasis by preventing loss of water.¹ The function of the skin barrier begins to develop *in utero* and is believed to reach complete maturity by the 34th week of gestation. Recent data have, however, challenged the idea that skin barrier function is complete in full-term infants, showing that development continues up to 12 months after birth.² In a study comparing barrier function

in 124 infants (3 months to 4 years of age) and 104 adults (14–73 years), the distribution and transport of water through the superficial layers of the skin were shown to be distinctly different between infants and adults.² Skin barrier is essential for infants, and it is important, therefore, that skin care, including bathing and cleansing, is appropriate and age adapted.

Current skin care practices in infants vary between populations and are based mainly on tradition, experience and cultural factors.

Skin care practices should, however, preserve skin integrity, prevent toxicity and address concerns such as potential sensitivity from chemical exposure.³ In an attempt to define best practice relating to skin care in infants, the US Association of Women's Health, Obstetric and Neonatal Nurses and National Association of Neonatal Nurses published an evidence-based practice guideline covering aspects such as bathing, cord care, nappy rash (diaper dermatitis) and trans-epidermal water loss.³ However, these guidelines were published in 2001 and, therefore, do not take recent research into account. In the UK, the National Institute for Clinical Excellence have issued guidelines relating to the routine postnatal care of women and their babies, although the guidance given regarding bathing is very limited and based on expert opinion rather than evidence-based medicine.⁴ To date, no pan-European guidelines for skin care in neonates and infants have been published.

On 13 February 2007, the 1st European Round Table meeting on 'Best Practice for Infant Cleansing' was held in Düsseldorf, Germany, and supported by an unrestricted educational grant from Johnson & Johnson. The panel consisted of expert dermatologists and paediatricians (i.e. senior physicians and researchers, and departmental heads) and panel members were invited by Johnson & Johnson to provide representative opinions from across Europe from individuals who were known to have interest and involvement in critical discussions relating to the care of infants. The aim was to discuss best practice on bathing procedures using the newborn as a standard, as procedures working in this group should translate to older infants.

At the meeting, the use of a number of standard terms was agreed upon: a newborn is a child within the 4 weeks after delivery; a normal baby is one that reaches maturity at ≥ 37 weeks of gestation, with healthy skin with no pathological findings (i.e. a low risk of developing skin disorders at 3 months and beyond); normal skin care was considered to be that which maintains the status of the skin, covering a period from > 37 weeks of gestation to 12 months of life. Furthermore, for the purposes of this manuscript, the term infant is assumed to cover the first year of life after birth.

A comprehensive evidence review of published literature was carried out after the meeting to allow the generation of this consensus statement. The PubMed database was searched for terms suggested by the outcomes of the consensus panel, including (but not limited to) the general terms 'neonate', 'newborn', 'infant', 'bathing', 'washing' and 'cleansing', and specific terms, including 'atopic dermatitis', 'cloth', 'culture', 'contamination', 'emollient', 'hard water', 'liquid cleanser', 'oils', 'psychological benefits', 'safety', 'season', 'shampoo', 'soap', 'sponge', and 'temperature'. Additional manuscripts cited in those identified by literature search were also checked for relevance, as were publications cited in the US Association of Women's Health, Obstetric and Neonatal Nurses and National Association of Neonatal Nurses guidelines.³ Given the heterogeneity of studies in this area, with widely differing

methods and outcomes measures, no attempt to conduct a meta-analysis of data was made. In particular, data generated from specific studies in infants are limited in several areas and the only data available are from adult studies, making interpretation difficult in light of the differences between adult and newborn skin outlined above. It should therefore be noted that the recommendations made in this manuscript are primarily those of the authors and panel members, based on their extensive clinical experience and supported by the published literature wherever possible.

First cleansing

Immediately after delivery, the full-term newborn can simply be wiped or washed with water according to local cultural preferences to remove vernix caseosa. Timing of the newborn's first bath or wash varies from culture to culture, and a study in 51 normal newborns (minimum axillary temperature, 36.5°C) compared those bathed within the first hour of birth with those bathed 4–6 h after birth.⁵ Results showed that axillary temperatures, measured before and immediately after the bath, and at 1 and 2 h later, did not differ significantly between the two groups, confirming the findings of earlier studies.^{6,7} As noted, the investigators in these studies selected infants with a stable axillary temperature,^{5,6} as there is the potential for hypothermia and respiratory distress if temperature is not stabilized.^{6,8} In healthy newborns, bathing in warm water may have a beneficial effect on body temperature, leading to a more even temperature profile across the trunk and peripheries.⁹

Overall, the consensus is that bathing times can be kept flexible, in line with the characteristics and stability of the newborn, and family preferences.⁵ The location of bathing can also vary depending on family preference, and a study comparing bathing by the parent under nursing supervision at the bedside in the first few hours of birth with bathing by a nurse in an admission nursery showed that there was no difference in temperature change between the two groups.¹⁰ If the first bath is carried out by healthcare workers rather than the parent, however, gloves should be worn to protect the healthcare worker from exposure to maternal blood.^{6,8,11,12} Recommendations of the consensus panel regarding newborns' first cleansing are summarized in Table 1.

Routine bathing

Results from numerous studies have clearly demonstrated that bathing of newborns and infants can be carried out with no harm to the baby.^{6–8,10,13–15} While some cultures may prefer to delay bathing until after the umbilical cord has fallen, bathing can safely be carried out before.^{14–16} In a study of 102 mother–baby pairs who were randomly assigned to a tub bath or a sponge bath, no differences in cord healing were reported,¹⁵ while an earlier study comparing washing and bathing in newborns showed no difference in bacterial colonization of the umbilical cord between

Table 1 Recommendations of the consensus panel regarding first cleansing of newborns

Recommendation
• Immediately after delivery, the baby can be wiped with water
• Timing of the first bath should be according to local culture
• The newborn's temperature should be stabilized before the first bath is given
• Healthcare workers should use gloves for the first bath

the two groups.¹⁴ A study in Egypt comparing traditional methods of cord care with alcohol or natural drying found, however, that tub bathing was associated with a significantly increased incidence of cord infection.¹⁷

When compared with cloth or sponge washing, bathing has been shown to have several advantages. First, studies have shown that infants are generally calmer and quieter when bathed compared with cloth washing.^{14,15} For example, Bryanton and colleagues (2004) showed that babies who received a tub bath were significantly more content (Brazelton Neonatal Behavioural Assessment Scale) than those washed with a sponge ($P < 0.01$).¹⁵ Bathing is also associated with less heat loss than cloth washing, with no difference in infection or bacterial colonization.¹⁴ Recently, data from a study in 57 healthy newborns showed that washing during the first 4 weeks of life was associated with increased *trans*-epidermal water loss and reduced stratum corneum hydration compared with bathing.¹⁶

In newborns, 5–10 min is an adequate length of time for the bath, with some authors preferring bathing to last for not more than 5 min, particularly if soap is used.¹⁷ To date, bathing is usually carried out as often as is appropriate according to local culture. However, daily bathing is generally discouraged,³ and a frequency of no more than twice-weekly until the baby is crawling has been recommended by the UK Royal College of Midwives.¹⁸ The timing of bathing during the day also varies from culture to culture and should be decided on an individualized basis.⁶ It is possible, however, that evening bathing may be associated with a calming effect, leading to improved sleep, as has been demonstrated in young adults¹⁹ and elderly individuals.^{19,20} In both of these populations, pre-sleep bathing is associated with reduced time to sleep and improved subjective experiences of sleep quality. Recommendations of the consensus panel regarding routine bathing of infants are summarized in Table 2.

Safety while bathing

When bathing an infant, basic safety precautions should be followed, such as placing the bath in a safe place, or using the main household bath if possible. In addition, infants should not be left unattended, and young children should not be allowed to wash the baby.²¹ Baths and bath toys are a potential source of microbiological contamination,^{22,23} such as an outbreak of *Pseudomonas aeruginosa*

Table 2 Recommendations of the consensus panel regarding routine bathing of infants

Recommendation
• Bathing does not harm the baby
• Routine bathing may begin before the umbilical cord has fallen, but there may be advantages associated with waiting
• Bathing is better than washing with a cloth
• Bathing in the evening can help to calm the baby and improve sleep
• For newborns, the bath should last 5–10 min
• Bathing should be carried out 2–3 times per week until the baby is crawling, or as often as required by local culture

reported on an Australian paediatric ward that was traced to a toy box containing water-retaining bath toys.²⁴ Therefore, the bath and any bath toys should be disinfected before bathing.¹⁶ This includes bath mats, which are recommended if bath oils are used during bathing (see also 'Use of liquid cleansers in bathing', below).

The temperature of the bathing water should be kept close to body temperature (i.e. 37–37.5 °C),^{3,13} although some authors recommend slightly lower temperatures, corresponding to skin temperature (34–36 °C).¹⁶ Before placing the infant in the bath, the water should be mixed to ensure an even temperature, and checked by the parent or caregiver. The depth of the water should reach to the hips of a sitting infant (approximately 5 cm).^{3,13} While no studies on suitable air temperature have been carried out, it seems reasonable to suggest maintaining the room temperature at 21–22 °C, although there may be benefits to a temperature closer to skin temperature (e.g. 28 °C).

During bathing, the infant's entire body, excluding the head and neck, can be immersed in water.^{3,13,14} Alternatively, the infant can be washed in a sitting position, with a wash cloth used either to cover the belly or to splash water on the belly to maintain body heat. To avoid injury to the epidermis, the cloth should not be used to rub the skin.⁸ While sponges are an alternative to cloths, an there is a risk of fungal and bacterial contamination and, thus, they are not recommended.^{25–28} Recommendations of the consensus panel regarding safety during bathing are summarized in Table 3.

After bathing

When bathing is finished, the baby should immediately be covered with a dry towel and patted (not rubbed) dry.^{3,16} Significant temperature decrease can occur 10 min after neonatal bathing, and the baby should therefore be dressed immediately after drying, taking care that the clothing is not made damp.^{7,13} Particular care should be taken when bathing infants within 1 h of birth, as there is an increased risk of hypothermia (i.e. body temperature < 36.5 °C) after bathing.²⁹

If changes to skin structure, such as dryness, fissures or flaking, are observed after bathing, a suitable emollient should be applied.³

Table 3 Recommendations of the consensus panel regarding safety while bathing infants

Recommendations
<ul style="list-style-type: none"> • The bath should be placed in a safe place • The bath and any bath toys should be disinfected to avoid microbiological contamination • Water temperature should be 37–37.5 °C • Water depth should be to the infant's hips • A wash cloth may be used to cover or splash water onto the belly to maintain body heat • Room air temperature should be 21–22 °C • The baby should not be left alone while in the bath, and young children should not be allowed to wash the baby • If oils are used, a mat should be placed in the bath, which should also be disinfected regularly.

Table 4 Recommendations of the consensus panel regarding procedures after bathing

Recommendations
<ul style="list-style-type: none"> • Immediately cover the baby with a towel and pat dry • Dress the baby immediately after drying • Changes to skin structure (e.g. dryness, fissures, flaking) should be treated with an emollient or a protective ointment (diaper area)

Numerous studies have shown that emollients can protect the integrity of the stratum corneum and skin barrier, in addition to treating dry, cracked or flaky skin.^{30–32} Emollients may be of particular benefit in babies at high risk of developing atopic dermatitis (see 'Infants at high risk of atopic dermatitis', below). Recommendations of the consensus panel regarding procedures after bathing are summarized in Table 4.

Psychological benefits of bathing

While the benefits of bathing in terms of infant hygiene are perhaps clear, studies have also been carried out into other benefits of bathing and, broadly speaking, the psychological benefits of bathing can be divided into two categories. First, bathing has obvious tactile aspects, providing a pleasurable experience for the infant and promoting bonding between the baby and the parent or caregiver.^{8,13,15} Second, numerous studies have shown that bathing can be a calming, soothing experience for the infant.^{8,13–15,33,34} As discussed above, bathing has advantages over sponge or cloth washing in terms of infant contentment.¹⁵ It has also been shown that tub bathing provides advantages over a 'shower-bath' in terms of relaxation and normal bathing behaviour.³³ Bathing may also be a simple intervention that can be used to manage persistent crying in the first 3 months of life, a problem reported by up to 20% of parents.³⁴ Recommendations of the consensus panel regarding the psychological benefits of bathing are summarized in Table 5.

Table 5 Recommendations of the consensus panel regarding procedures after bathing

Recommendations
Bathing can be a fun experience for the infant, providing tactile stimulation and bonding with parents and other caregivers
Bathing can be a calming, soothing experience for the infant

Use of liquid cleansers in bathing

Benefits of liquid cleansers over water

Although some guidelines recommend the use of water alone for cleansing infants, this is not evidence based. The National Institute for Clinical Excellence guidelines, for example, state that 'the only cleansing agent suggested, where it is needed, is a mild non-perfumed soap', although the evidence level for this is rated as opinion only. Indeed, studies have shown that washing with water alone has a drying effect on infants' skin, depending on the frequency of use.^{35,36}

For example, a recent randomized, investigator-blinded clinical study showed that twice-daily cleansing with water alone in healthy infants (3 weeks to 11.5 months old) was associated with a significant increase from baseline in skin erythema after 2 weeks, while no significant change was seen in infants washed with a mild liquid cleanser. Washing with water alone was also associated with a significant decrease in skin pH after 1 week that returned to normal at 2 weeks.³⁵ An earlier non-comparative study in 52 normal infants (aged 3–6 months) showed that bathing in water alone dramatically altered the biophysical properties of skin, with decreased moisture accumulation and lower friction, indicating a drier skin surface ($P < 0.01$) when measured 2 min after bathing compared with pre-bathing levels. After 15 min, however, the alterations were resolved.³⁶ Moreover, this short-term effect was observed at the non-diapered site while at the diapered site there was no effect.

Studies in children with atopic dermatitis have shown that hard water can have an irritating effect.^{37–39} Data on 1-year period and lifetime prevalence of eczema in 4141 primary-school children and 3499 secondary-school children in the UK showed that, among primary-school children (age 5–11 years), there was a significant direct relationship between 1 year and lifetime prevalence of eczema and water hardness ($P < 0.001$), both before and after adjustment for confounding factors.³⁸ Similar data were obtained in a Japanese study of data from 458 284 children aged 6–12 years, in which the prevalence of atopic dermatitis was significantly higher in the highest water hardness category than in the lowest ($P < 0.0001$).³⁷

The function of baby care liquid cleansers is to interact with surface soil on the skin and remove harmful substances without damaging the skin. Faecal enzymes, for example, can be harmful to the skin if not removed, predisposing the infant to nappy rash.^{40,41} When twice-daily washing with a mild baby care liquid

cleanser was compared with twice-daily washing with water alone in 120 infants (aged 3 weeks to 11.5 months), results showed that both regimens were clinically well tolerated,^{35,42} although twice-daily washing may be more frequent than is normally carried out. No visible irritation was elicited by the mild baby liquid cleanser or water alone, with no significant changes in erythema, oedema, dryness or scaling (clinical dermatologist assessment) with either regimen. When skin hydration and erythema were assessed using more sensitive measures (conductance and oxyhaemoglobin levels, respectively), the liquid cleanser was shown to be associated with a significant increase in hydration over baseline after 1 week ($P < 0.05$), while water alone was associated with a significant increase in erythema after 2 weeks ($P < 0.05$). Overall, the authors concluded that a daily cleansing routine with a mild baby wash was as mild as a routine of water alone cleansing, with a mild baby wash providing better hygiene through effective removal of faecal residues and urine components.^{35,42} Additional protective effects on infants' skin, which cannot be provided by water or a liquid cleanser alone, can be achieved by using a liquid cleanser that contains an emollient, and many authors recommend regular emollient use.^{30,31,40,43,44} Furthermore, studies in elderly incontinent individuals have shown that using a cleanser with an emollient is superior to using soap and water for preserving the perineal skin barrier.⁴⁶

Recommendations of the consensus panel regarding the benefits of liquid cleansers over water are summarized in Table 6a. It should be noted, however, that data on liquid cleansers in newborns are currently limited. In a recent clinical study on the effect of bathing with body wash gel and topical lotion compared to bathing with clear water skin barrier development of term newborns was not adversely affected by either bathing regimen.⁴⁷

Selecting liquid cleansers for routine bathing

When selecting liquid cleansers for use on infants' skin, products should be selected whenever possible on the basis of robust evidence, preferably where that evidence has been acquired in practical use settings in addition to laboratory safety tests. Preferably, the product should have been clinically proven to be suitable for newborns, as even seemingly innocuous substances can have important detrimental effects when applied to the skin. For example, numerous case reports are available describing contact dermatitis in adults after exposure to olive oil,⁴⁸⁻⁵¹ which is used in traditional neonatal massage in developing countries⁵⁰ and as a penetration enhancer in some topical formulations. The impact of a range of vegetable oils on epidermal barrier function was evaluated in mice, with mustard, olive and soybean oils associated with a significant delay to barrier recovery after tape-stripping,⁵⁰ although a single application of sunflower seed oil significantly accelerated skin barrier recovery within 1 h.⁵⁰ In light of the reports of contact dermatitis in adults and data from animal studies, it seems reasonable to recommend that addition of

Table 6 Recommendations of the consensus panel regarding the use of liquid cleansers in bathing

Recommendations

a) Benefits of liquid cleansers over water

- A randomized study of a liquid cleanser suggested that washing with water alone may have a more drying effect on skin compared with use of a mild cleanser
- In children, hardness of local water is linked to the incidence of atopic dermatitis
- Liquid cleansers that contain emollients provide further protective effects on skin that cannot be provided by water
- Liquid cleansers can cleanse and hydrate the skin better than water in adults, further studies are required in newborns and infants

b) Selecting liquid cleansers for routine bathing

- A hypothetical 'ideal cleanser' is one that does not alter the normal pH of the skin, cause skin irritation, or cause irritation or stinging of the eyes
- Liquid cleansers should not alter the normal pH of the skin, cause skin irritation, or cause irritation or stinging of the eyes
- Parents and carers must read the product instructions and abide by them
- Products should be selected on the basis of evidence acquired in practical use conditions
- Liquid cleansers should contain adequate and appropriate preservatives
- Soap-free liquid cleansers have properties suggesting that they are preferable to soaps
- Liquid preparations, which often contain emollients, are preferable to bars

vegetable oils such as olive oil to bath water should be avoided. The same is true of cosmetic bath oils, which are often used to protect against skin drying, as the irritant potential of such agents in adults varies widely from product to product.⁵¹ Indeed, some oil-based products containing MIPA (monoisopropanolamine)-laureth sulphate have been shown to irritate, rather than protect, the skin of adult volunteers,⁵¹ and equivalent data in newborns are again lacking.

In addition to testing of the overall product, individual components, such as fragrances, should also undergo rigorous testing. Indeed, some authors are of the opinion that little or no fragrance should be included in baby care cleansers,^{8,43} as newborns are exposed to a wide range of chemical agents⁵² that may have different effects on their skin⁵³ compared with that of the adults in which such products are routinely tested. It is possible that use of natural products, such as aloe or chamomile, may improve the mildness of products on infants' skin, although data are very limited in this regard. There is, however, a consensus that cleansers, particularly liquid formulations, should contain adequate and appropriate preservatives to prevent contamination by harmful bacteria.^{43,54} As with other ingredients, preservatives used in baby care liquid cleansers should have demonstrated safety and tolerability.³

Traditional soaps, which are generally alkaline, can be irritating and potentially drying to infants' skin.^{8,43,54,55} For example, one randomized study in 40 infants (aged 2 weeks to 16 months) found that 10 min after washing with alkaline soap, skin pH had increased by 0.45, with a decrease in epidermal fat content of 4.81 $\mu\text{g}/\text{cm}^2$.⁵⁵

Washing with tap-water (pH 7.9–8.2) was associated with an increase of 0.19 in pH and decrease in fat content of 0.93 $\mu\text{g}/\text{cm}^2$. In adults, alkaline soaps have also been shown to have an irritating effect on skin surfaces,^{56–58} and sodium lauryl sulphate, a common ingredient of soaps, has been shown to affect barrier function, in terms of *trans*-epidermal water loss, as well as affecting cytokine expression,^{57–59} although whether similar effects occur in neonatal and infant skin remains to be determined. In the opinion of the consensus panel, the properties of a hypothetical 'ideal' liquid cleanser seem, therefore, to be the opposite of traditional soaps. First, liquid cleansers should not alter the normal acid mantle of the skin surface, with pH-neutral or mildly acidic liquid cleansers (pH 5.5–7.0) most likely to achieve this.^{3,8,54,55} Second, numerous authors have expressed the opinion that ideal liquid cleansers should not cause irritation to the skin or eyes, and this has also been linked with product pH, although robust data from clinical trials in infants are again lacking.^{3,8,16,43,60} In a study comparing the irritation potential of a range of soaps and liquid cleansers in adult volunteers, the irritation index (a derived parameter based on the incidence of erythema, scaling and fissures) was shown to be significantly correlated with pH ($P < 0.006$).⁶¹

Moreover, as detailed above, a recent comparison between one baby care liquid cleanser and washing with pure water showed that the liquid cleanser was clinically as mild as water on skin in terms of skin hydration, pH and *trans*-epidermal water loss.³⁵

Having selected an appropriate liquid cleanser, it is important that parents and carers read the product instructions, such as those relating to dilution or quantity, and abide by them. Education by dermatologists and dermatology practice staff can assist in this process.⁶² Practical considerations, such as provision of a pump to provide the correct amount, may also assist parents and carers to provide appropriate skin care for the infant, although there are no published data in this area.

The appropriate timing for introduction of cleansers into the infant's bathing routine may differ between cultures, and even published recommendations vary. Some authors recommend introduction of liquid cleansers as soon as the umbilical cord falls,¹⁶ while others specify a given time after birth, from 2–4 weeks⁸ to 6 weeks.⁴³ These recommendations appear, however, to be a matter of personal preference. The use of a shampoo, in addition to a general liquid cleanser, to clean infants' hair is also a matter of personal or cultural preference. If a shampoo is used, it should meet the same criteria for skin liquid cleansers discussed above (i.e. mildness to skin and eyes, non-drying, non-irritant).

Recommendations of the consensus panel regarding the selection of liquid cleansers for bathing are summarized in Table 6b.

Table 7 Recommendations of the consensus panel relating to seasonal differences

Recommendations
<ul style="list-style-type: none"> • The status of the skin can be affected by environmental factors, such as humidity and temperature • At signs of dryness, erythema, irritation or any other change in skin structure, emollients should be used

Seasonal differences

It is well known that the status of the skin can be affected by environmental factors, such as humidity and temperature, that vary according to the time of year. For example, a study in elderly patients in Turkey showed the incidence of skin infestations (spring and summer), fungal infections (summer) and pruritus (autumn) is higher in particular seasons.⁶³ In particular, low humidity, such as that experienced during the winter months, affects transepidermal water loss (TEWL) in the stratum corneum of the skin and causes a decrease in mean skin temperature. In a study of hand dermatitis in Germany, existing hand dermatitis was significantly associated with low temperature and low absolute humidity ($P < 0.0001$).⁶⁵ These effects are particularly pronounced in individuals with atopic dermatitis.⁶⁶ Moreover, low humidity can increase the effects of skin irritants such as sodium lauryl sulphate.⁶⁷ As with post-bathing changes, any signs of seasonal dryness, erythema, irritation or other change in infants' skin structure should be treated with an emollient.^{30,31,68–70} Recommendations of the consensus panel regarding seasonal differences in skin care are summarized in Table 7.

Infants at high risk of atopic dermatitis

In babies born with normal skin, there is the potential for development of dermatitis within 3 months of life and beyond,⁷¹ and epidemiological studies have shown that around 20% of newborns develop atopic dermatitis within the first 6 months of life.^{72,73} The development of atopic disease is the result of complex interactions between genetic and environmental factors,⁷⁴ with several studies showing that the risk of developing atopic dermatitis is strongly associated with a family history of the condition. A recent prospective birth cohort study of 213 infants in Japan found that maternal atopic dermatitis was a risk factor for development of atopic dermatitis in the first year of life,⁷⁵ with similar findings reported in studies in Denmark⁷⁶ and Taiwan.⁷² Paternal history of atopic dermatitis also appears to be a risk factor, although it is less strongly predictive of developing atopic dermatitis in the first 6 months of life than maternal history.⁷³ In addition, some authors report an increased risk in infants with older siblings who have atopic dermatitis,⁷⁷ while an earlier Japanese study found that the likelihood of bearing allergic children was related to the overall number of allergic individuals within the family.⁷⁸

Table 8 Recommendations of the consensus panel regarding infants at high risk of atopic dermatitis**Recommendations**

- Infants with a family history of atopic dermatitis are at very high risk of developing the condition themselves
- Babies born with normal skin can develop atopic dermatitis within 3 months and beyond
- 20% of newborns develop atopic dermatitis within the first 6 months of life
- In this group of infants, emollients should be used during and after bathing if skin condition requires it

In infants at risk of atopic dermatitis, regular cleansing of the skin is important to prevent bacterial infection and assist with skin debridement.^{16,79–81} Clinical experience shows that most infants with atopic dermatitis can be bathed regularly with no adverse effects, although data are limited and the precise role of bathing should always be established on an individual basis.¹⁶ Published guidelines for bathing in infants with atopic dermatitis recommend the use of a moisturizing liquid cleanser,^{79–81} and the general recommendations for choosing liquid cleansers listed above (see Table 6) should be followed. In babies at high risk of atopic dermatitis, emollients should be used during and after bathing,^{16,80–82} and some authors have reported benefits associated with the use of emulsifying bath oils.^{82,83}

Recommendations of the consensus panel regarding infants at high risk of atopic dermatitis are summarized in Table 8.

Summary and conclusions

Current guidelines for bathing and cleansing of infants are limited, and a panel of European experts was convened to develop a series of recommendations. If basic safety procedures are followed and frequency of bathing is limited to 2–3 times a week, bathing does not harm the infant. Indeed, bathing is superior to washing and has psychological benefits for the infant and parents/carers. When bathing infants, the available data suggest that appropriate liquid cleansers may be superior to water alone. Liquid cleansers should be mild, and should not alter the normal pH of the skin or cause skin irritation. Liquid cleansers that contain an emollient may have additional advantages, particularly in babies and infants at high risk of atopic dermatitis. Further clinical research is now needed to investigate more fully the potential benefits of appropriate liquid cleansers in newborns.

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