Practical Approaches to Baby Skin Care
Recommendations: Key Tips

Victoria, BC
Thursday, October 27, 2011
Welcome and Introduction

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Faculty

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Disclosures

- **Carolyn Lund, MSN, RN, FAAN**
  - Received honoraria from AWHONN for leading science team in revision of Neonatal Skin Care Guideline (2007)
  - Received honoraria for serving on the Global Clinical Advisory Board for Newborn and Infant Skin Care, 2010-2011 (funded by Johnson & Johnson Consumer Products)
  - Received honoraria for serving on the Skin Integrity Advisory Panel of 3M (2011)

- **Luisa Ciofani, MSc(A), RN, IBCLC, PNC(C)**
  - Participated in the Collaborative Healthcare Steering Committee, 2011 (Johnson & Johnson)

- **This session is supported by an educational grant from Johnson & Johnson**
Session Objectives

By the end of this session, participants will be able to:

- Explain the basic science of baby skin and overview the fundamental differences between adult and baby skin
- Highlight the evidence supporting best practices in baby skin care
- Identify principles for selecting skin care products for newborn skin
Highlights: Survey Results

- Evidence-based skin care recommendations are an educational priority
- Safety is a key concern in product recommendations as cited by nurses, yet most parents don’t ask about the safety of ingredients in baby skin care products
- There is debate over whether water alone is an effective cleanser
- Fragrance/perfume is the ingredient of most concern to both nurses and parents
- Parents are asking about what products to use on their newborns, but nurses are reluctant to recommend specific products
- There is a high level of variability in cited baby skin care best practices, with conflicting recommendations common (eg, petrolatum, oil, soap)
Agenda

12:00 pm  Welcome and Introduction
          * Luisa Ciofani, MSc(A), RN

12:10 pm  Baby Skin Care Fundamentals
          * Carolyn Lund, MSN, RN

12:50 pm  New Evidence and Research
          * Carolyn Lund, MSN, RN

1:00 pm   Panel Discussion
          * Carolyn Lund, MSN, RN, Luisa Ciofani, MSc(A), RN

1:15 pm   Close
          * Luisa Ciofani, MSc(A), RN

*Please hold questions until the Panel Discussion
Baby Skin Care Fundamentals: Evidence-based Skin Care

Carolyn Lund, MSN, RN
What’s Different About Neonatal Skin?

- Review of the anatomy of skin
- Differences in neonatal skin
Skin Layers

Epidermis

Dermis

Subcutaneous tissue

Stratum Corneum

Basal Layer
Measuring Skin Parameters

- TEWL
  - Transepidermal Water Loss
- pH
  - Acid-base balance
- Stratum corneum hydration (SCH)
  - Surface hydration
- Colorimeter
  - Erythema
- Visual Inspection Scales
- Skin Cultures
Stratum Corneum and TEWL

- 10-20 layers of stratum corneum in term infants and adults
- Far fewer layers in premature infants <30 weeks, increased fluid and heat losses
- Evaporimeter measures skin barrier function—TEWL (transepidermal water loss)
- 5-10 gms H2O/m2/hr in adults
Key Differences Between Adult and Baby Skin

- Baby stratum corneum is 30% thinner than adult, epidermis is 20-30% smaller
- Keratinocyte cells smaller with higher cell turnover rate; explains better wound healing in babies
- Dermis is also different; short collagen fibers, absent reticular layer, makes skin feel softer
- Baby skin absorbs more water, and loses it faster than adult
- Baby skin contains less total lipids and less sebaceous lipids, confirming the decreased activity of glands
- Baby skin is more permeable than adult skin, with increased risk of permeability of topical agents

Pediatric Dermatology and Journal of Investigative Dermatology (2008, 2010)
What is Skin Barrier Function?

Skin Barrier Function $^{1,2}$

- Maintains internal hydration and electrolytes
- Protects against water loss
- Prevents entry of harmful substances (e.g., pathogens, bacteria, allergens, particulates, pollutants)
- Provides thermal regulation$^3$

Skin pH

- pH >6.0 at birth, falls to <5.0 in 4 days (Behrendt and Green 1971); pH of adult skin ~5.5
- Acid mantle (<5.0) is protective against pathogenic microorganisms, such as gram negative bacteria, yeast
- Premature infants--pH 5.5 after one week, 5.1 after one month (Fox 1999)
- Diapered areas--pH 6.0 during first month of life (Visscher et al 2000)
Newborn skin assessment
Bathing
Vernix
Umbilical cord care
Circumcision care
Disinfectants
Diaper dermatitis
Adhesives
Emollients
Transepidermal water loss in ELBW infants
Skin breakdown
Intravenous infiltration
History of the Neonatal Skin Care Guideline

- Collaboration between two national nursing organizations in the US (AWHONN and NANN)
  - Included Canadian representation (Mélanie Élise Archambault)
- Reviewed over 200 research articles about neonatal skin and skin care
- First evidence-based, clinical practice guideline (2001) evaluated in 51 US nurseries
- Revision of guideline December 2007
- Revision planned for 2012
Bathing
Bathing and Skin Flora

- Studies indicate bathing with cleansers or water briefly reduces colonization with normal flora
- Does not affect pathogenic bacteria
- Bathing no more than every other day is recommended

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<td>Prematures daily water or soap+water baths; no difference in skin colonization, ↓ in colonization after bathing</td>
<td>Prematures were bathed every 2 or every 4 days; no difference in skin flora or colony counts</td>
<td>Term infants bathed with cleanser+water or water; no difference in colonization; skin colonization increases over time regardless of use of cleansers</td>
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First Bath

- Studies indicate that newborns bathed as soon as 1 hour after delivery will maintain their temperature if they have a normal temperature to begin with
  - Vital signs, temperature stable 2-4 hours
  - Would they, or their mothers, choose to be bathed as early as possible?
- Antiseptic cleansers not currently required
- Universal precautions until bathed
- Not necessary to remove all vernix
What is Vernix Caseosa?

- Cheesy substance composed of sebum from sebaceous glands, broken-off lanugo, desquamated cells—unique to humans
- Primarily water (80%), lipids, protein
- Production begins end of 2nd trimester, most accumulated 36-38 wks
- Vernix detaches from skin as levels of pulmonary surfactant rise
Vernix Caseosa and Neonatal Adaptation

- First systematic assessment of vernix in 50 years
- 60 infants enrolled
  - 30 vernix retained; 30 vernix removed
- Bathed with liquid washing product at two hours
- Stratum corneum hydration higher at birth and at 24 hours for vernix retained infant group
- pH lower for vernix retained
- Vernix retention contributes to more hydrated skin surface, formation of acid mantle
- Is vernix a prototype for developing new barrier creams?
Immersion Bathing

- Stable premature infants
- Full-term infants with intact umbilical cord
- Water temperature 100.4°F, 38°C
Tub Bathing vs Sponge Bathing

- Hennigson (1981): 232 newborns, no infection or colonization problems, better temperature, less crying with tub bathing
- Hylen (1983): 618 newborns, rectal temperatures better with tub bathing, no difference in infection
- Anderson (1995): axillary temperatures stable with tub bath, better for attachment and bonding
- Cole (1999): tub bath maintained temperature better, 70% remained drowsy or quiet alert vs 90% crying with sponge bath
102 newborns randomized to tub or sponge bath
- Tub bathed had less temperature loss, behaviour more content
- No differences in umbilical cord healing
- Mothers rated tub bathing as more pleasurable
Routine Bathing

- Use mild baby wash that has been formulated for and tested on newborns and infants
- Bathe every other day or less frequently, although this may be influenced by cultural factors
- Avoid rubbing, use rinsing or immersion
Baby Skin Care Product Considerations
Baby Skin Care Product Considerations

- Soap vs synthetic detergents vs water
- Emollients and topical oils
- Fragrances
- Preservatives
What is “Soap”? 

- Soap: animal or vegetable fat and lye, sometimes with added emollients; alkaline (pH>7) if made with lye
- Syndets: synthetic detergents
  - Sodium lauryl sulfate is irritating
  - Sodium laureth sulfate less so
  - Neutral pH (5.5-7)
- Mildness determined by the type of surfactants, pH
- How to spot soap
  - If you see “saponified”, it’s basically soap – beware of eyes and sensitive areas
What is a “Surfactant”?

- Surfactants function as cleansers by reducing the surface tension of water and emulsifying fat-soluble substances into droplets that may be rinsed away.
- In the ordered phase, surfactants form larger particles called micelles.
- Larger micelles have less potential for skin penetration and less potential for irritation.
- How a surfactant behaves in solution is critical in the design of a cleanser.

Monomers

- Anionic
- Amphoteric

Micelles

- Adult shampoo
- Body cleanser
- Baby cleanser

Surfactants combined to achieve larger micelle size.

Mildness increases

Abstracted from
Effects of Soap and Detergents on Skin pH, Stratum Corneum Hydration, Fat Content

Gfatter (1997) Dermatology 195:258

- 40 infants age two weeks to 16 months old
- RCT: water, liquid detergent, compact detergent, or alkaline soap; 10 in each group
- pH, fat content, stratum corneum hydration measured before, 10 minutes after bathing
- ↑pH, ↓fat content and stratum corneum hydration in all groups, significant with soap
- Each agent influences skin surface; increase in pH changes protective acid mantle, cutaneous microflora and enzyme activity of the epidermis
Effect of Standardized Skin Regimes on Neonatal Skin Barrier Function

Bartels et al, Ped Derm (2010), 27:1-8

- 64 full-term neonates randomized to treatment groups
  - Water only
  - Water + wash gel
  - Water + cream after bath
  - Water + wash gel + cream

- Measured TEWL, stratum corneum hydration, pH, neonatal skin condition score, umbilical cultures on Day 2, week 2, 4, 8

- Bathed twice weekly, no additional products

- TEWL lower (improved), stratum corneum hydration better with cream compared to water

- pH gradually lower over the first month of life

- No difference in umbilical cultures

- Skin care regimes do not negatively influence skin barrier adaptation
What is Water?
About Emollients

- Protect integrity of the stratum corneum and improve barrier function
- Ointments: petrolatum-based ointments “gold standard” to retain surface hydration; highest oil-to-water ratio
- Creams: absorbed more quickly than ointments; better “spreadability” over large areas of skin; lower oil-to-water ratio than ointments
- Lotions: light emollient, higher water content; easiest to spread, least thick
- Can reduce/treat dry scaly skin, cracking or fissure on skin surfaces
Topical Oils and Skin Barrier Function

- Darmstadt (2002): used hairless mouse model for skin, stripped with tape to remove stratum corneum
- Sunflower seed oil accelerated skin barrier recovery
- Aquaphor ointment also significantly improves skin barrier recovery
- Mustard oil, olive oil, soybean oil delay skin barrier recovery
Fragrances

- **Purpose:**
  - Impart scent to a product
  - Mask the odour of other materials in a product
  - Support a desired mood (i.e., relaxation, calmness)

- Fragrance (Parfum) as an ingredient listing can represent many molecules and the fragrance “ingredient” can be different for different products

- What’s the difference between Fragrance-Free and Unscented?
  - **Fragrance-Free:** Product has no ingredients added for sole purpose of imparting scent but can contain fragrance ingredients added for some other purpose
  - **Unscented:** Product has been formulated to have no scent but can contain fragrance ingredients added to mask rather than impart scent
Fragrances  *cont’d*

- **The Challenge:**
  - Public called for fragrance-free products so industry made them
  - But products didn’t sell

- **Learning:**
  - In the end, most people want fragrance in products
  - How parents want babies to smell is largely dependent on culture

- **Key Take-away:**
  - A product with appropriate safety testing, including mildness, will address most ingredient issues, including fragrance
Ensuring that products are effectively preserved is essential for safety

*Preservative-free*, or use of non-registered preservative ingredients, does not mean a product is safer

Not all preservatives are created equally
Personal Care Products Can Be Contaminated by an Array of Microorganisms

- Personal care products contaminated with microorganisms can cause allergic reactions, inflammation, potentially fatal infections
- Bacterial and fungal contamination of personal care products can occur through regular storage and use by consumers

Gram-positive bacteria
- *Staphylococcus aureus*
- *Streptococcus pyogenes*
- *Enterococcus species*
- *Clostridium tetani*
- *Clostridium perfringens*

Gram-negative bacteria
- *Pseudomonas aeruginosa*
- *Klebsiella* species and other Enterobacteriaceae

Fungi
- *Candida albicans*
- *Candida parapsilosis*
- *Malassezia furfur*
- *Trichophyton* species
- *Trichoderma*
- *Aspergillus* species

A Case of Life-threatening Infections Due to Preservative Absence in a Topical Cream

A Case of Life-threatening Infections Due to Preservative Absence in a Topical Cream and Audit Demonstrating Magnitude of the Problem.  Presented at International Congress of Pediatrics, Johannesburg, South Africa, 2010.  Amani Sultan,1 Julie Carr,2 Simon Danby,1 Michael Akram,1 Andrew Messenger,3 Patricia Fenton,3 Manar Moustafa,1,2 Michael J. Cork1,2,3. 1Academic Unit of Dermatology Research, Department of Infection & Immunity, The University of Sheffield, Sheffield, UK; 2Sheffield Children’s Hospital NHS Trust, Sheffield, UK; 3The Royal Hallamshire Hospital, Sheffield, UK

The face of a child whose parents used unpreserved cream in treating his atopic dermatitis
Translation to Practice

- Bathing with water alone may not be better
- Select mild/gentle skin care products
  - Specifically formulated for baby skin
  - Safety tested
- It can be difficult to identify fragrance in a product, therefore safety testing is very important
  - Many parents want their babies to smell a certain way
- Preservatives have an important role to play
  - Natural does not necessarily mean better
- Safe products start with safe ingredients
  - Ideal products have additional safety assessments on the total product formulation
Future Skin Science

- There is scientific evidence to guide elements of skin care for newborns and infants → more is needed
- Does skin care in the neonatal period influence skin conditions (like atopic dermatitis)? What is the effect of early alterations in barrier function?
- Evaluate how different skin care regimes and products affect skin barrier function in newborns and infants
New Evidence and Research

Carolyn Lund, MSN, RN
Do We Have the Full Story on Colonization of the Skin?

- The past decade has seen a shift in how we see the microbes and viruses in and on our bodies.
- 9 in 10 of the cells in our body are microbial; especially in the gut and on the skin.
- A few microbes make us sick, most are commensal ("good bacteria").
- Imbalance of commensal bacteria may lead to disease states.
- Newer studies that determine the "microbiome" of our skin and GI tract involve PCR techniques.
- Amniotic cavity harbours greater diversity of microbes than previously realized
  - May be involved in preterm labour and delivery

- 64-82% of MRSA infection in infants found in c/s deliveries

- GI microbiome may influence development of NEC in premature and some full-term neonates
Skin Microbiome Considerations for Bathing Babies

- Normal infant skin microbiome: desirable bacteria, protect against growth of unhealthy bacteria
- Cleansing skin can strip away bacteria, may disrupt the normal balance of the skin microbiome
  - Beneficial bacteria are removed
- Appropriate cleansers should remove dirt and germs, but should maintain the normal healthy balanced microflora that live on skin
- We will learn more about this in future studies
Panel Discussion

Carolyn Lund, MSN, RN
Luisa Ciofani, MSc(A), RN
Thank you!

Please remember to complete the evaluation form.