Infant Bathing, Diaper Dermatitis & Product Selection

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Disclosures

- Investigator-initiated grant from Johnson & Johnson Consumer Products to study the first bath in full term newborns, 2012-13

Session Objectives

Highlight and discuss the evidence supporting:

- Timing of First Bath and Type of Infant bathing
- Assessment and Treatment of Diaper Dermatitis
- Selection of skin care products for newborn skin

Evidence-based Findings in Key Areas

- Timing of First Bath
- Type of First Bath
- Routine Bathing

What is Vernix Caseosa?

- Fetal protective skin barrier-unique to humans
  - Primarily water (80%), lipids, protein
  - Production begins end of 2nd trimester, most accumulated 36–38 weeks
  - Vernix detaches from skin as levels of pulmonary surfactant rise
- Recommend it wear off naturally

Benefits of Vernix Caseosa

- Protection from infection - contains antimicrobial peptides and proteins
- Decreased skin permeability - “waterproofs” the fetus
- Skin cleansing
- Moisturization of skin surface - better hydration
- pH development - earlier acidification of the skin
- Wound healing - contains glutamine which is required for rapidly proliferating cells and epidermal regeneration

Vernix Caseosa and Neonatal Adaptation

- First systematic assessment of vernix in 50 years
- 60 infants enrolled
  - 30 vernix retained (48% coverage)
    30 vernix removed (26% coverage)
- 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
- Could vernix be a prototype for developing new barrier creams?

- *Visscher et al (2005) J Perinat 25:440-446*

Evidence-based Findings: Timing of 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
- AWHONN Guideline:
  - Vital signs, temperature stable 2-4 hours
  - Antiseptic cleaners not currently required by American Academy of Pediatrics, Center for Disease Control
  - Universal precautions until bathed
  - Not necessary to remove vernix
- WHO: wait at least 6 hours
- AAP: Skin-to-Skin and Initiation of Breastfeeding for 1st 2 hours of life is priority

How to Give the First Bath?

- Sponge bath
- Under the faucet
- Small tub
- Large tub
  “immersion bath”
- Swaddle bath

Evidence: 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

Evidence: Tub Bathing or Sponge Bathing for Newborns

- 102 newborns randomized to tub or sponge bath
- Tub bathed had less temperature loss, behavior more content
- No differences in umbilical cord healing
- Mothers rated tub bathing as more pleasurable

- *Bryanton (2004) JOGNN 33:704*

Evidence: Immersion Bathing

- Stable premature infants
- Full-term infants with intact umbilical cord
- Water temperature 100.4°F, 38°C
- Heidelise Als described immersion bathing as more soothing from a developmental perspective

Swaddled Bathing

Promotes feeling of security

↓ Motor stress, crying & agitation

↑ Calm, quiet alert state

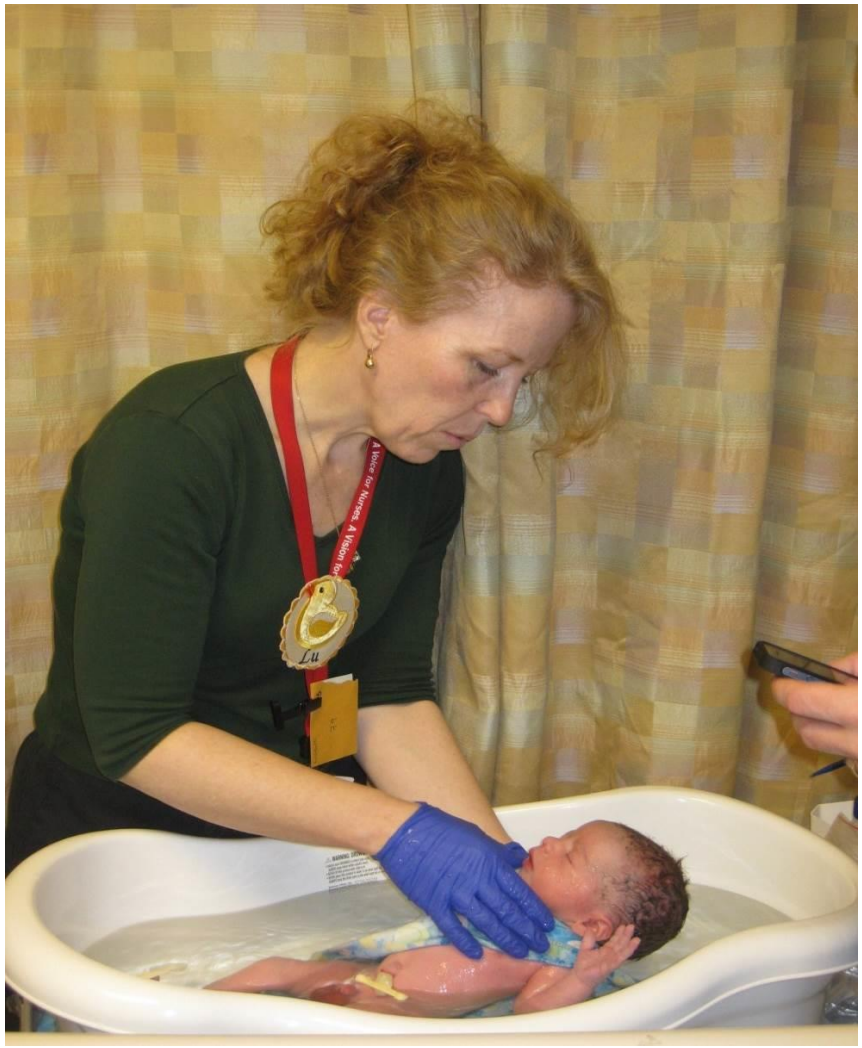
Swaddled Immersion Bathing

- Reduces Behavioral stress responses
- Promotes a calm bathing experience

Evidence: Routine Bathing

- Bathe every other day or less frequently, although this may be influenced by cultural factors
- Avoid rubbing; use rinsing or immersion instead
- Use neutral or mildly acidic baby wash that has been formulated for and assessed on newborns and infants, with a preservative and ocular safety

Our “First Bath” Study (2012–13)



- 100 babies randomised to first bath with water alone or water with liquid baby wash
- 50 vaginal birth, 50 c/s
- All babies immersed and swaddled in the bath
- Pre and Post-Bath:
  - Skin pH
  - TEWL
  - Stratum corneum hydration
  - Skin microbiome (baby, mother)
  - Baby’s temperature
  - Water pH, hardness

C/S – cesarian section; TEWL – Transepidermal water loss

Evidence-based Guideline Adaptations

Skin-to-skin contact between newborns and parents improves mother-infant attachment and increases parental sense of well-being[1]

1. Anderzen-Carlsson A, Lamy ZC, Tingvall M, Eriksson M. Parental experiences of providing skin-to-skin care to their newborn infant – Part 2: A qualitative meta-synthesis. Int J Qual Stud Health Well-being. 2014; 9:24907.

Studies have shown that babies bathed with a fragranced bath product* …

- Displayed 30% more engagement cues (mutual gaze, smile, verbalization) with their parent after bath[1]
- Stress (cortisol) levels of the baby and parent decreased during bath time with a scented product[2]

*compared to bath with un-fragranced product

1. White-Traut R, et al. Poster presented at: Third National Congress on the State of the Science in Nursing Research. October 7, 2004. Washington, DC. (Clinical study report enclosed: BRN Main Manuscript File.)
2. Field T, Cullen C, Largie S, Diego M, Schanberg S, Kuhn C. Lavender bath oil reduces stress and crying and enhances sleep in very young infants. Early Hum Dev. 2008;84(6):399-401.

Water Considerations

- Hardness
- Osmolarity
- May not remove substances from the skin that are not water soluble; such as fecal enzymes
- pH

Water Hardness

- Water Hardness (Calcium Carbonate) increased the risk of eczema by 87% in the UK

- Addition of a baby cleanser softened hard water by binding the free Calcium concentration in bath water

- Walters et al, 2016, Clinical, Cosmetic and Investigational Dermatology

Effect of different types of water on the skin barrier

Water + Soap

pH > 7.5

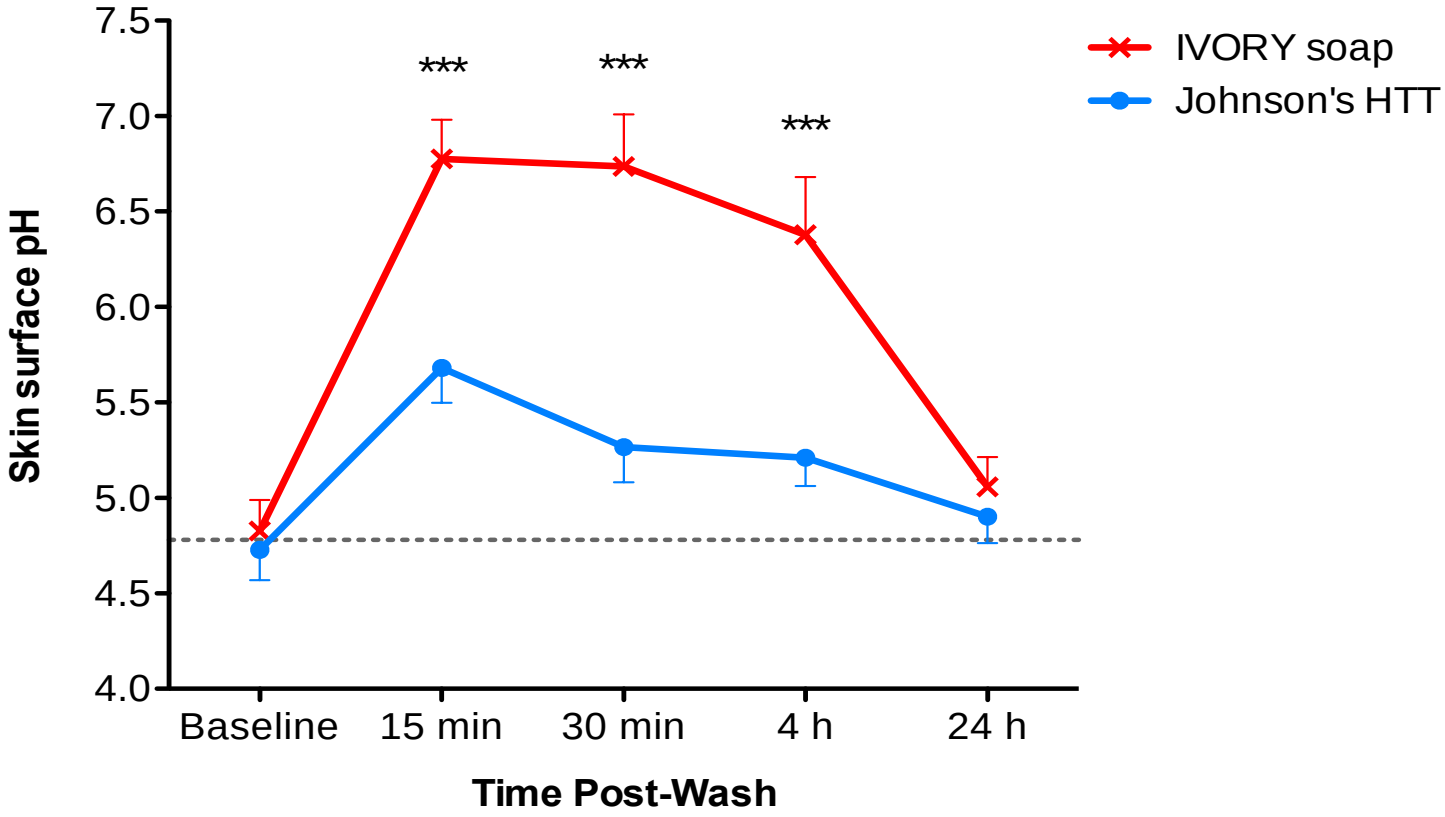
Water alone

pH = 7.2

Water + Optimal cleanser

pH = 5.5

Effect of washing the skin with Top to Toe and Ivory soap on skin surface pH



Danby SG & Cork MJ, The Academic Unit of Dermatology Research, The University of Sheffield.

Diaper Dermatitis

- Irritant contact diaper dermatitis (IDD)
- Candida (fungal) diaper dermatitis
- Combination

About Irritant Diaper Dermatitis

- Wetness:
  - Macerates stratum corneum, impairs barrier function
- Friction:
  - trauma from skin-to-diaper contact
- Urine and feces:
  - Fecal ureases release ammonia, ↑ skin pH
  - Activates proteases and lipases, disrupts epidermis
- Risk factors:
  - Malabsorption (short bowel syndrome, NAS)
  - Fecal incontinence (Hirschsprung's, lack sphincter tone)
  - Atopic dermatitis (altered barrier function)
  - Oral antibiotics
  - Wearing diapers!

Preventing Napppy Dermatitis

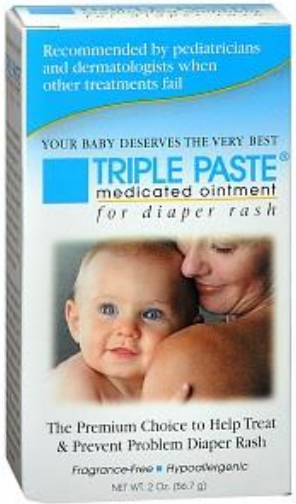
- Frequent diaper changes in first month, q 1-3 hours
- Superabsorbant disposable diapers offer some benefit, keep surface drier
- Bathing shown to restore acid mantle temporarily (Visscher 2002)
- Diaper holiday
- Role of petrolatum or zinc oxide-based ointment
- Wipes – may be a better cleanser than water if they have a lower pH and no alcohol

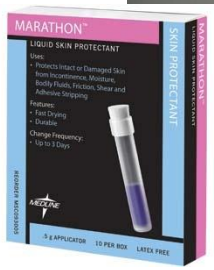
Diaper Wipes

- Visscher (2009):
  - 130 NICU infants, 23-41 weeks, 30-51 weeks when studied
  - RCT: wipe A, wipe B or cloth/water
  - TEWL, erythema better with wipes; pH lower with wipe B (acidity as preservative)

- Lavender (2012)
  - 280 full term neonates, measurements at 48 hours and 4 weeks
  - randomized to wipes vs. cotton wool/water
  - No difference in SCH, TEWL, pH
  - Mothers reported more “napkin rash” in the water group

Diaper Dermatitis Treatments





Contact Irritant Diaper Dermatitis: Create a Barrier

prevent skin contact with moisture and irritants

"frosting-on-a-cake"

creams, ointments and polymer skin protectants

Candida Diaper Rash

- Fiery red, satellite lesions
- Distributed on thigh, perineum & in skin folds
- Treat with antifungal ointment
- Combination candida + IDD
  - "Crusting" technique
  - Dust with antifungal powder
  - Seal powder on with skin protectant
  - Apply thick layer of barrier

Combination Nappy Rash

- Antifungal powder
- Seal powder on with skin protectant

  "Crusting" technique
- Can then apply thick layer of Ilex paste
- Layer of Petrolatum to prevent sticking to diaper

Beginning at the Bottom: Evidence-based Care of Diaper Dermatitits

Heimall et al (2012); MCN 37:10-16

- Survey at single children's hospital showed 24% had diaper dermatitis
- Nurses were inconsistent with treatment, not evidence-based
- Recommended frequent diaper changes, super-absorbent diapers
- Visual chart with grading system, treatment options

- Authors agreed to let us include this chart in Appendix of 2013 Neonatal Skin Care Guideline!

Perineal Skin Care Guildelines for Diapered and/or Incontinent Patients DRAFT#

	Intact Skin No erythema	Intact Skin Erythema No fungus	Intact Skin Erythema Evidence of fungal	Denuded skin No fungus	Denuded skin Evidence of fungal
Skin Assessment					
Goal(s) of Treatment	Prevention	Prevention Provide barrier	Prevention Treat fungus Provide barrier	Prevention Provide Barrier	Prevention Treat Fungus Provide barrier
	No-Sting Skin Prep may be applied prior to application of any of the below products to perin				
	No Sting Skin Prep adheres best to intact skin - consider Stomahesive Powder as alternative to skin prep to d				
Treatment*	"Aquaphor" or "Z-Guard"	Desitin Maximum Strength or No Sting Skin Prep and "Z-Guard"	Anti-fungal agent, then Desitin Maximum Strength or "Z-Guard"	"Semi-Care Barrier Cream" or "Stomahesive powder, then Hex, then "Aquaphor"	"Anti-fungal, then Semi-C Barrier Cream" or Anti-fungal, then Hex, t "Aquaphor"
Hints for Use	Apply a thick layer over the entire area to be protected ("icing on a cake")	Consider No Sting Skin Prep. Apply a thick layer over the entire area to be protected ("icing on a cake".)	Apply antifungal, then apply a thick layer of Desitin Maximum Strength or Z-Guard over the entire area to be protected ("icing on a cake".)	Only apply anti fungal cream with evidence of fungus. apply a thick layer ("icing on a cake") of Semi-Care Ba Cream or Hex followed by Aquaphor Or If evidence of fungus, apply anti-fungal cream. Then Apply a think layer of stomahesive powder, brus away (it will stick to denuded areas.) Then apply a thic Hex. "Press" Hex into place rather than trying to spread Apply a thick layer of Aquaphor to prevent diaper fric	

Evidence-based Product Selection

Evaluating Products

- pH – maintain acid mantle
- Ocular safety – eye mildness
- Irritancy – skin mildness, erythema, TEWL
- Preservatives – safety from bacterial contamination
- Packaging – single use vs home use
- Ingredient assessment – labeled correctly
- Essential oils – may produce an allergenic response
- Cost/Affordability
- Fragrance
- Liquid washes are the mildest

Personal Care Products Can Be Contaminated by an Array of Microorganisms

- Bacterial and fungal contamination of personal care products can occur through regular storage and use by consumers
- Personal care products contaminated with microorganisms can cause allergic reactions, inflammation, potentially fatal infections
- Natural or organic products are often “food” for bacteria and fungi

Ravita T et al. *J Ind Microbiol Biotechnol.* 2009;36:35-38.
Parker M. *J Soc Cosmet Chem.* 1972;23:415-426.

Fragrances

- **Purpose:**
  - Impart scent to a product
  - Mask the odor of other materials in a product
  - Support a desired mood (ie, relaxation, calmness)
  - May be on label as Parfum or an essential oil

- 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


This usually lasts 6 to 8 weeks
NEW BABY SMELL
whyatt

Ocular Safety - Blink Rate & Blink Reflex

- Babies keep eyes open longer than do adults

  -Blink rate is 23-60 seconds vs 11 seconds for adults
- Blink Reflex present at birth but much lower rate than in adults
- Blinking to visual stimuli is first found in infants between 6 and 14 weeks of age

Massage Oils

Mineral oil or certain Vegetable oils are recommended:

- Oils that are high in a substance called linoleic acid. Linoleic acid is a fatty acid that may help to protect the skin barrier and is thought to be gentle on your baby's sensitive skin.

  -Vegetable oils that are higher in linoleic acid are higher in polyunsaturated fats

- Some oils are high in oleic acid. Vegetable oils high in oleic acid are harsher on your baby's skin than vegetable oils rich in linoleic acid or baby mineral oils.
  - Vegetable oils that are higher in oleic acid are higher in monosaturated fats.

Unsaturated Fatty acid composition of Oils

	Oleic	Linoleic
Castor seed	7	5
Wild apricot seed	72-75	18-22
Coconut	5-8	0-1
Corn	19-49	34-62
Cotton seed	35	42
Jojoba seed	1	---
Flax seed	12-34	17-24
Mustard seed	**22**	**14**
Olive	65-80	4-10
Palm kernel	11-19	0.5-2
Palm	38-52	5-11
Poppy seed	11	72
Rice bran	40-50	29-42
Safflower	**13-21**	**73-79**
Sesame	40-50	35-45
Soya bean	**22-34**	**43-56**
Sunflower seed	14-35	44-75
Tea seed	---	7-14
Wheat germ	8-30	44-65

Product Myths

Natural and organic products are safer choices

- Natural products are composed of molecular entities derived from natural sources
- Synthetic products are man made but can be structurally identical to natural molecules with the same safety profile.
- An ingredient's source does not determine its safety.
- Very little scientific evidence on natural and organic product use on infant skin
- Everything is a Chemical

Natural Products

- An Orange Peel contains about 24 different chemicals
  - including several known as allergens

- Allergic contact dermatitis reported to aloe, arnica, calendula, chamomile, goldenseal and yarrow

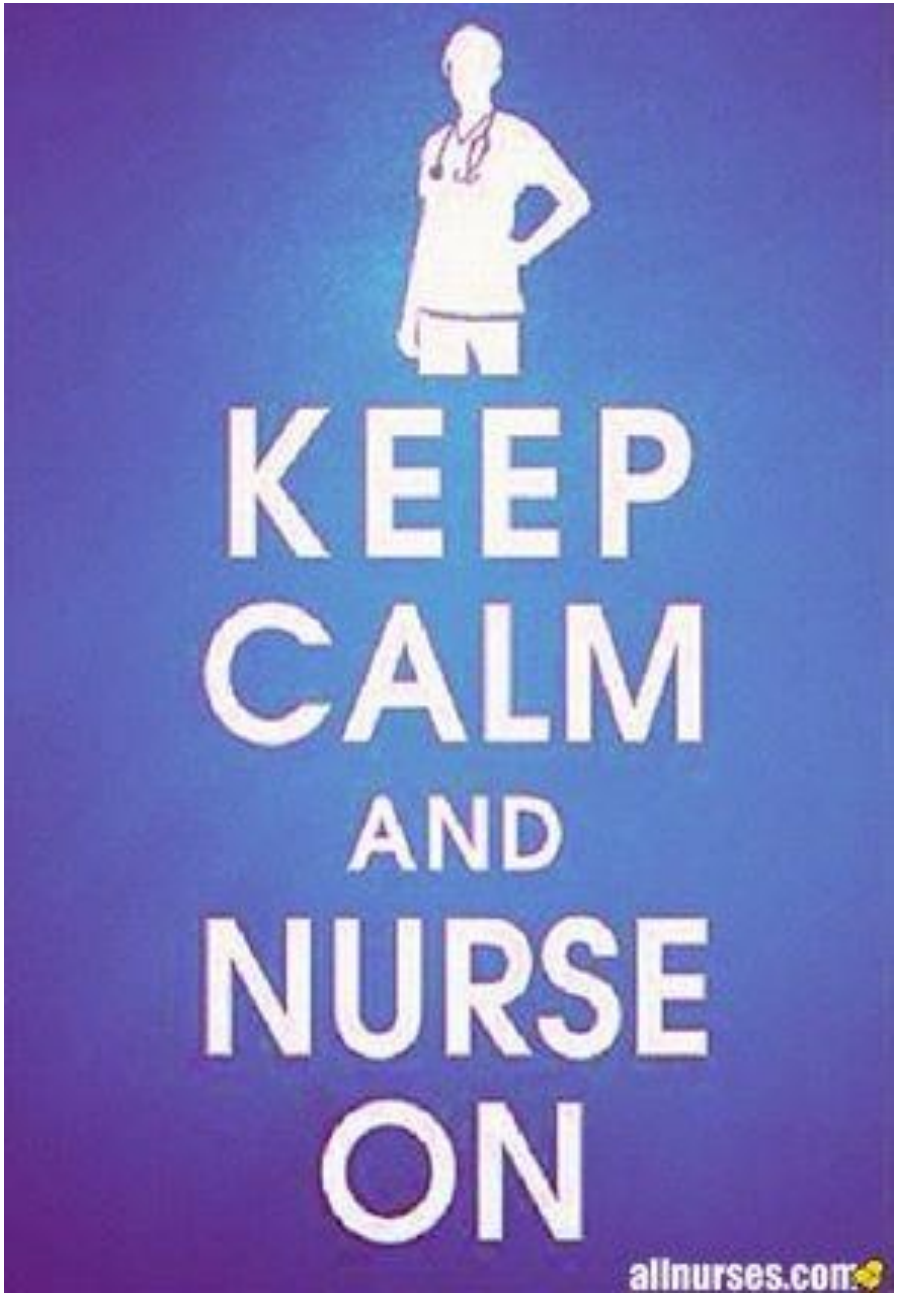
All NATURAL Blueberry

INGREDIENTS: AQUA (84%), **SUGARS (10%)** (FRUCTOSE (48%), GLUCOSE (40%), SUCROSE (2%)), FIBRE E460 (2.4%), **AMINO ACIDS (<1%)** (GLUTAMIC ACID (23%), ASPARTIC ACID (18%), LEUCINE (17%), ARGININE (8%), ALANINE (4%), VALINE (4%), GLYCINE (4%), PROLINE (4%), ISOLEUCINE (3%), SERINE (3%), THREONINE (3%), PHENYLALANINE (2%), LYSINE (2%), METHIONINE (2%), TYROSINE (1%), HISTIDINE (1%), CYSTINE (1%), TRYPTOPHAN (<1%)), **FATTY ACIDS (<1%)** (OMEGA-6 FATTY ACID: LINOLEIC ACID (30%), OMEGA-3 FATTY ACID: LINOLENIC ACID (19%), OLEIC ACID (18%), PALMITIC ACID (6%), STEARIC ACID (2%), PALMITOLEIC ACID (<1%)), ASH (<1%), PHYTOSTEROLS, OXALIC ACID, E300, E306 (TOCOPHEROL), THIAMIN, **COLOURS** (E163a, E163b, E163e, E163f, E160a) **FLAVOURS** (ETHYL ETHANOATE, 3-METHYL BUTYRALDEHYDE, 2-METHYL BUTYRALDEHYDE, PENTANAL, METHYLBUTYRATE, OCTENE, HEXANAL, DECANAL, 3-CARENE, LIMONENE, STYRENE, NONANE, ETHYL-3-METHYLBUTANOATE, NON-1-ENE, HEXAN-2-ONE, HYDROXYLINALOOL, LINALOOL, TERPINYL ACETATE, CARYOPHYLLENE, ALPHA-TERPINEOL, ALPHA-TERPINENE, 1,8-CINEOLE, CITRAL, BENZALDEHYDE), METHYLPARABEN, 1510, E300, E440, E421 and **FRESH AIR** (E941, E948, E290).

James Kennedy, VCE Chemistry Teacher
Haileybury University Australia

Bathing and Skin Care

- Harsh chemicals can damage the skin barrier
- Some practices affect local microenvironment potentially shifting microbial composition
- Barrier creams or oils may fortify skin surface against microbial penetration
- pH changes can affect bacterial composition
- Water pH & chemical content are potential irritants to the skin



It has been a pleasure being here with you in Dunedin!! Keep up the Great Work!

THE END

AWHONN International Adaptations

- China adaptation led by CMCHA – 2nd edition launch November, 2016.

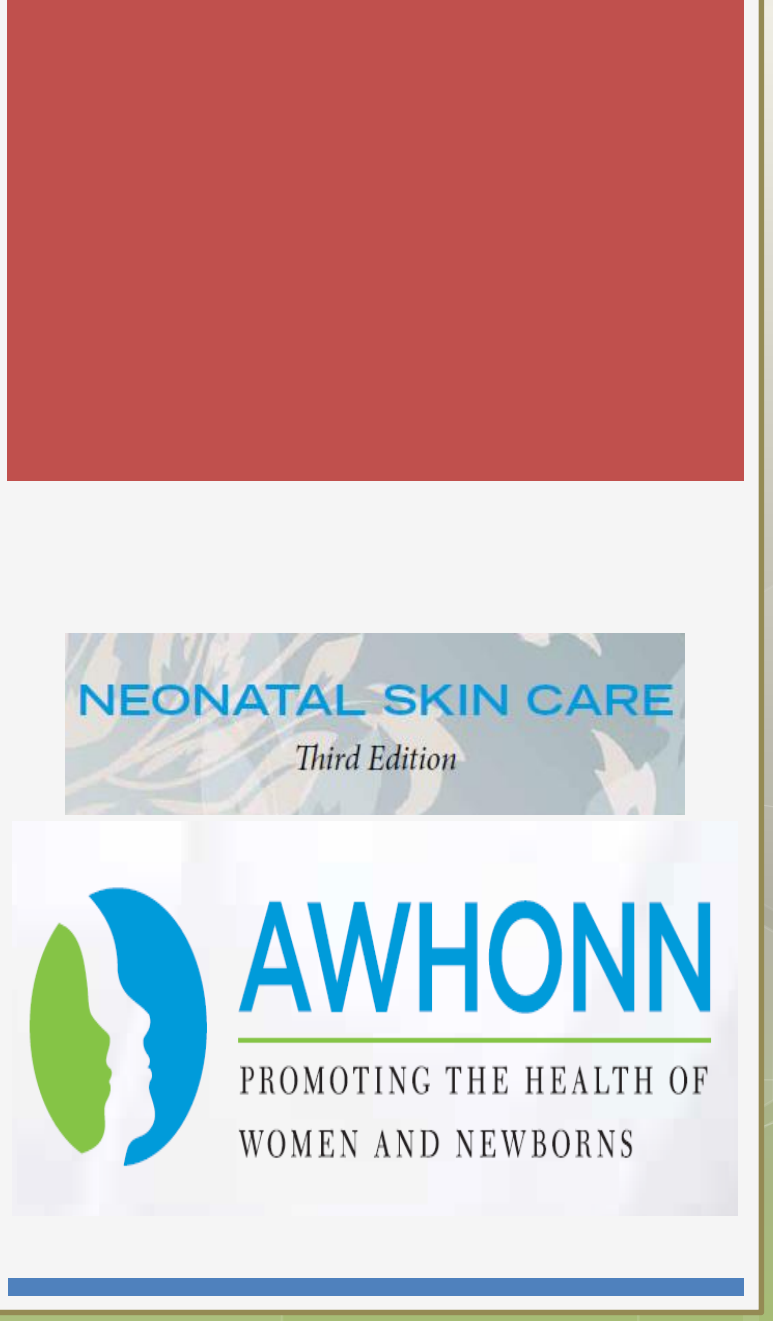
- **Philippines adaptation, 1st edition launch September , 2016.**

- India adaptation – targeting late 2016/early 2017.

- Additional programs implemented, or in planning, for Australia, Russia, Malaysia, Indonesia.

PHILIPPINE ADAPTATION OF NEONATAL SKIN CARE GUIDELINE

September 2016



CONCLUSIONS

- The skin microbiome community structure at birth varies depending on birth route
- Infants born by Cesarean section showed the largest change in their microbiomes after the first bath
- The effects on the skin microbiome of bathing in water with Head-To-Toe or water alone were not significantly different
- Analysis by 16s rRNA sequencing and shotgun metagenomics resulted in measureable differences in the microbiome profiles from infants at birth
- Everyday use of a cleanser for 4 weeks causes changes the driven by the less dominant members of the skin microbiome community
- The use of a castile soap baby cleanser on adults demonstrated a distinct change in the microbiome as compared to mild synthetic detergent-based cleansers

THE END…