

## Hygiene for the newborn – to bath or to wash?

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### SUMMARY

Appropriate skin care of newborns is performed partly to prevent infection but also for aesthetic and cleansing purposes. Skin care should involve cleansing with a non-toxic, non-abrasive neutral material. This study compared the relative risks and benefits of washing versus bathing with regard to bacterial colonization rate, clinical infection rate, body temperature and crying. The results confirm our clinical impression that bathing and washing routines do not differ with regard to signs of infection or other clinical complications. However, the washing routine does increase the babies heat loss and make them less comfortable.

### INTRODUCTION

Consideration of skin care of the newborn is complicated by the fact that the infant does not have a protective skin flora at birth. Moreover, the newborn also has an open surgical wound, the umbilicus. Consequently, the risks and benefits of each skin care technique for the newly born must be assessed. The American Academy of Pediatrics (1974) recommends washing (dry technique) as it causes less heat loss by exposure, is less traumatic for the skin, and does not expose the infant to agents with known or unknown side effects. Similar recommendations apply in Great Britain and in Sweden (Emmerson & Jenner, 1978; Lagercrantz & Nyström, 1978). In France, however, Leboyer (1974) recommends bathing of the newborn to avoid unnecessary crying.

The aim of the present study was to compare the effects in newborn babies of washing and bathing, with regard to bacterial colonization rate, clinical infection rate, body temperature, and crying.

### METHODS

The study was carried out on two maternity wards at the Obstetrical and Gynaecological Department, Malmö, Sweden, during 4 months in 1982 (April–June and October); 618 babies were included in the study, 305 of these were bathed (ward 1) and 313 were washed (ward 2) daily from the first day of life. Specimens for culture were obtained from the umbilicus of 24 and 26 consecutive babies from wards 1 and 2 respectively at the beginning of the first investigation period, and from an additional 24 and 22 from wards 1 and 2 respectively on day 4 of life,

Table 1. *Materials and methods*

	Ward 1 (bathed)		Ward 2 (washed)	
	Observed	Culture taken	Observed	Culture taken
Day 2 and day 4 of life, observations and culture from all	24	24	26	26
Day 4 of life, observation and culture from all	24	24	22	22
Day 4 of life, observation from all and culture from infected umbilicus	257	68	265	57

$n = 305$ ;  $n = 313$ .

constituting the control group. From all babies with an infected umbilicus, *viz.* 68 of 257 on ward 1 and 57 of 265 on ward 2, cultures were taken on the 4th day of life during the 4-month study period (Table 1).

#### *Routines of the maternity wards*

At birth, the infant's umbilicus is occluded with an elastic cord, which is left in place until the separation of the cord. The mother and her baby are taken 2 h post-natally from the delivery unit to one of the two maternity wards, depending on which ward has unoccupied beds. A rooming-in system is used, which means that each mother takes care of her baby during the daytime. At night, all babies are placed in a nursery.

On ward 1 all the babies were bathed daily in a bath-tub filled with water at 37 °C. The baby's body was immersed completely and its skin cleaned by hand. No soap was used. Immediately afterwards, the baby was wrapped in a big towel and dried. The bath-tub was cleaned with a dish-brush and detergent after each bathing and disinfected with 70% ethanol.

On the other ward (ward 2) all babies were washed with water at 37 °C using a face-flannel and without soap. Otherwise, the daily care of the babies in the hospital was identical on the two wards. The bathing or washing procedure was demonstrated to the parents, who were instructed to follow the method daily in the hospital and later at home.

#### *Signs of infection*

The following criteria of infection were applied: swollen, smeary and/or unpleasant smelling umbilicus; a bacterial culture was made from any umbilicus with one or more of these criteria. All observations were made by two observers.

After discharge from the hospital the newborn babies were checked twice at child welfare centres and the nurses at these centres reported any clinical signs of infection in the babies studied. As the city of Malmö has only one Pediatric Clinic, infants with severe infection are referred to this clinic for hospital care.

#### *Bacteriology and sampling procedure*

Samples were taken with a cotton swab, transported in a modified Stuart medium (Gästrin, Kallings & Marcetic, 1968) and cultured on the same day.

Table 2. *Welfare centres observations*

	Ward 1 (bathed)	Ward 2 (washed)
In mean day 10	<i>n</i> = 230	<i>n</i> = 259
Infected	72 (30%)	75 (29%)
In mean day 16	<i>n</i> = 204	<i>n</i> = 235
Infected	30 (15%)	37 (16%)

Conventional methods were used for culture, sensitivity testing, and identification of the strains (Cowan & Steel, 1974).

#### *Registration of body temperature*

The rectal temperature of the babies was measured before and immediately after bathing or washing. Body temperature was measured with a Celsius thermometer and any difference of more than  $\pm 0.1^\circ$  was recorded.

#### *Registration of crying*

Crying during and after bathing or washing was recorded as loud, moderate, or none at all.

## RESULTS

#### *Clinical signs of infection*

Eighty-two (27%) of 305 babies on ward 1 developed an infected umbilical cord on their 4th day of life. Sixty-four (20%) of 313 babies on ward 2 similarly had an infected umbilical cord. A further two observations using the same criteria as applied in the hospital were made by the child-welfare centres nurses. At the first of these observations (mean day 10 of life), 30% from the two wards had an infected umbilicus, while on day 16 of life (mean), 15% were still infected (Table 2). Separation of the cord occurred on day 8 of life (mean) in both groups.

After discharge from the hospital one of the babies (bathed) was found on the 7th day of life to be infected with *Streptococcus* group B and required antibiotic treatment. The baby was admitted to the Pediatric Clinic for care. Otherwise, none of the 618 observed babies required antibiotic treatment on account of their umbilicus during their first 2 months of life, either in hospital after birth, or at a child welfare centre.

#### *Bacterial colonization*

Of the 50 babies from whom cultures were made on day 2 of life, 49 had an umbilicus colonized with an average of two bacterial strains. These infants were significantly ( $P < 0.001$ ) more often colonized with *Staphylococcus epidermidis* (Table 3) than the 221 infants whose cultures were set up on day 4, but they were significantly less often colonized with *S. aureus* ( $P < 0.001$ ) and Gram-negative rods ( $P < 0.01$ , ward 1 and  $P < 0.001$ , ward 2) belonging to the enteric flora, when compared with the same group of infants. The infants with cultures made on day 4 of life were colonized with an average of three bacterial strains, irrespective of the appearance of the umbilicus.

Table 3. *Percentage of bacterial colonization in infants with infected and uninfected umbilicus on second and fourth day of life*

Patient groups...	Ward 1 (bathed)			Ward 2 (washed)		
	Uninfected		Infected	Uninfected		Infected
	day 2 (24)	day 4 (34)	day 4 (82)	day 2 (26)	day 4 (41)	day 4 (64)
Day of culture...						
Number...						
Bacteria isolated						
<i>S. aureus</i>	29 <sup>a</sup>	91 <sup>a</sup>	96	39 <sup>b</sup>	88 <sup>b</sup>	94
<i>S. epidermidis</i>	79 <sup>c</sup>	24 <sup>c</sup>	7	65 <sup>d</sup>	14 <sup>d</sup>	1
<i>Str. viridans</i>	54	38	30	35	31	31
Str. group B	17	12 <sup>e</sup>	37 <sup>e</sup>	8	5	8
Str. group G	0	0	0	0	2 <sup>f</sup>	22 <sup>f</sup>
<i>Str. faecalis</i>	29	41	51	19	38	53
All Enterobacteriaceae	17 <sup>g</sup>	56 <sup>g, h</sup>	90 <sup>h</sup>	23 <sup>i</sup>	76 <sup>i, k</sup>	98 <sup>k</sup>
Other species	4	3	10	0	5	8
Mean number of strains per infant	2.3	2.6	3.3	1.9	2.6	3.3

The following pairs of figures were significantly different: at the  $P < 0.001$  level a, b, c, d, e, i, k; at the  $P < 0.01$  level f, g, h.

Table 4. *Body temperature before and after bathing versus washing*

	Ward 1 (bathed) (n = 230)	Ward 2 (washed) (n = 253)
Change in temperature		
Reduction	102 (44%)	163 (64%)***
Increase	16 (7%)	5 (2%)
Unchanged	112 (49%)	85 (34%)

\*\*\*,  $P < 0.001$ .

Table 5. *Crying during bathing versus washing*

	Ward 1 (bathed) (n = 235)	Ward 2 (washed) (n = 249)
Crying score		
Loud	41 (17%)	141 (57%)***
Moderate	120 (51%)	97 (39%)
None	74 (31%)	11 (4%)

\*\*\*,  $P < 0.001$ .

On ward 1, 305 babies were bathed and an infection rate of 27% was registered on day 4 but no significant difference in colonization rate was found between infected and uninfected umbilicuses. On ward 2, 313 babies were washed during the study and an infected umbilicus was registered in 20% of the infants on day 4. Significant differences ( $P < 0.001$ ) were found between infected and uninfected umbilicuses on both wards regarding colonization with *Enterobacteriaceae*. Moreover, there was a significant difference ( $P < 0.001$ ) in the isolation of *Streptococcus*

group B in cultures from infected umbilicus in ward 1 and a significant difference ( $P < 0.05$ ) in recovery of *Streptococcus* group G from children in ward 2.

### Body temperature

The rectal temperature fell during cleansing in 102 of 230 (44%) of the infants on ward 1 and 163 of 253 (64%) on ward 2. This difference is statistically highly significant ( $P < 0.001$ ). The mean temperature loss in the bathing group was 0.3 °C and in the washing group, 0.4 °C (Table 4).

### Crying

Forty-one (17%) of 235 babies in the 'bathing' group cried loudly during cleansing, in contrast to 141 (57%) of 249 babies in the 'washing' group (Table 5). This difference is statistically highly significant ( $P < 0.001$ ).

## DISCUSSION

The fetus is sterile. The colonization of the baby's skin by micro-organisms from the mother occurs rapidly during the birth process and after. The nosocomial micro-organisms such as *S. aureus* and Gram-negative rods are transferred to the infant from the environment by the mother's hands or by the personnel. In our study the infants on day 2 were colonized mostly by harmless bacteria, but on day 4 the bacterial flora of the umbilicus was dominated by potential pathogens.

Except for nosocomial spread during the study of  $\beta$ -hemolytic streptococci of different types on the two wards, we found no differences between the bacterial colonization when the different nursing regimes were compared. Good correlation between colonization and symptoms was found both for streptococci and Gram-negative rods. *S. aureus* and Gram-negative bacteria were found in equal proportions irrespective of which nursing regime was used. This finding has also been reported by Henningsson, Nyström & Tunell (1981).

The high percentage of colonization by *S. aureus* (96 and 94%) and Gram-negative rods (90 and 98%), together with a high percentage (27 and 20%) of infected umbilicuses on both wards, indicates that both nursing regimes must be supplemented with prophylactic disinfection of the umbilicus after cleansing in order to reduce the number of potential pathogens and thereby indirectly the risk of symptomatic infection.

The results of the present study confirm our clinical impression that there are no differences in signs of infection or other clinical complications between bathing and washing routines. Our study also confirms that the washing routine increases the babies' heat loss and makes them less comfortable, in comparison with the bathing routine.

As a result of our study, bathing is now used routinely as skin cleansing procedure on our maternity wards because of the positive reactions from the babies and their mothers.

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