pretreatment before procedure, and the other one without EMLA cream before procedure. A time gap of more than 72 h was required between the venipunctures. The scores of the 'Neonatal Pain, Agitation and Sedation Scale' (N-PASS) [3, 4] of each enrolled premature infant were measured before, during and 10 min after venipuncture with and without EMLA cream pretreatment. The result revealed a significant difference between the N-PASS scores during venipuncture without EMLA pretreatment (3.2 ± 2.3) and with EMLA cream pretreatment (1.5 ± 1.6; paired difference: 1.7 ± 2.2, $p = 0.000$, by paired *t*-tests), demonstrating that EMLA cream can effectively minimize the pain of a venipuncture. Figure 1 shows the mean N-PASS scores of the study infants without and with EMLA cream pretreatment at the three time points. To investigate the significant interaction between group (without and with EMLA pretreatment) and time points, we used repeated analysis of variance and Bonferroni multiple comparisons to examine pain levels at the three time points with and without EMLA cream pretreatment. A between-group difference was found regarding the time point of the procedure. No adverse effect was observed in this study.

The strength of this study is thatrepeated measurements were taken of each participating infant, and paired *t*-tests were used to compare the N-PASS scores without and with EMLA cream pretreatment, which differs from the majority of previousreports [5, 6]. This repeat-measures study design eliminates confounding factors, such as differentpainthresholds,among the different patients.

According to the N-PASS user guidelines, treatment or interventions for known pain and painful stimuli are suggested for scores of more than 3 points. This study revealed that themeanN-PASS score during venipuncturewithout EMLA cream pretreatment was3.2 points—more than 3 points—whereas the score decreased to 1.5points when EMLA cream was applied before the procedure. These results confirmthe suitability of usingthe N-PASS pain assessmenttool in NICUs, and that EMLA cream intervention is effective for relieving the pain of venipuncture.

Funding

This work was supported by a grant from the Premature Baby Foundation of Taiwan [grant number 9804].

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doi:10.1093/tropej/fms040
Advance Access published on 8 September 2012

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How Long Does Flash-Heated Breast Milk Remain Safe for a Baby to Drink at Room Temperature?

Key words: flash heating, breast milk, HIV, *Staphylococcus aureus*, *Escherichia coli*.

Introduction

In 'HIV and Infant Feeding' (2009), World Health Organization recommend heat-treated expressed breast milk as one option for feeding infants of human immunodeficiency virus (HIV)-positive mothers [1]. World Health Organization also recommended more research on the practicalities and feasibility of this method.

HIV in expressed breast milk can be killed, while retaining nutritional value and immune properties,

through a heat-treatment procedure called flash heating [2–4]. Flash heating represents a low-technology home-based pasteurization method for low-resource settings.

In environments where there is no refrigeration, stored flash-heated breast milk could become contaminated with bacteria that could cause infant illness. *Staphylococcus aureus* and *Escherichia coli* are two common bacteria that contaminate breast milk [5].

A previous study confirmed safety of breast milk for 8 h after flash heating [6]. In environments without refrigeration, where a mother leaves her infant and goes to work, 8 h is too short. Another study examined a 12 h interval after breast milk underwent Pretoria pasteurization, a process similar to flash heating [7], and concluded breast milk could be safely stored at room temperature for 12 h [8]. Flash heating has been shown to be superior to Pretoria pasteurization for eliminating HIV viral activity [9].

This study examines the presence of bacterial contamination in unrefrigerated flash-heated breast milk for 24 h.

Methods

Expressed breast milk was obtained from the Milk Matters breast milk bank (Cape Town, South Africa). The breast milk was flash heated according to procedures described by Israel-Ballard [2]. A volume of 60 ml of milk was placed into each of eight glass jars and then placed into a pot of water at room temperature. The pot of water was brought to a rolling boil. The glass jars were taken out of the boiling water and placed at room temperature. One glass jar was placed in a freezer every 4 h for 24 h. One glass jar of unheated breast milk was also placed in the freezer at time zero. The date, time and room temperature were noted before placing each specimen in the freezer. The temperature of the freezer was −22°C. The glass jars of frozen breast milk were taken on ice to the South African Bureau of Standards laboratory. At South African Bureau of Standards, each container was tested for *S. aureus* and *E. coli*.

Results

The room temperature during the study ranged from 29 to 38°C. For each 4 h time interval through 24 h, there was no harmful growth of either bacterium.

Conclusion

After testing flash heated expressed breast milk, no *S. aureus* or *E. coli* colonies grew in unrefrigerated breast milk for 24 h. This is consistent with previous studies that examined bacterial contamination of heat-treated expressed breast milk for shorter time periods [6, 8], and also with research indicating flash heating does not destroy bacteriostatic properties in breast milk [10].

This extends the period for which heat-treated expressed breast milk may be considered safe to store at room temperature. HIV-positive mothers living without access to refrigeration can be reassured that heat-treated breast milk is safe for their infant to drink for up to 24 h after flash heating.

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doi:10.1093/tropej/fms046
Advance Access published on 23 September 2012

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Acknowledgements

The authors thank Millicent Julius and the South African Bureau of Standards who process the specimens. They also thank Catherina Kruger for project assistance.

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Head Nodding Predicts Mortality in Young Hypoxaemic Papua New Guinean Children With Acute Lower Respiratory Tract Infection

In children under 5 years of age in developing countries, acute lower respiratory tract infection (ALRI) is a significant cause of mortality and morbidity [1]. In these children, hypoxaemia increases the risk of death >4-fold [2]. Consequently, many studies have attempted to correlate clinical signs of ALRI such as cyanosis, chest recession, fast breathing, grunting, nasal flaring and head nodding, with hypoxaemia [3–5]. However, none of these clinical signs has been shown to clearly distinguish hypoxaemic from non-hypoxaemic children. Though most of these signs are well documented, head nodding is a sign that has not been widely studied. Head nodding refers to head movements that are synchronous with each breath due to contractions of accessory muscles of respiration, and indicates severe respiratory distress [6].

We report head nodding as a clinical predictor of death in hypoxaemic Papua New Guinean children <5 years of age admitted to Port Moresby General Hospital with ALRI. Clinical procedures, ethical approval and other details of this report have been previously published [3].

Of the 77 children with ALRI, 20 were moderately hypoxaemic ($SpO_2 < 90\%$), while 10 were severely hypoxaemic ($SpO_2 < 85\%$). Case fatality rate was 5%, and all four children who died were severely hypoxaemic with oxygen saturations of 69, 71, 78 and 84%. A total of eight children had head nodding at the time of admission and of these, six were severely hypoxaemic and three (50%) died (Fisher exact test, $p < 0.001$). Head nodding was present in three of the four hypoxaemic children with ALRI who died. Other clinical signs predictive of death were cyanosis (Fisher exact test, $p = 0.01$), drowsiness (Fisher exact test, $p = 0.01$) and a respiratory rate of >60/min (Fisher exact test, $p = 0.03$).

Head nodding was the most significant clinical predictor of mortality in our study. This is consistent with findings from a study in India that documented head nodding as a determining factor for mechanical ventilation, and a predictor of death in young children with ALRI [7]. Unlike cyanosis, which is often affected by skin pigmentation, anaemia and interobserver discrepancies, head nodding is easily recognizable without the need to undress the child. Furthermore, it can be easily taught to primary healthcare workers with limited training [6]. Head nodding is a clinical sign that is age dependent, and it is ALRI-specific, useful only in young children without co-morbidities [8]. This argument is supported by a recent ALRI study where a significant proportion of children had diarrhoea and malnutrition as co-morbidities [9]. In that study, metabolic acidosis did not influence the final outcome in those with and without head nodding, and the authors attributed this lack of association to co-morbidity.

In conclusion, this study shows that head nodding is an under-recognized ALRI-specific clinical predictor of mortality in hypoxaemic young children. Therefore, the presence of head nodding should prompt primary healthcare workers to give immediate priority to such patients with regards to oxygen administration or referral to an appropriate healthcare facility.

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doi:10.1093/tropej/fms048
Advance Access published on 15 October 2012

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