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Bacterial contamination of oral sucrose solutions

Sweet-tasting solutions such as sucrose and glucose have been shown in a large number of studies to be efficacious in reducing procedure-related pain in newborn infants.¹ However, issues concerning the risk of bacterial contamination of such solutions have been raised. Abu-Arafeh et al reported significant bacterial contamination of a 10% sucrose solution occurring 24 hours after preparation.² To further examine this issue, an audit was conducted to determine the growth of bacteria in both refrigerated and unrefrigerated 33% (w/v) sucrose solution over a one-month period. This concentration of sucrose is routinely used for procedure-related pain reduction in infants in the tertiary referral neonatal intensive care unit (NICU) where this audit took place.^{3,4}

The sucrose solution was prepared in the Pharmacy Department of the tertiary referral centre, and packaged in 100 ml bottles. Six bottles were dispensed simultaneously to the NICU. As per standard practice, one bottle was placed in each of four patient care rooms in their respective refrigerators. Refrigerator temperatures were maintained between 4–8°C. In addition, one bottle was stored unrefrigerated in an office in the NICU, and a "control bottle" was stored in a temperature monitored refrigerator constantly maintained at 2–6°C, in the Infection Control Department, and only accessed once every seven days. Each bottle, with the exception of the control bottle, was labelled with an access record, and staff placed a tick on the label whenever the bottles were accessed for clinical use. Staff also randomly accessed the unrefrigerated bottle on a daily basis to mimic routine ward usage, and subsequently discarded the sucrose from this bottle.

Quantitative culture was performed by plating 50 µl of the solution onto horse blood agar and incubating the plates for 48 hours at 35°C in air. Any organisms isolated were identified to the species level using standard microbiological techniques. The six bottles were cultured on the day the solutions were prepared and then every seven days thereafter for a total of 28 days.

All bottles, with the exception of the Room 1 bottle, which was inadvertently discarded on day 15, had complete microbiological data for the required 28-day period. Results of the bacterial cultures, together with the number of times each bottle was accessed, are presented in table 1.

No bacterial contamination was identified in the control bottle stored in the refrigerator in the Infection Control Department, or in two of the bottles in routine clinical use and accessed multiple times. The other two bottles in routine clinical use and the unrefrigerated bottle grew small numbers of common skin organisms. The bacteria at these low levels are of low pathogenic potential and were not consistently isolated from the bottles, suggesting either contamination of the sample at the time of collection, or an inability of the 33% sucrose solution to support the growth of these organisms. No Gram-negative bacteria were isolated from the solutions.

This study failed to identify consistent or significant bacterial overgrowth in a 33% (w/v)

Table 1 Bacterial growth in 33% (w/v) sucrose solution

Sampling day	Culture result	Number of times accessed (cumulative)
Control bottle		
1	NG	0
7	NG	1
14	NG	2
21	NG	3
28	NG	4
Unrefrigerated bottle		
1	NG	0
7	<i>Micrococcus luteus</i> , 20 cfu/ml	8
14	NG	26
21	<i>Micrococcus luteus</i> , 20 cfu/ml	35
28	NG	44
Room 1 bottle		
1	NG	0
7	NG	18
14	NG	29
Room 2 bottle		
1	NG	0
7	NG	14
14	<i>Staphylococcus epidermidis</i> , 20cfu/ml	32
21	NG	39
28	<i>Corynebacterium</i> spp., 80 cfu/ml	39
Room 3 bottle		
1	NG	0
7	NG	26
14	<i>Staphylococcus warneri</i> , 20 cfu/ml	48
21	NG	75
28	NG	105
Room 4 bottle		
1	NG	0
7	NG	2
14	NG	6
21	NG	9
28	NG	13

NG, no growth.
CFU, Colony Forming Units

sucrose solution, stored in a refrigerator within a clinical setting and accessed multiple times during 28 days of use. In addition, the same concentration of sucrose stored in an unrefrigerated environment within close proximity to the clinical setting and accessed multiple times by clinical staff, failed to result in any significant bacterial growth. These results provide preliminary evidence of safety, in terms of bacterial overgrowth, of both refrigerated and unrefrigerated sucrose solutions. Further studies are required to examine the risk of bacterial growth in other concentrations of sucrose solutions commonly used around the world for management of procedure-related pain in infants.

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Test weighing for term and premature infants is an accurate procedure

We write in response to the article by Savenije and Brand,¹ in which the investigators conclude that test weighing is too imprecise for the