

# Low-volume, high-frequency cow's milk feedings sped recovery from diarrhea in infants

Wan C, Phillips MR, Dibley MJ, Liu Z. Randomised trial of different rates of feeding in acute diarrhoea. *Arch Dis Child*. 1999 Dec;81:487-91.

## QUESTION

In infants with acute diarrhea, do more frequent, low-volume feedings of cow's milk promote faster recovery than less frequent, high-volume feedings of the same total volume of cow's milk?

## DESIGN

14-day randomized (unclear allocation concealment\*), unblinded,\* controlled trial.

## SETTING

4 tertiary care hospitals in Chengdu, China.

## PATIENTS

282 boys who were 3 to 12 months of age and had acute diarrhea and mild to severe dehydration. Exclusion criteria were malnutrition, exclusive breast feeding, systematic infections (e.g., pneumonia or septicemia), or other diseases requiring additional treatments. Only boys were enrolled to facilitate the separation of urine and stool. 262 boys (93%) (mean age 8 mo) completed the study.

## INTERVENTION

Infants were stratified by hospital and initial hydration status and allocated exclusively to cow's milk, either 18 mL/kg of body weight every 3 hours over 18 waking hours (6 feeds/d [high volume]) ( $n = 128$ ) or 9 mL/kg every 1.5 hours over 18 waking hours (12 feeds/d [low volume]) ( $n = 134$ ).

## MAIN OUTCOME MEASURES

Recovery from diarrhea (2 d of formed stools at prediarrhea frequency and 24-h stool weight  $< 30$  g/kg) and treatment failure (dehydration  $> 5\%$  of body weight after third day of admission, serious complications, persistent electrolyte abnormalities, prolonged severe diarrhea, or diarrhea continuing after 14 days of treatment).

## MAIN RESULTS

All but 1 infant in the low-volume group had recovered from diarrhea by day 14; no infants in either group met criteria for treatment failure. Kaplan-Meier analysis showed that the low-volume group had a more

rapid recovery from diarrhea than the high-volume group. After adjusting for age, dehydration status on admission, and cause of diarrhea, the rate of recovery from diarrhea was 29% higher in the low-volume group than in the high-volume group (hazard ratio 1.29, 95% CI 1.00 to 1.65,  $P = 0.048$ ). The increase in body weight was faster in the low-volume group ( $P = 0.012$ ), and average stool frequency and stool weight from the second to fifth day of treatment were lower ( $P \leq 0.027$ ).

## CONCLUSION

In infants with acute diarrhea, feedings of cow's milk 12 times per day promoted faster recovery than the same total volume of cow's milk given 6 times per day.

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\*See Glossary.

## COMMENTARY

Diarrhea accounts for one third of infant and child deaths worldwide. Although widespread use of oral rehydration therapy has reduced deaths by one third, 2 million children still die of diarrhea each year (1). Even uncomplicated diarrhea causes considerable weight loss, which results in a substantially lower level of nutrition than that in the prediarrheal state. The effect of diarrhea is worsened by the custom of starving the child to give rest to the gut and by the child's poor appetite. Early feeding as soon as dehydration is corrected is advised to prevent weight loss (2). However, an injured gut may not tolerate full-strength milk, especially in young infants. Recurring diarrhea has been attributed to lactose intolerance (3) and has led to the recommendation of diluting milk to reduce the risk for intolerance. However, a well-done randomized controlled trial has shown that diluting milk does not reduce complications (4).

The study by Wan and colleagues provides an appealing solution. It has proved convincingly that small, frequent feedings result in quicker restoration of the prediarrheal nutritional status. We know intuitively that the low-volume, frequent feedings are less likely to burden the functioning of a diseased gut.

Many of the study limitations have been pointed out by the authors. However, the outcome measures were reasonably objective. If the results of this study can be repeated, milk can be given with oral rehydration salt solutions, and the need for intravenous rehydration and hospitalization can be minimized. More randomized trials are needed in this area using different types and dilutions of feeds.

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