**BACKGROUND**

- Feeding can be physiologically challenging for medically fragile infants.
- Milk flow, or the rate of milk transfer from the bottle to the mouth during feeding, contributes to the extent of physiologic instability encountered.
- There is little current data on milk flow rates from available bottle nipples.

**AIMS**

- Describe milk flow rates from bottle nipples commonly used to feed infants in the hospital and after discharge home.
- Guide decision-making for nurses, parents, and researchers.

**METHODS**

- Ten each of 38 types of nipples (n=373) were tested using a standardized procedure.
- Power analysis: 10 nipples of each type were used for all tests. 60mL Grad-U-feed bottle filled with 50mL of formula, ounce formula used for all tests. Similac Advance ready-to-feed 20 calorie/ounce formula was changed every 10 trials to maintain milk consistency.
- Samba Micro-Pressure Measurement System was used to test sucking rate and pressure using Samba Micro-Pressure Measurement System every 50 trials.
- Formula was changed every 10 trials to maintain milk consistency.
- Nipples were color coded according to brand.
- Nipples were color coded according to category of coefficient of variation.

**RESULTS**

- **Mean Flow Rate (mL/min)**
  - Mean sucking rate was 110 sucks/minute.
  - Mean sucking pressure was 14.3 mmHg.

- **VARIABILITY IN FLOW RATES**
  - There was a wide range in variability in flow rates amongst the nipples tested. COV ranged from 0.03 (Dr. Brown’s Level 5) to 0.61 (Bionix Level 5).
  - All nipple types significantly different.
  - Some Similac Slow nipples faster than Similac Standard.
  - Enfamil Premature was highest flow of all Enfamil nipples.
  - Dr. Brown’s Preemie and Medela SpecialNeeds Feeder had individual tests that were significantly different.
  - Highest Flow: Dr. Brown’s Preemie and Medela SpecialNeeds Feeder
  - Lowest Flow: Medela Calma, MAM, Medela Wide Base Slow

- **COMPARISONS WITHIN CATEGORY**
  - Mean Flow Rate of “Slow” Flow Nipples (n=9)
  - Mean Flow Rate of “Standard” Flow Nipples (n=14)

- **COMPARISONS WITHIN BRAND**
  - Bionix: Controlled Flow Baby Feeder
    - Nipple and Collar tested separately because interchangeable.
    - Nipple tests: Levels 2.5 not different from one another.
    - Collar tests: Levels 2 and 3 the same, Levels 4 and 5 the same.
    - Bionix Levels 4 and 5 were among the most variable of all the nipples tested.
  - Dr. Brown’s: Premmie, level 1, 2, and 3 among least variable of all nipples tested.
  - Enfamil: Premmie was highest flow of all Enfamil nipples.
  - Some Similac Slow nipples faster than Enfamil Standard.
  - Similac: Similac Slow and Standard were not significantly different from one another.
  - Similac Premature was significantly faster than other Similac nipples.
  - Some Similac Slow nipples faster than Similac Standard.
  - Medela: All nipple types significantly different.

**CONCLUSIONS**

- Choosing a nipple is an important decision given the wide range of flow rates of available nipples.
- The name of a nipple (e.g., slow, preemie) does not always give an accurate indication of the flow rate.
- Variability in flow rate between and within nipple types is an added challenge that may contribute to feeding difficulty in vulnerable infants.

**GUIDING DECISION-MAKING NURSES**

- Start with the slowest flow nipple available for vulnerable infants.
- Consider changing to a different nipple of the same type if having a difficult feeding.
- Consider checking that the nipple hole is open and reapppy nipple to bottle to release suction if not transferring milk.

**PARENTS**

- When an infant is ready to be discharged home, choose a nipple of lower flow and low variability to ensure consistency.
- If a baby is having difficulty feeding with the nipples available in the hospital, purchase a nipple with lower flow and low variability to take into the hospital for feedings.

**RESEARCHERS**

- In studies evaluating effect of feeding interventions, it is critical to:
  - Know the flow rate of the nipple chosen for the study.
  - Choose a nipple with low variability in flow rate to ensure consistency.
  - Report the nipple used in the study.

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**THE FEEDING FLOCK**

Feeding Interest Group