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Breast Milk Supply Establishment for Mothers of NICU Infants: a retrospective chart review examining milk volume, maternal factors and pump type

Cynthia C Jackson BSN, MPH, IBCLC

Background

Human milk is of critical importance to the NICU infant. The short and long term nutritional, immunological and developmental benefits of human milk are well established. Mother's own milk (MOM) is ideal yet many mothers of NICU infants are challenged to establish and maintain an adequate milk supply for feedings in the NICU and post discharge continued breastfeeding and breastmilk feeds. Many mothers are initially breast pump dependent to establish their own milk supply. Insurance companies often provide breast pump coverage but many do not cover the recommended hospital grade pumps. In addition, mothers of NICU infants often have medical conditions that may have an effect on their supply.

Purpose

The purpose of this study was to answer three questions:

1. What percentage of mothers with NICU infants are able to establish an adequate milk supply by day 14 post birth? (Adequate supply is defined as >500ml/day)
2. What additional maternal/infant factors are related to adequate versus inadequate milk supply? (for example: primipara versus multipara, maternal age, gestational hypertension, obesity, diabetes, history of depression/anxiety, gestational age of infant and length of stay).
3. Are mothers using the Medela "Symphony" versus the Medela "Pump in Style" (PIS) pump more likely to succeed in establishing an adequate milk supply?

Methods

Study design:

Observational retrospective cohort design.

Study population:

Chart audit of all infants admitted to NICU in 2015 with length of stay greater than 7 Days.

Study process/methods:

IRB: Approval by Providence St. Vincent Medical Center Institutional Review Board was obtained prior to initiation of data collection.

Method: Chart review of history and physical (H&P) provided by the neonatologist and lactation staff progress notes. Data points collected were gestational age of infant, infant length of stay, maternal age, parity, maternal medical conditions (ie pre-eclampsia, gestational hypertension, obesity, diabetes, depression, polycystic ovarian syndrome), breast milk supply (ml/day) at day 7 and 14 post delivery, pumping frequency/day, and type of home breast pump used.

| Categorical Variables | % (n/N) |
|---|-----------------|
| First Time Mother | 50.2% (102/203) |
| Vaginal Delivery | 47.8% (97/203) |
| Multiple Birth | 18.7% (38/203) |
| Adequate Milk Supply by day 14 (>500ml/day) | 62.5% (110/176) |
| Symphony Pump as Home Pump | 43.8% (89/203) |
| PIS Pump among those not using Symphony | 74.6% (85/114) |
| PIH/Gestational HTN | 33% (67/203) |
| Chronic HTN | 12.8% (26/203) |
| Diabetes | 16.3% (33/203) |
| Obesity | 15.3% (31/203) |
| Depression/Anxiety | 15.8% (32/203) |

| Continuous Variables: | mean (sd) | median (IQR) |
|-------------------------|---------------|-------------------|
| Maternal Age (yrs) | 30.4 (6.1) | 31 (26, 35) |
| Gestational Age (wks) | 32.8 (3.3) | 33.6 (30.6, 34.7) |
| Length of Stay (days) | 29.7 (24.5) | 18 (13, 40) |
| Day 7 Pumping Freq | 6.4 (1.7) | 7 (5, 8) |
| Day 7 Milk Volume (ml) | 450 (382.5) | 360 (162, 630) |
| Day 14 Pumping Freq | 6.8 (1.2) | 7 (6, 8) |
| Day 14 Milk Volume (ml) | 604.6 (438.2) | 532.5 (315, 785) |

Results

Descriptive statistics: Maternal variables potentially affecting milk supply included gestational hypertension/pre-eclampsia (33%), diabetes (16%), obesity (15%) and depression/anxiety (16%).

Adequate milk supply by day 14 post birth (>500ml/day) was noted in 62% of the mothers. Mean milk volume/pumping frequency/day at day 14 was 605ml/6.8x. 43% of mothers used symphony pump at home.

Univariable analysis: Lower gestational age (p-value 0.002) and obesity (p-value <0.001) were clearly associated with inadequate milk supply by day 14. Borderline association was noted for first time mothers. Of those with inadequate supply at day 14, 60% were 1st time mothers.

Multivariable analysis (logistic regression) After accounting for obesity and gestational age, among first time mothers, symphony pump did not make any difference in milk supply, while it was associated with an OR (odds ratio) of 5.66 for adequate milk supply among non-first time mothers.

Being a first time mother was associated with poorer milk supply among those using symphony pumps (OR=0.14).

| Adequate Milk Supply by Day 14 (>500ml/day) | No | Yes | p-value |
|---|-------------------|-------------------|---------|
| # of Mothers | 66 | 110 | |
| Maternal Age (years) median (IQR) | 33 (28, 35) | 30 (26, 34) | 0.08 |
| Gestational Age (weeks) median (IQR) | 31.9 (28.8, 33.9) | 33.9 (31.6, 34.8) | <0.001 |
| LOS (days) median (IQR) | 30.5 (17.2, 52.8) | 17.5 (13, 34.5) | <0.001 |
| Day7 Pumping Frequency median (IQR) | 6 (5, 8) | 7 (6, 8) | <0.001 |
| Day14 Pumping Frequency median (IQR) | 6 (5, 7.8) | 7 (7, 8) | <0.001 |
| Obesity | | | <0.001 |
| (not obese=0) | 47 | 101 | |
| (obese=1) | 19 | 9 | |
| First Time Mother (primipara) | | | 0.06 |
| (not prima=0) | 26 | 61 | |
| (Prima=1) | 40 | 49 | |

Discussion/Conclusions

Adequate breast milk establishment remains a challenge for NICU mothers as only 62% of those studied were able to succeed at day 14. Lactation is a process influenced by a complex hormonal milieu including both reproductive and metabolic hormones. (Hurst 2007) Obesity has been shown in the literature to be associated with delayed lactogenesis. (Nommsen-Rivers 2015). It is not surprising then that this analysis also demonstrated this association.

The Medela symphony pump has been the gold standard for hospital NICUs. This study demonstrated its benefit in establishing adequate supply for non first-time mothers but did not show superiority over other pumps for first time mothers.

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