Indian Experience of Setting a Human Milk Bank

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Human Milk Bank – The need

- 10,000 -12000 deliveries / year
- Over 60% High risk Deliveries
- 2500 – 3000 babies transferred for intensive care
- LBW babies over 60%
- High mortality rates - over 60% related to infection
Measures to decrease mortality-
1980’s

- A number of low cost measures were tried
- Use of exclusive breastmilk was one such measure
- Prelacteal feeds were stopped
- Feeding bottles discarded
- Formula milk was banned
Ensuring human milk for all babies in the hospital

- Normal babies nursed by their own mothers
- Babies admitted in the PU/NICU fed by their own mothers, directly or fed expressed breast milk
- Babies who could not be fed by their mothers fed banked milk

*These measures were not enough to provide all babies breast milk*
How To Ensure a Constant and Safe Supply Of Human Milk To Babies?

- The answer was to establish a Human Milk Bank
The basic requirements

- Administrative approval
- Finance
- Space
- Donors
- Cooperation of other departments
Objectives Of The Milk Bank

- To ensure that every baby born or admitted to the hospital receives mothers milk
- To avoid bottle, animal & formula milk
- To heighten breastfeeding awareness
- Ancillary support to breastfeeding practices
- To promote Baby Friendly Hospital care
Human Milk Bank At LTMMC (2008)
Equipment

- 2 Refrigerators
  - Receiving and Thawing Milk
- 2 Deep Freezers
  - Storing Milk At – 20 º C
- Shaker Water Bath
  - Heat Treatment of Milk
- Generator
  - SOS for Power Failure
Equipment

- Shaker Water Bath
- Hot Air Oven
- Freezer & Containers
The Team
Donor Selection Criteria

- Healthy & well nourished
- No evidence of Tuberculosis or other infectious diseases
- Normal on physical examination
- HIV, VDRL, Hep B negative
- No H/O hepatitis, blood transfusions in recent past
- Not on any medications contraindicated while breastfeeding
- Willing to donate
Donor Population

- Hospital Based
- Mothers in PNC Wards:
  - BM in excess of baby’s needs.
  - Expressing to maintain output when babies not in a position to feed.
Donor Population

Mothers following up in PNC OPD
Milk Expression Pumps
Milk Expression & Collection Procedure

Average volume donated: 50-150 cc. Milk is pooled separately as colostrum, preterm & mature milk.
Method of Banking

- Milk expressed into Autoclaved, Labeled, Steel Containers with Caps
- Babies fed own mothers’ unprocessed milk
- Excess milk and milk from voluntary donors pooled in larger containers ➔ Refrigerated ➔ Transferred to Bank
Holder Pasteurization of Milk

- As per recommendations of HMBANA:
  - Pasteurized at 62.5 deg C for 30 min in shaker water bath
  - Preserve >80% of immunological factors, destroying 99% of pathogens including HIV virus
Cultures Of Milk Samples
Storage Of Heat Treated Milk

- Stored in the freezer at -20 degrees C
- Pasteurized milk can be stored for 6 months
- Freezer compartment of fridge for 48 hours
- Room temp: 6-8 hours
Distribution Of Banked Milk

- “First in first out” basis
- Milk shifted to fridge in neonatal unit as per need
- Milk thawed by standing container in lukewarm water
- Use thawed milk within 4-6hrs
Recipients

- VLBW babies especially first few days
- LSCS deliveries esp if LBW
- Multiple pregnancies
- Babies of mothers with problems:
  - Eclampsia, PPH, acute illnesses
- Necrotizing enterocolitis, GI surgeries (SNICU)
- Babies whose mothers are not in a position to feed them
- Others
Modifications

- Donors
- Supervised collection
- Stainless steel containers for storage
- Pooling of milk – colostrum, preterm, term
- Use of exclusive breastmilk for all babies in the hospital
Issues

- Donors
- Acceptance
  - Personnel
  - Replicability and sustainability
- Questions in Parliament
Conclusion

A breast milk bank is a feasible project

A Breast Milk Bank ensures that every baby receives breast milk while in hospital

- Milk is bacteriologically safe

☐
Conclusion

- Serves as a reservoir for human milk

- Every hospital with a large NICU must have a HMB

- Positive influence on breastfeeding practices in the hospital and community by underlining need for mother’s milk alone for every baby
Collection And Storage Containers

- **Pyrex containers vs plastic containers:** lactoferrin, lysozyme & S-IgA no significant difference
- **Single use, hard plastic containers,** preferred in West
- **Poly-carbonate plastic containers,** increased migration of bisphenol A into the milk
- **Stainless steel containers:** Easily available, durable, easy to clean & autoclave
- **Inert, nutrient composition normal on storage,** cellular components reduced
Storage Containers

Storage containers at MMB Austin Texas.
Number Of Donor Mothers LTMGH Vs MMB Austin

Average Per Day Donor Mothers:
Indoor: 20 - 30
OPD: 20 – 45.
Number Of Recipients

Average Recipients: 35-40 / day
Common Organisms Cultured

- Bacillus Subtilis
- CONS
- Micrococcus
- E Coli
- Staph Aureus
- Acinetobacter
- Enterococcus
- Enterobacter
- Klebsiella
## Biochemical Analysis Of Banked Milk

<table>
<thead>
<tr>
<th></th>
<th>Fresh Milk</th>
<th>Post freezing</th>
<th>Post Pasteurization</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Proteins (g/dl)</strong></td>
<td>1.47 ± 0.040</td>
<td>1.45 ± 0.03 NS</td>
<td>1.45 ± 0.03 NS</td>
</tr>
<tr>
<td><strong>Lactose g/dl</strong></td>
<td>6.040 ± 0.08</td>
<td>6.01 ± 0.06 NS</td>
<td>6.02 ± 0.07 NS</td>
</tr>
<tr>
<td><strong>Total Lipids</strong></td>
<td>3.49 ± 0.03</td>
<td>3.48 ± 0.03 NS</td>
<td>3.49 ± 0.03 NS</td>
</tr>
<tr>
<td><strong>Triglycerides</strong></td>
<td>2.01 ± 0.02</td>
<td>1.883 ± 0.01</td>
<td>1.896 ± 0.01*</td>
</tr>
<tr>
<td><strong>Free fatty acids (umol/L)</strong></td>
<td>1487.72 ± 42.76</td>
<td>1607.70* ± 37.33</td>
<td>1584.6 ± 35.25*</td>
</tr>
</tbody>
</table>

* - Significant difference (p < 0.05)
### Ig A Estimation On Banked Milk (n = 50)

<table>
<thead>
<tr>
<th>IgA (mg/dl)</th>
<th>Fresh Sample (%)</th>
<th>Post Freezing (%)</th>
<th>After Heat Treatment (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 100</td>
<td>7 (28)</td>
<td>8 (32)</td>
<td>9 (36)</td>
</tr>
<tr>
<td>100 – 200</td>
<td>4 (16)</td>
<td>6 (24)</td>
<td>8 (32)</td>
</tr>
<tr>
<td>200 – 300</td>
<td>7 (28)</td>
<td>5 (20)</td>
<td>3 (12)</td>
</tr>
<tr>
<td>&gt; 300</td>
<td>7 (28)</td>
<td>6 (24) (p&gt;0.05)</td>
<td>5 (20) (p&gt;0.05)</td>
</tr>
</tbody>
</table>

Milk secretory IgA

98% preserved post freezing,

79% preserved post pasteurization

Effect Of Processing on Nutritional & Anti Infective Factors In Banked Milk

- Post Freezing
  - Reduced:
    - Vitamins B6, C
    - IgM, IgG
    - Lipases,
  - Number and function of cells
  - Not Affected
    - sIgA, Lysozyme, Lactoferrin
    - Macronutrients
    - Fat soluble vitamins

- Post Pasteurization
  - Reduced:
    - IgA, IgG, IgM and complement
    - Lysozyme, lactoferrin
  - Number and function of cells
  - Growth factors,
  - Lipase, and lipase activity
  - Not Affected
  - Macronutrients, Fat soluble vitamins, Amylases.
<table>
<thead>
<tr>
<th></th>
<th>Donor Milk Gr.</th>
<th>Preterm Formula Gr</th>
<th>MM Gr</th>
<th>Signif</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth Wt (gms)</td>
<td>947±233</td>
<td>957±267</td>
<td>999±259</td>
<td>NS</td>
</tr>
<tr>
<td>Gest Age (wks)</td>
<td>27±2</td>
<td>27±2</td>
<td>27±2</td>
<td>NS</td>
</tr>
<tr>
<td>Wt Gain (g/kg/d)</td>
<td>17.1±5.0*</td>
<td>20.1±6.7</td>
<td>18.8±5.8</td>
<td>DM v PF P =0.001</td>
</tr>
<tr>
<td>Length gain (cm/kg/week)</td>
<td>1.2±0.8</td>
<td>1.0±1.0</td>
<td>0.6±0.4</td>
<td>P =0.03</td>
</tr>
<tr>
<td>HC (cm/wk)</td>
<td>0.9±0.9</td>
<td>0.9±0.8</td>
<td>0.9±0.5</td>
<td>NS</td>
</tr>
</tbody>
</table>

Mother’s Milk Essential For VLBW & ELBW Babies
Benefits - Human Milk Banking

- Ensures continuous supply of safe human milk for sick and preterm babies
- Reduces infection rates in hospitalized babies
- Frequent expression helps maintain lactation
- Reduction in long term morbidity and mortality
- Positive influence on breast feeding practices in hospital and community
Hospital Grade Electric Milk Pumps