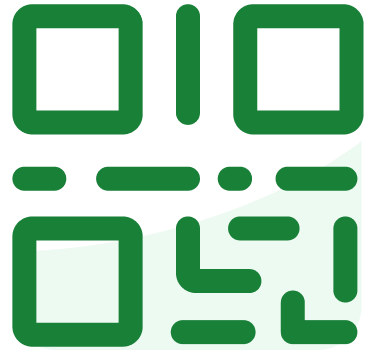


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**Join at slido.com
#38367437**

ⓘ Start presenting to display the joining instructions on this slide.



Collection, Storage, and Preparation of Human Milk

KACEY NATION, MSN, RNC-NIC, CBC

Children's Healthcare of Atlanta NICU
Registered Nurse
Atlanta, GA

Introduction

Egleston NICU
x 11 years

Certified
Breastfeeding
Counselor

Long-time
Human Milk
Advocate

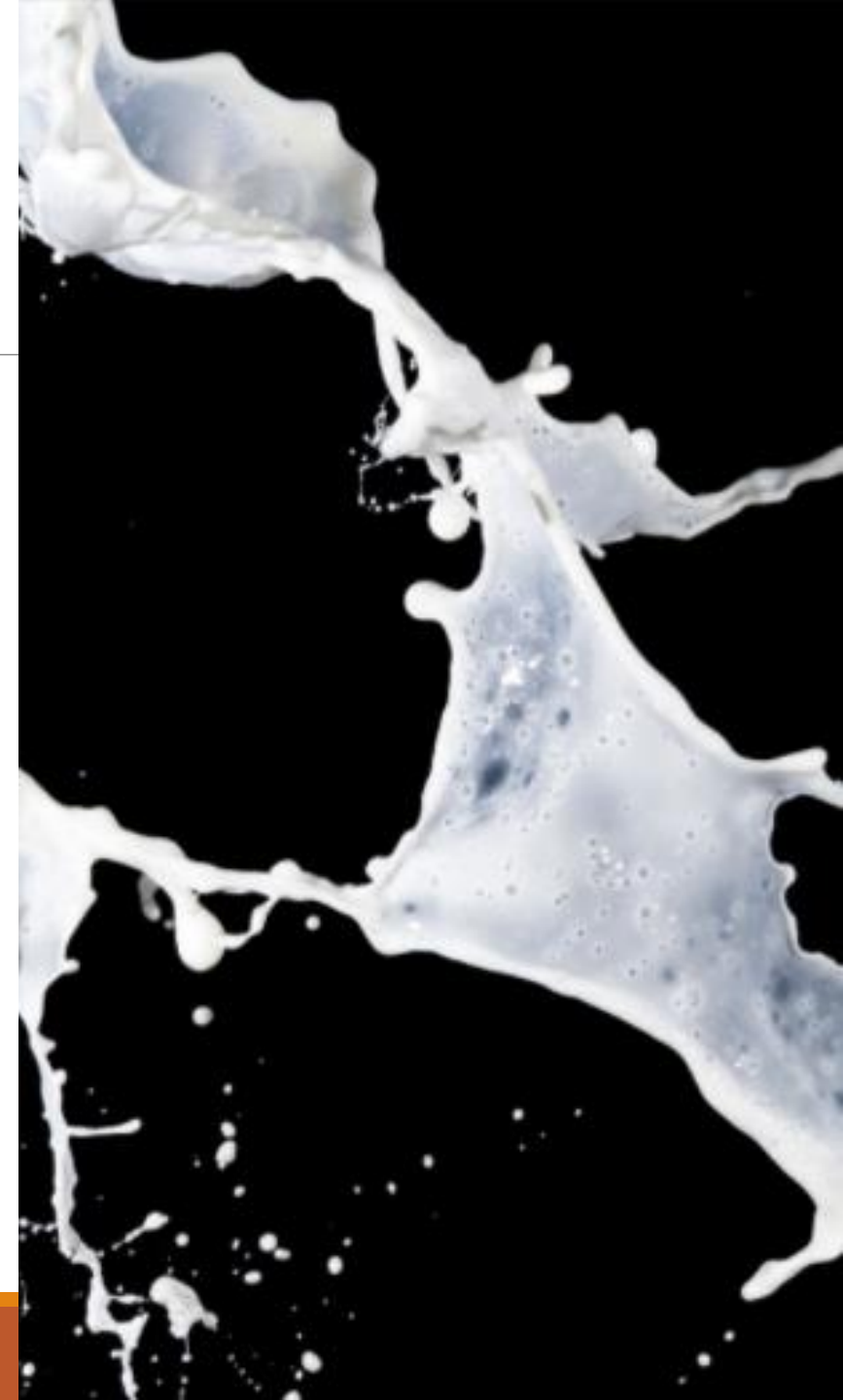
MSN Nursing
Informatics

Disclosures

No disclosures

Objectives

- Recognize situations in which expression of human milk would be an appropriate alternative to direct feeding at the breast
- Identify different types of breast pumps and their clinical applications
- Identify opportunities for enhancing the safety of collection, storage, and preparation in the in-patient setting



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List some reasons why a parent would need to express milk instead of directly feed at the breast/chest.

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Indications for milk expression

Parent/Infant Separation

Risk factors for delayed L2 or suppressed milk production

Infant health issues/not feeding well

Personal choice



Anna:

G1, 40 weeks, c-section at MN on the weekend, s2s in OR,
to Mother Baby 0400

In Mother/Baby, latched briefly a few times

By the afternoon, issues with latching

- CLC on call for the weekend assisting, able to latch again

Overnight, more difficulty latching

- Mom asks for nipple shield—unit only has certain sizes
- Attempting to use the shield=nipple trauma

CLC back in the AM

- After assessment, believes baby is tongue-tied

Anna:

Baby not
latching, maybe
tongue tied

Moving into
24h of Life

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What should the postpartum nurse suggest for Anna?

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Anna:

Hand expression

Pumping

Types of Breast Pumps



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**What kind of pump should Anna be using?
(can select multiple)**

ⓘ Start presenting to display the poll results on this slide.



Hand Expression

No equipment,
water, or electricity

Can relieve
engorgement and
help facilitate latch

Encourages milk
production in early
lactation

Safe and effective in
emergency or
natural disaster

May be more
comfortable for
some who have pain
with a breast pump

Manual Breast Pumps



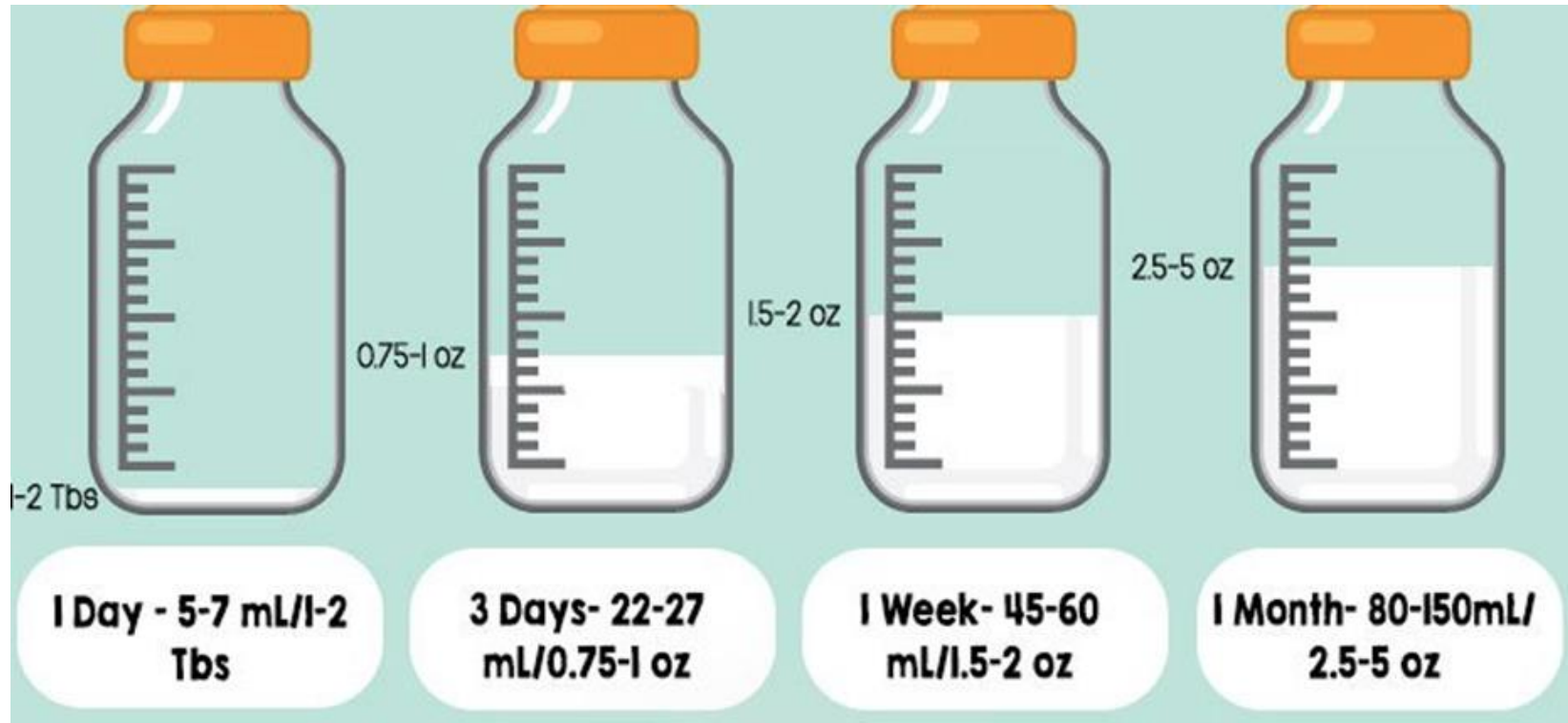


“Purchase grade” breast pumps



Anna:

Is storage going to be a concern?



Anna:

Hand expression

Pumping

How to support her:

- Hand expression vs mechanical expression
- HGBP vs Home pump
- Storage containers
- Cleaning supplies
- Pumping instruction
- Bottle feeding instruction

Olivia:

2nd pregnancy; NSVD after PPRM at 28wk GA

Delivered at 0600

APGAR 8,9, spontaneous respirations at delivery, crying

Infant immediately moved to infant warmer; transferred to NICU soon after delivery

0715: dayshift nurse introduces themselves

0845: nurse comes in to do assessment; "are you going to breastfeed?"

0745: tech comes in—VS, ice

"Didn't make enough milk" with first baby

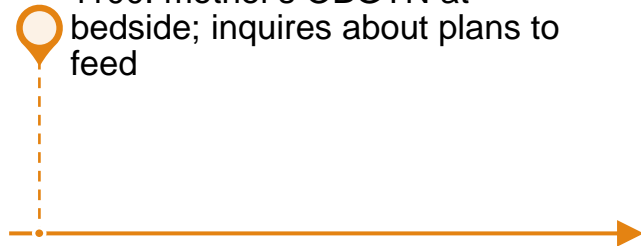
Olivia:

Breastmilk is best for your baby...
We support your decision.

Didn't make enough milk....
Going to use formula....



1100: mother's OBGYN at bedside; inquires about plans to feed



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What has the strongest impact on milk production?

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Olivia:



1145: IBCLC at bedside

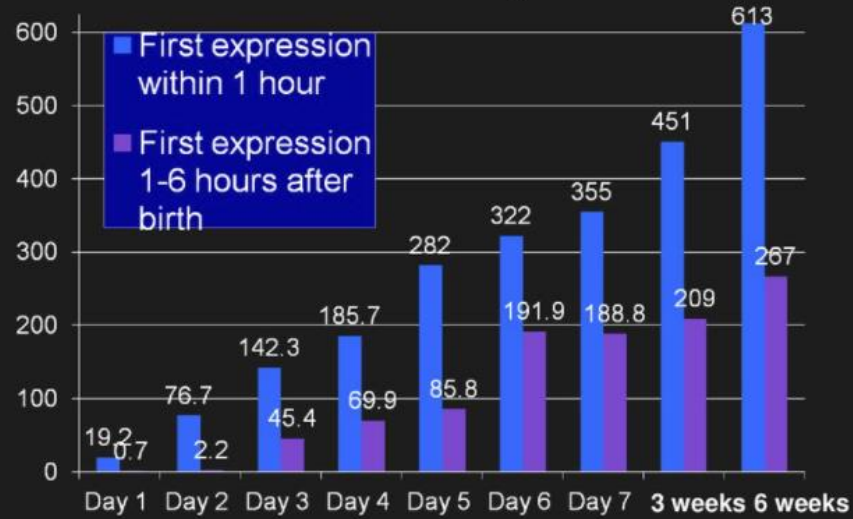
Lunch time

Discussed feeding choice in light of preterm infant

Mother wants to try to pump

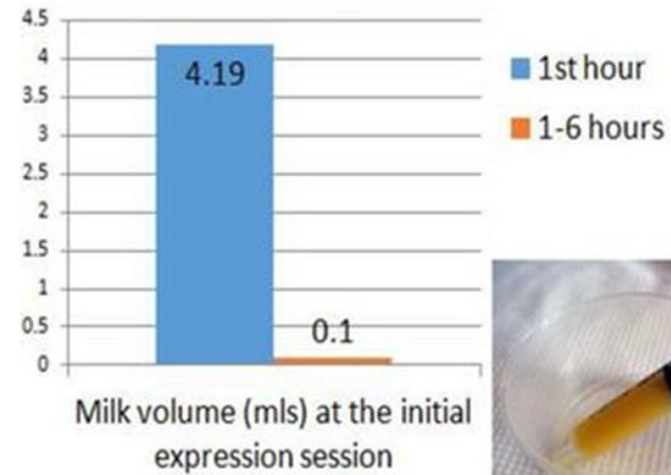
**WHAT'S
OUR
CONCERN
NOW?**

Milk Volumes From Day 1 To 6 Weeks



Parker, J Perinatol,
2012

Mothers get more milk if they express in the first hour after birth



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What kind of pump does Olivia need to use?

ⓘ Start presenting to display the poll results on this slide.



Hands-On Pumping



- Compress breast tissue while using breast pump
- Either using hands-free set up (more later on this) or when pumping one breast at a time
- Increases fat content of expressed milk
- More fully empties the breast- stimulates milk production
- More volume expressed per pumping session

Clinical Update

Keys to Coming to Volume

(producing >500 milliliters of milk per day by postnatal day 14 for mothers of infants in the NICU)

5x5



Expressing milk at least
5 times a day by day 5

Early AM



At least one of those
between 1 and 5 am

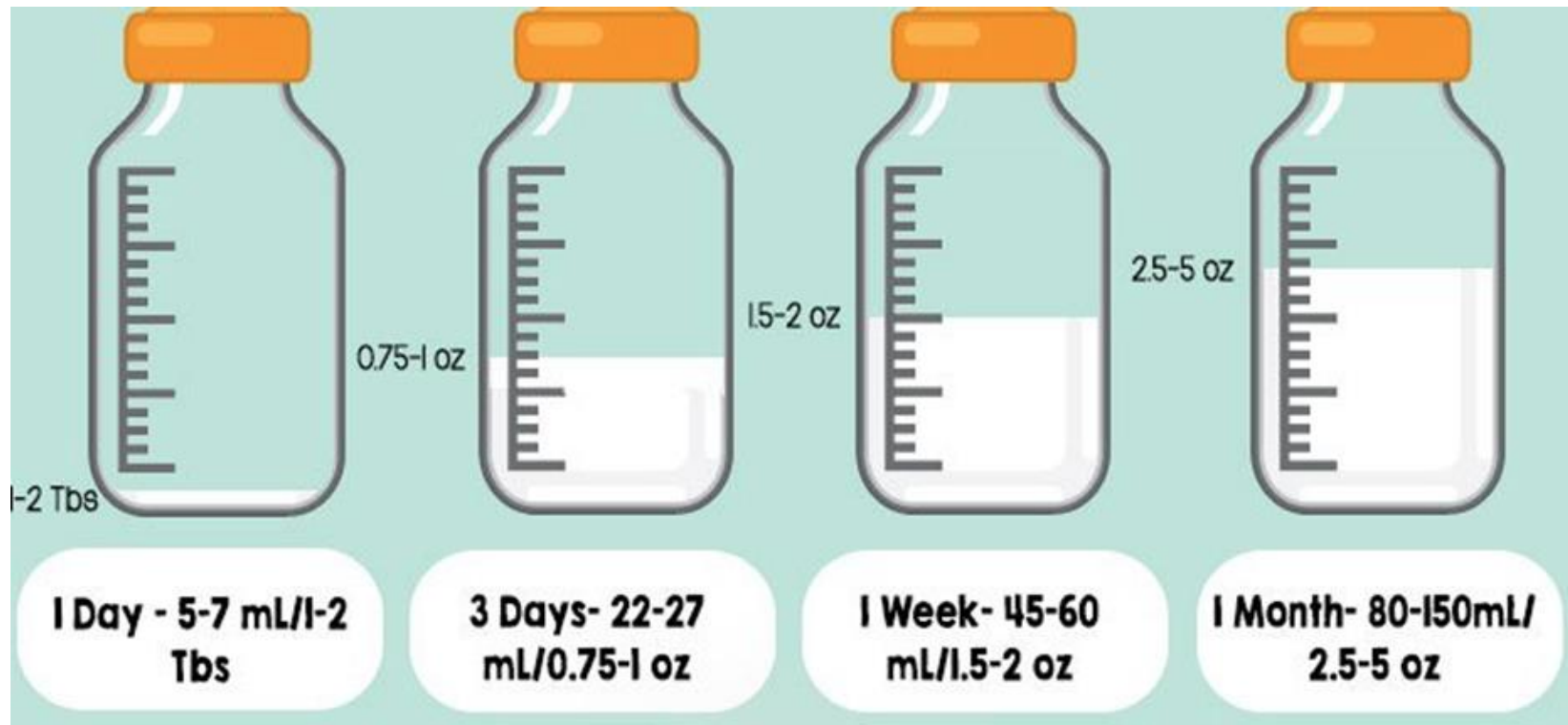


Mago-Shah, D.D., Athavale, K., Fisher, K. et al. Early pumping frequency and coming to volume for mother's own milk feeding in hospitalized infants. *J Perinatol* (2023).

Coming to
Volume

Olivia:

Coming to Volume



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What other ways can we support Olivia?

ⓘ Start presenting to display the poll results on this slide.

Other Support

IBCLC consult

Storage
Supplies &
education

Pump use
education

Pump kit
cleaning

Oral Care
information

Kangaroo Care
information

Anything else?

Olivia: In the NICU...

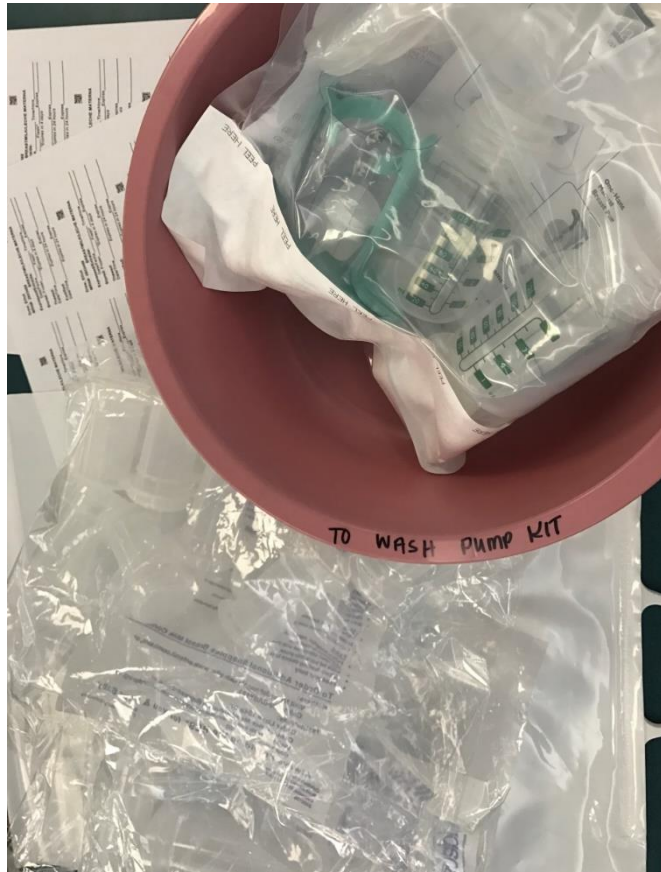
Mom pumped at 9, discharged from postpartum unit around 11am

Comes to bedside in NICU

- Unit orientation from the NICU nurse: 30 min
- Introduction by medical team: 30 min
- Nurse goes to lunch: 40 min
- Mom goes to lunch: 30 min

How long has it been since mom pumped?

Supplies



Parts of a Breast Pump Milk Collection “Kit”

Flanges	Tubing/connectors	Back flow protector	Membrane or valve
One part or two part	Don't wash!	DO wash!	Controls suction
			

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Mom wants to go home for the night to rest. What should the nurse ask about before she leaves?

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If she doesn't have access to a pump at home, what can the nurse suggest? (select all that apply)

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Olivia:

Hand expression

Pumping

How to support her:

- Hand expression vs mechanical expression
- HGBP vs Home pump
- Storage containers
- Cleaning supplies
- Pumping instruction
- Cleaning Instruction
- Storage Instruction

Milk Storage

Imperative to store milk safely to ensure safety of infants and maintain the nutritional integrity of the milk



American Academy of Pediatrics Guide to Storing Fresh Breast Milk

Place	Temperature	How Long	Things to Know
Countertop, table	Room temp (up to 77°F)	Up to 4 hours is best. Up to 6 to 8 hours is okay for very cleanly expressed breast milk.	<ul style="list-style-type: none"> • Store breast milk in small batches. 2 to 4 ounces is recommended to prevent waste. • Any remaining breast milk left in a bottle after your baby is finished with a feeding should be used within 2 hours, or, if quickly refrigerated, used for the next feeding. You can always thaw an extra bag if needed.
Refrigerator	39°F or colder	Up to 4 days is best. Up to 8 days is okay for very cleanly expressed breast milk.	<ul style="list-style-type: none"> • Store breast milk in the back of the refrigerator. • To warm breast milk from the refrigerator, place the bottle in a bowl of warm water or run it under warm water. Heating breast milk in microwaves is not safe.
Freezer	0°F or colder	Up to 9 months	<ul style="list-style-type: none"> • Store breast milk toward the back of the freezer. • Breast milk expands as it freezes, so do not fill the milk all the way to the top of the storage container. • To thaw breast milk from the freezer, put the bottle or bag in the refrigerator overnight, hold it under warm running water, or set it in a container of warm water. Heating breast milk in microwaves is not safe. • Once breast milk is thawed, it can be stored in a refrigerator and must be used within 24 hours.
Deep freezer	-4°F or colder	Up to 12 months	<ul style="list-style-type: none"> • Store breast milk toward the back of the deep freezer. • Breast milk expands as it freezes, so do not fill the milk all the way to the top of the storage container. • To thaw breast milk from the deep freezer, put the bottle or bag in the refrigerator overnight, hold it under warm running water, or set it in a container of warm water. Heating breast milk in microwaves is not safe. • Once breast milk is thawed, it can be stored in a refrigerator and must be used within 24 hours.

Human Milk Storage Guidelines

STORAGE LOCATIONS AND TEMPERATURES

TYPE OF BREAST MILK	Countertop 77°F (25°C) or colder <i>(room temperature)</i>	Refrigerator 40 °F (4°C)	Freezer 0°F (-18°C) or colder
Freshly Expressed or Pumped	Up to 4 Hours	Up to 4 Days	Within 6 months is best Up to 12 months is acceptable
Thawed, Previously Frozen	1–2 Hours	Up to 1 Day <i>(24 hours)</i>	NEVER refreeze human milk after it has been thawed
Leftover from a Feeding <i>(baby did not finish the bottle)</i>	Use within 2 hours after the baby is finished feeding		

These guidelines are for healthy full-term babies and may vary for premature or sick babies. Check with your health care provider.

Find more breastfeeding resources at: WICBreastfeeding.fns.usda.gov
www.cdc.gov/breastfeeding/

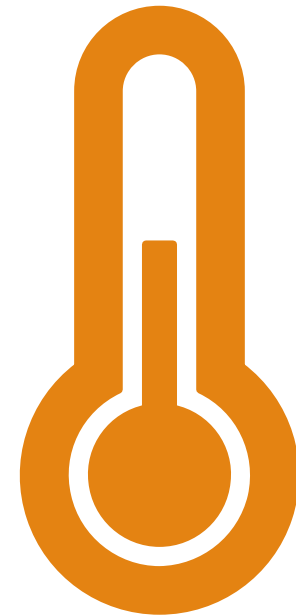


TABLE 1. MILK STORAGE GUIDELINES

<i>Location of storage</i>	<i>Temperature</i>	<i>Maximum recommended storage duration</i>
Room temperature	16–29°C (60–85°F)	4 hours optimal 6–8 hours acceptable under very clean conditions
Refrigerator	~4°C (39.2°F)	4 days optimal 5–8 days under very clean conditions
Freezer	<–4°C (24.8°F)	6 months optimal 12 months acceptable

Equipment/Supplies

- Ideally: dedicated human milk refrigerators and freezers
- Adequate storage space with ample airflow to ensure temperature regulation
- Refrigerator: 2-4 C
- Freezers: at or below -20 C
- Reliable temperature monitoring
- Alarms for temperature out of range
- Limit access to avoid waste and tampering



Storage
Suggestions

First in, First Out

Store at the bottom/back
of the freezer

Don't store in the door of
the fridge



Containers

Clean, food grade

Tight lids



Preparation

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What is the best location to prepare human milk in the inpatient setting?

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Minimizes microbial growth



Best practice: Dedicated location,
separate from patient care areas



Human Milk feedings should not be
prepared in any patient care area due
to risk of contamination

Location



Hand-washing sink with hands-free controls



3-compartment sink/commercial dishwasher (unless all preparation items are disposable)

Location

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Which are acceptable methods for thawing human milk? (select all that apply)

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Maintaining Integrity During Prep

Thawing/warming

- Waterless milk warmers
- Overnight in the fridge
- Run under/place in warm water
- Never thaw in the microwave or at room temperature
 - Risk of bacterial growth & nutrient loss

Avoid shaking to avoid denaturing proteins

Equipment/Supplies



Preparation and storage items:

Made of stainless steel or BPA-free food-grade plastic

No glass (risk of glass particles)

Single-use, disposable items usually selected due to convenience and sanitation

- Can be sterile or non-sterile



Measurements

Liquid: use containers with precise graduations (ie: syringes, liquid measuring cups)

Powder: gram scale

Staff



Best practice: dedicated staff to prep and handle HM



Hand hygiene is critical

Staff nails should be short, neatly groomed, unpolished

- Artificial nails and long natural nails: associated with *P. aeruginosa* outbreak in NICU



Recommended: gowns, gloves, hairnet



Inpatient Human Milk Room



A Word About Linguistics

MILK ROOM

MILK BANK



Benefits of Centralized Management



Decreases bedside nurse workload



Minimizes contamination risk



Decreases risk of misadministration



Inventory to raise awareness of available milk
compared to feed order

Challenges of Centralized Management



Staffing



Staff understanding of the importance of HM/processes related to HM



New processes



Tendency to freeze all milk

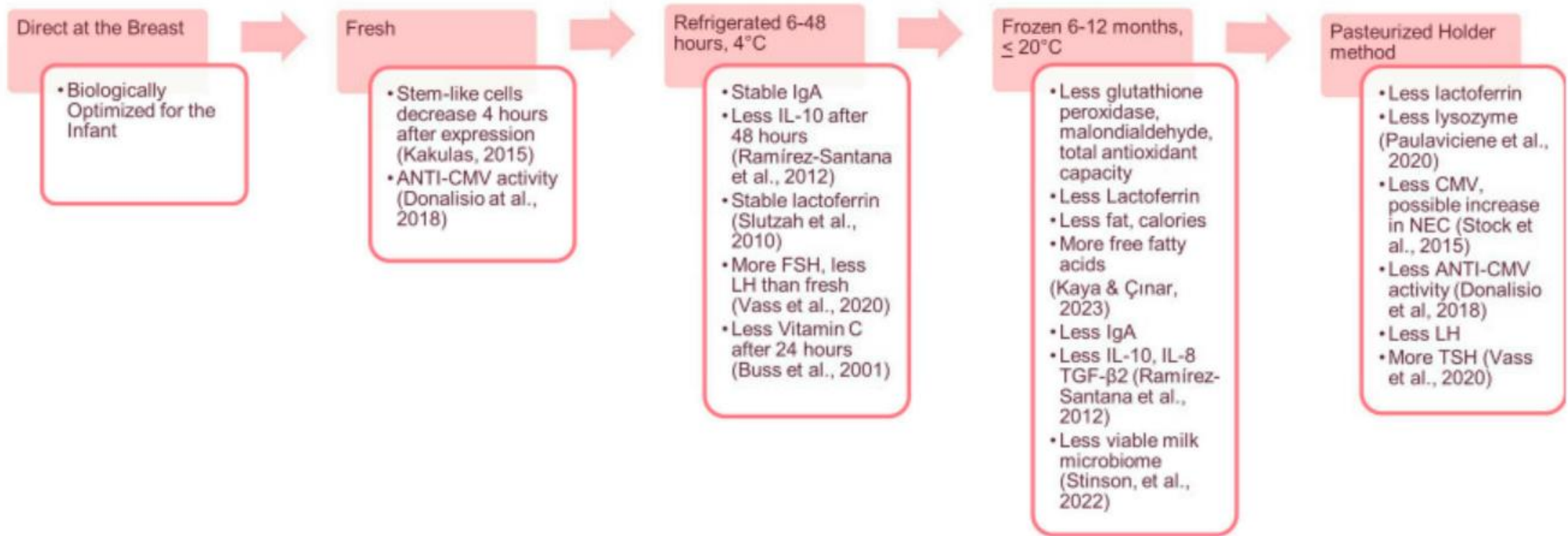


Hours/availability of milk room—impact on troubleshooting



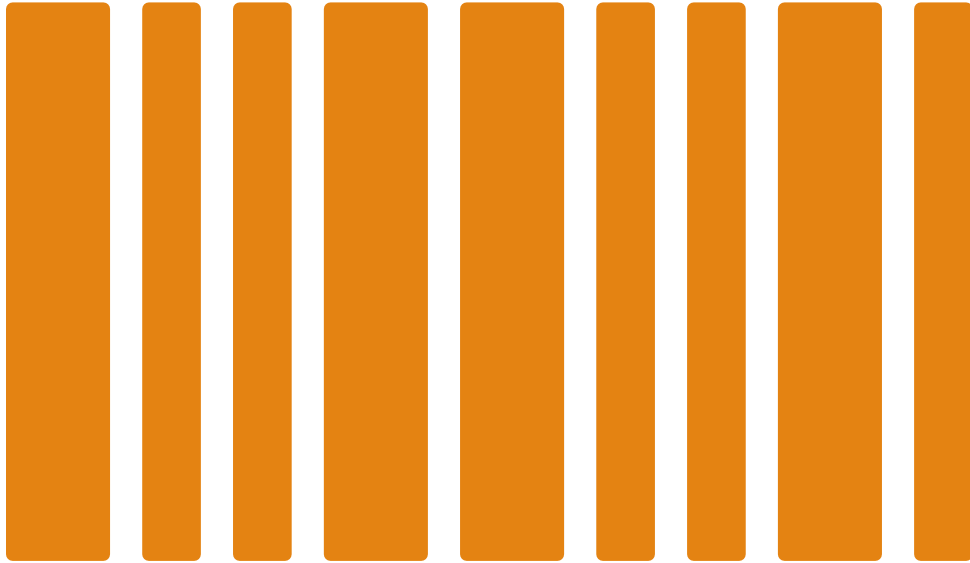
Growing pains upon opening

Composition Changes Based on Storage



Scanning

HM Barcode Scanning



- Reduce errors, improve efficiencies
- Replace manual two-person barcode verification
 - Decreases human error and confirmation bias
- Potential functions
 - Monitor expiration dates/times
 - Reduce risk of fortification errors by allowing automated fortification calculations and fortifier/additive scanning
 - Lot # tracking for PDHM/fortifiers/additives

BREAST MILK LABEL

INFANT NAME: _____

MRN: _____

COLLECTED DATE: _____ TIME: _____

THAWED: DATE: _____ TIME: _____

ADDITIVES: _____

MV07

BREAST MILK: MV06FP5314

Fresh _____ Frozen _____

THAWING: Date: _____ Time: _____

ADDITIVES: Date: _____ Time: _____

EXPRESSED BREAST MILK

MOTHERS NAME : _____

BABY'S NAME & DOB : _____

HOPITAL NUMBER : _____

DATE & TIME OF MILK

* EXPRESSED : _____

* REMOVED FROM FREEZER : _____

* FULLY DEFROSTED : _____

* EXPIRES : _____

BREAST MILK FORTIFIER **AMOUNT**

Date Added _____

Time Added _____

SIGNATURE _____

Bottle Label

 B2379

Mother: 376456201
Jane Doe

Medications? Yes[] No[]

EBM
Enter Date Time Pumped

For Enteral Use Only. Refrigerate until use.



Julie ANDREWS
20 days

BREAST MILK NORMAL TYPE

50ml



1456893032

Milk Management Systems

Risks of Inpatient Feeding Preparation

Barcode scanning through a medication administration technology still has potential for misadministration errors

- Dependent upon self-reporting: not all safety errors are captured

Risks of contamination throughout the preparation process for HM & formula

282 potential safety failure points exist throughout the process in hospital environments

480 errors prevented (average 3.7 per week) over 2.5 years in a Level IV NICU when formulas and fortifiers were incorporated into scanning

Benefits of Milk Management Systems

Enhanced
recipe
accuracy

Decreased
contamination

EHR
integration

Inventory
viewing

Prevents
expired milk
administration

Decreased
staff burden

Charts feeding
data

Challenges of Milk Management Systems

Process changes &
change management

- Impact on Feeding, Oral Care, etc.

New equipment
need (printers,
computers, etc)

Technology
reliability

Learning curve for
staff

Macrosystem
decision making vs
reality of the end
user experience

Summary

There are many reasons a parent would pump instead of feed at the breast/chest and the type of pump the parent needs will vary based on their and their baby's situation

When parents are pumping in the inpatient setting, appropriate support consists of educational support (such as from an IBCLC, RN, MD, etc) and structural support

When considering management of milk in the inpatient setting, the top priorities for all decisions should be safety and maintaining milk integrity

While not without challenges, centralized milk management and milk management technology are both recommended practices for human milk management in the inpatient setting, especially in NICU

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