Lactation Management Self-Study Modules

Level I

Third Edition
2009

Prepared for Wellstart International
by
Audrey J. Naylor, MD, DrPH, FAAP, FABM
and
Ruth A. Wester, BA, RN, PNP

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Wellstart International
PO Box 602
Blue Jay, CA 92317
E-mail: info@wellstart.org
Website: www.wellstart.org

We are guilty of many errors and faults,
but our worst crime is abandoning the children,
neglecting the foundation of life. Many of the
things we need can wait. The child cannot.
Right now is the time his bones are being formed,
his blood is being made and his senses
are being developed. To him we
cannot answer 'tomorrow'.
His name is Today.

Gabriele Mistral

Dedication

This Third Edition of Wellstart International's Lactation Management Self-Study Modules, Level 1 is dedicated to all of the mothers, fathers and families who are raising the next generation of the world's citizens. Whether they live in urban or rural settings, developed or developing nation, are rich or poor, they deserve our respect and well prepared services and support at all times.

About Wellstart International …

Wellstart International is a nonprofit organization with (501) (C) (3) tax deductable status. It was launched originally as the San Diego Lactation Program (SDLP) in 1979-1980. Initially the SDLP was within the Department of Community and Family Medicine of the University of California San Diego Medical School and was a component of the perinatal services and teaching of the University of California San Diego Medical Center. In 1983 with funding from the United States Agency for International Development (USAID) SDLP added an international faculty education and development program, The Lactation Management Education Program (LMEP). The program design included bringing multidisciplinary, leadership level teams of health care providers (OB, Pediatricians, Family Practitioners, Nurses, Nurse Midwives and Nutritionists) from teaching hospitals from several countries together for 3 weeks of lactation management education and skill development and 1 week of planning a program that they would undertake upon returning home. A follow-up visit was provided to their home site at the invitation of the team sometime after their program was underway. The conversion of the SDLP to an independent nonprofit organization, Wellstart International, and a move to a nearby but separate location occurred in 1985.

A primary objective of LMEP was to create a “cascade” of skilled and knowledgeable leaders in medical, nursing and nutrition education that could make needed changes in their curriculum as well as the services provided to mothers and babies that would promote successful breastfeeding. The program was considered quite successful and in the 15 years of continuation, 655 health care providers from 55 countries (including the United States) became Wellstart Associates. A follow-up study of 40 of these Associates undertaken at the request of UNICEF in 2003 suggested that the program through the cascade of training approach, had changed the care given to mother-baby pairs in hundreds of hospitals, modified curriculum in a significant number of professional training programs, contributed to hundreds of thousands of secondary training events and contributed to the global expertise regarding lactation management.

Since 1985, Wellstart, as an organization or through staff participation has also been very active and influential in many global events related to the protection, promotion and support of optimal infant and young child feeding. These include the development of the “Ten Steps”, Innocenti Declaration of 1990 and 2005, WABA and World Breastfeeding Week, The Baby Friendly Hospital Initiative, The United States Breastfeeding Committee and the development of the Academy of Breastfeeding Medicine. As will be further described in the foreword, Wellstart also has considerable experience in developing a number of useful teaching techniques and tools.

Since the conversion of the SDLP to Wellstart International in 1985, the organization has maintained an office in California but has had additional offices in Washington DC, and Cairo, Egypt. At the present time administrative tasks are carried out in California and programmatic activities are planned and coordinated in Vermont.

About the Authors….

Audrey Naylor

Audrey Naylor is a board certified pediatrician with additional training in infant development, maternal and child health and epidemiology. In addition to receiving a degree in Medicine from the University of California Los Angeles School of Medicine, she also holds a DrPH in Epidemiology (with a major focus on perinatal care) from UCLA School of Public Health. She has a lifetime professional interest in maternal, infant, and family health promotion, preferring to prevent rather than treat disease.

In 1985, with Ruth Wester, she co-founded, Wellstart International, a nonprofit organization established to educate health care providers (medical and nursing students as well as perinatal specialty residents), in the "why and hows" of optimal infant and young child feeding. She has been instrumental in both international efforts as well as those focused primarily in the United States to promote breastfeeding as the normal way to feed infants and young children.

She is a founding member of the Academy of Breastfeeding Medicine, the World Alliance of Breastfeeding Action, the United States Breastfeeding Committee and the Section on Breastfeeding of the American Academy of Pediatrics. She is also an experienced medical school educator and has been a member of several medical school faculties including Ohio State University College of Medicine, The University of Southern California School of Medicine, and The University of California San Diego School of Medicine. She is currently a Clinical Professor of Pediatrics (Voluntary, part-time) at the University of Vermont College of Medicine.

Ruth Wester

Ruth Wester is a registered nurse with extensive experience in both inpatient and outpatient pediatric nursing. She also was the Head Nurse of the Marion Davies Pediatric Clinic, a highly regarded teaching and service clinic at UCLA. While serving UCLA, she accepted an opportunity to train as a pediatric nurse practitioner (PNP) and subsequently served the clinic as both the Head Nurse as well as a PNP.

In 1978, she accepted a position as the normal newborn discharge nurse and Assistant Professor of Pediatrics at UCSD Medical Center in San Diego and began to instruct medical students and residents about breastfeeding and lactation management. With Dr. Naylor, she co-founded Wellstart International and has provided service to many thousands of breastfeeding families and taught lactation management to medical and nursing students as well as residents and faculty all over the world. She is an expert in the field of lactation management education.

Contents

Annexes

Alphabetic Listing of References

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Acknowledgements

First Edition, 2000

A First Edition is always the inspiration of all future editions. The creation and development of the First Edition of the Wellstart International Lactation Management Self-Study Modules, Level I in 2000 would not have been possible without the input and effort of a number of talented people. We would like to express our continuing gratitude to the following individuals who assisted with that document:

Eyla Boies, MD, Clinical Associate Professor of Pediatrics, University of California, San Diego
Elizabeth Creer, RN, FNP, MPH, Wellstart International faculty
Pamela Deak, MD, Division of Obstetrics and Gynecology, University of California, San Diego
Donata Eggers, BS, RD, Instructor, Department of Pediatrics, Southern Illinois University
Stephanie Gabela, MPH, RD, Wellstart International faculty
Helen Moose, MS, CNM, Instructor, Department of Family and Community Medicine, Southern Illinois University
Victoria Nichols-Johnson, MD, Associate Professor, Division of General Obstetrics and Gynecology, Southern Illinois University
Janine Schooley, MPH, Wellstart International, Project Manager
Kirsten Searfus, MD, Assistant Professor, Division of Family Medicine, University of California, San Diego
Kim Solis, Wellstart International Assistant Project Manager
Yvonne Vaucher, MD, MPH, Clinical Professor of Pediatrics, Division of Neonatal/Perinatal Medicine

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Second Edition, 2005

As is usually the case, the Second Edition was developed on the basis of the content of the First Edition. Several members of the original team of talented people participated in creating the revisions for the second edition. We gratefully thank Yvonne Vaucher, MD, MPH, Clinical Professor of Pediatrics, Division of Neonatal/Perinatal Medicine, University of California, San Diego who encouraged and gave many hours to this effort as well as Kirsten Searfus, MD, Assistant Professor, Division of Family Medicine, University of California, San Diego for their support.

A special thanks also goes to Maria Elena Sandoval, Wellstart International Administrative Manager, for her skill, patience and extra effort in helping to prepare the second edition

Finally, we would like thank Denise Sofka, RD, MPH of the US Department of Health and Human Services, Health Resources and Services Administration, Maternal and Child Health Bureau, for her continuing encouragement of Wellstart International and of the preparation of both the first and second editions of this teaching tool.

Audrey J. Naylor, MD, DrPH, F.A.A.P., F.A.B.M.
President and CEO
Wellstart International
Clinical Professor (non-salaried), Pediatrics and Familiy Medicine
University of California San Diego School of Medicine

Ruth A. Wester, BA, RN, PNP
Vice-President
Wellstart International

San Diego, California
2005

Third Edition, 2009

In planning for this Third Edition of Wellstart's Self-Study Modules, Level I, it was important to assure that the information was not only current but that it could be used internationally. Thus this edition has also been carefully reviewed for final suggestions, corrections and international relevance by an outstanding team of 30 volunteer reviewers and contributors from all over the world. The following list includes these colleagues who have significant teaching experience in medical, nursing and pharmacy schools and residency training programs as well as providing service to breastfeeding mothers and babies around the world. Many are Wellstart Associates (*) or faculty members who taught in Wellstart International's Lactation Management Education Faculty Development Program (**).

Phillip Anderson, D.Phar **
Health Sciences Clinical Professor
UCSD Skaggs School of
Pharmacy and Pharmaceutical
Science, San Diego, California,
USA

Nadia Badwari, MD*
Professor of Pediatrics, Cairo University,
President of Arab Network for Quality
Assurance in Higher Education, Cairo,
Egypt

Eyla Boies,MD**
Clinical Professor of Pediatrics, UCSD
School of Medicine
Medical Director of Premature Infant
Nutrition Clinic, San Diego, California,
USA

Carmen Casanovas,MD, MPH*
Technical Officer NHD/NPL
World Health Organization
Geneva,
Switzerland

Judy Canahuati, MPh,*
Nutrition and HIV Advisor Office of Food
for Peac, United States Agency
for International Development
Washington, D.C.
USA

Wirapong Chatranon, MD*
Professor Emeritus (Pediatrics), Faculty of
Medicine, Siriraj Hospital, Mahidol
University
Former Senior Consultant for
Implementing BFHI, UNICEF for Asia, and
Pacific Region, Bangkok
Thailand

Sarah Coulter-Danner, RN,CNM, CPNP
Adjunct Faculty, Department of
Nursing, Salish Kootenai College,
Pablo MT, Former Chairperson,
Department of Nursing, Oglala
Lakota College, Pine Ridge, SD,
USA

Patrice DeMarco, RN
Lactation Consultant
Fletcher Allen Health Center, Burlington,
Vermont
USA

Lawrence Gartner, MD **,
Professor Emeritus, Departments of
Pediatrics and OB/GYN, University of
Chicago, President of MedWord
Valley Center, California,
USA

Angela Gatzke-Plaman, MD
Resident in Family Practice, University of
Vermont College of Medicine, Burlington,
Vermont,
USA

Veronica Gomez, MA,*
Breastfeeding Program Manager,
Ghana Health Service, Accra,
Ghana

Tom Hale, RPh, PhD
Professor, Department of Pediatrics,
Texas Tech University Health Sciences
Center, School of Medicine
Amarillo, Texas
USA

Zeinab Heada,MD,*
Component Manager, RH/HIV,Care
International, Cairo,
Egypt

Elisabet Helsing, PhD**
Former Regional Adviser, WHO Regional
Office for Europe, Copenhagen and Senior
Adviser, Norwegian Board of Health, Oslo,
Norway

Elizabeth Hunt, MD
Clinical Associate Professor and Newborn
Hospitalist
Department of Pediatrics
University of Vermont
Burlington, Vermont
USA

Rose Kast, RN,
President
Momma's Pumps
Carlsbad, California,
USA

Ruth A. Lawrence, MD**
Professor of Pediatrics, Obstetrics and
Gynecology, Department of Pediatrics,
University of Rochester School of
Medicine and Dentistry
Rochester, New York,
USA

Cecila Muxi, MBA,*
Nutritionist
National Program of Infant Health
Ministry of Health of Uruguay
Montevideo,
Uruguay

Roxana Saunero Nava, MD*
Pediatrician, Docente Instructor de pre y post grad Hospital Materno Infantil, Caja Nacional de Salud
Directora Ejecutiva de COTALMA, Secretaria Permanente de Comité Nacional de Lactancia, La Paz,
Bolivia

Ketevan Nemsadze, MD,*
Professor,Tbilisi State Medical University, Pediatric Department
Director of M.Lashvili Children's Central Hospital, Tblisi,
Georgia

Victoria Nichols-Johnson, MD, MS,*
Associate Professor of OB/Gyn, Chief of the Section of Maternal Nutrition and Metabolism, Southern Illinois University School of Medicine, Springfield, Illinois,
USA

Sallie Page-Goertz, MN ARNP*
Clinical Associate Professor
Department of Pediatrics
Kansas University School of Medicine, Kansas City, Kansas,
USA

Marina Rea,MD, PhD*
Consultant, Instituto de Saude, Saude do Estado de Sao Paulo
Sao Paulo,
Brazil

Clavel Sanchez,MD,MPH*
Coordinadora de la Comision Nacional de Lactancia Materna,Santo Domingo
Dominican Republic

Felicity Savage-King, BM, Bch Oxon, FRCPCH, FABM**
Honorary Senior Lecturer, Institute of Child Health London, Leeds,
United Kingdom

Wendelin Slusser, MD**
Assistant Clinical Professor, UCLA School of Medicine, Director of the UCLA Breastfeeding Resource Program, Co-Director of the Community Health and Advocacy, UCLA Residency Program
Los Angeles, California,
USA

Lisa Stellwagen, MD
Associate Professor of Clinical Pediatrics, UC San Diego School of Medicine, Director of Newborn Service, Lactation Director of the SPIN Program,
San Diego, California,
USA

Teresa Toma, MD,*
Pediatrician Researcher , Instituto de Saude, Secretaria de Saude do Estado de Sao Paulo,
Brazil

Veronica Valdes, MD,*
Pediatrician, Former Adjunct Associate Professor of Family Medicine at the Catholic University and Consultant for UNICEF Chile, Argentina and Uruguay,
Santiago,
Chile

Yvonne Vaucher,MD, MPH
Professor of Pediatrics and Attending Neonatologist, Director, Infant Special Care Follow-Up Program, UCSD School of Medicine, San Diego, California,
USA

These colleagues have done an outstanding job of helping to assure that this tool is current, and international in scope. They have our most sincere and heartfelt thanks.

Finally, once again, thanks goes to Maria Elena Sandoval for helping to prepare this Third Edition of Wellstart's Lactation Management Self-Study Modules, Level I.

Audrey J. Naylor, MD, DrPH, FAAP, FABM
President and CEO
Wellstart International
Clinical Professor of Pediatrics (vol part-time)
University of Vermont College of Medicine

Ruth A. Wester, BA, RN, PNP
Vice-President
Wellstart International

Shelburne, Vermont
April 2009

Foreword

In a series of articles published in Lancet in 2003 it is noted that some 13% of the 9.5 million annual deaths in the world among children under 5 years can be prevented or significantly decreased in severity by breastfeeding exclusively for six months and then adding appropriate nutritious complimentary foods. The majority of these deaths occurred in the less economically developed nations of the world. In addition, however, breastfeeding is now well accepted as a very effective evidenced based primary health care strategy in developed nations for improving both the immediate health and well being of mothers, infants and children as well as lowering the risk of a significant number of chronic diseases of older children and adults. (Figure 1)

Figure 1

Percent Lowered Risk of Specified Conditions in Developed Countries for Mothers and Babies who Breastfeed*

Conditions in Infants and Children

➢ Lower Respiratory Tract Infections	72%
➢ Gastrointestinal Infections	64%
➢ Otitis Media	50%
➢ Atopic Dermatitis	42%
➢ Asthma	27%, 40%
➢ Diabetes	
▪ Type 1	19%, 27%
▪ Type 2	39%
➢ Obesity	7%, 27%
➢ SIDS	36%
➢ Childhood Leukemia	15%, 19%

Conditions of Mothers

➢ Breast Cancer	28%
➢ Ovarian Cancer	21%

***From: Ip S, Chung M, Raman G, Chew P, Magula N, DeVine D, Trikalinos T, Lau J. Breastfeeding and Maternal and Infant Health Outcomes in Developed Countries, Evidence Report/Technology Assessment No. 153 (Prepared by Tufts-NewEngland Medical Center Evidence-based Practice Center.) AHRQ Publication No 07-E007. Rockville, MD: Agency for Healthcare Research and Quality. April 2007**

Thus when breastfeeding, a biologically normal reproductive process and way to feed human infants and young children, is supported as a basic component of optimal infant and young child feeding (OIYCF, Figure 2) individual, family and community health can be significantly improved globally.

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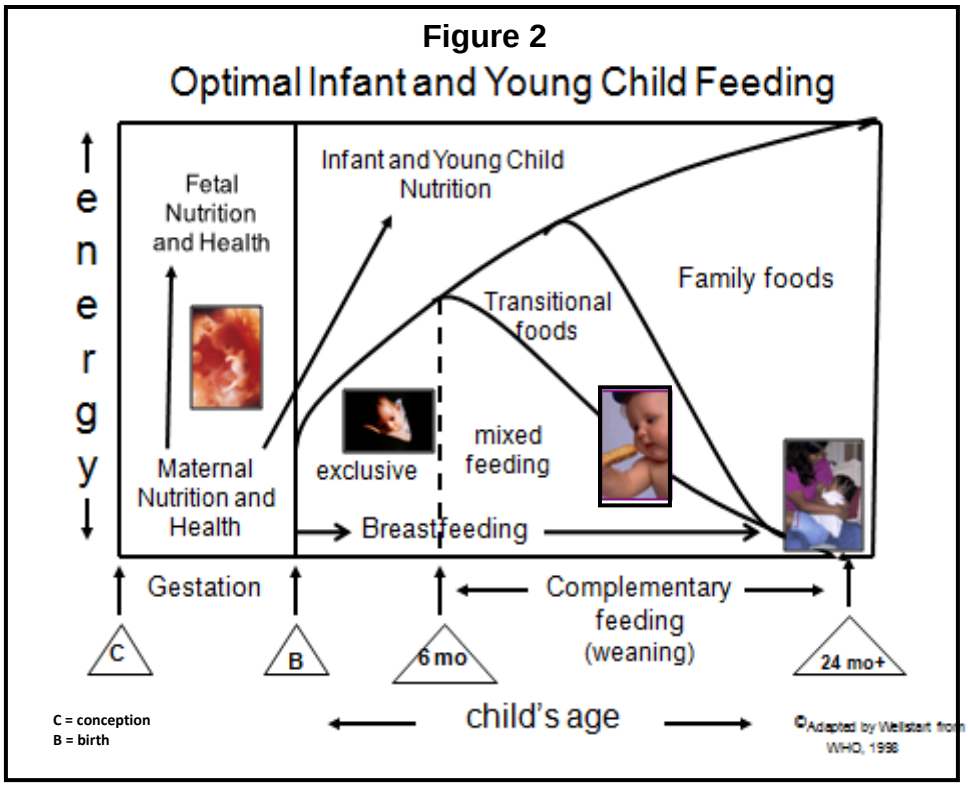
Figure 2



There are, of course, many influences on achieving OIYCF. Among these are health care providers with knowledge and skill of lactation management and breastfeeding support . Unfortunately many health care providers have only a limited knowledge of this topic. An important reason for this lack of knowledge is that many schools of medicine and nursing as well as nutrition programs have not included lactation management education in their curricula.

Lactation Management Curriculum

In 1985, to assist in meeting this need for curriculum content in lactation management, Wellstart International began providing education and training in lactation management and breastfeeding promotion for both students and faculty of the health professions. In 1999, with funding from The United States Maternal Child Health Bureau of the Health Resources and Services Administration and in collaboration with the University of California San Diego Medical School, Wellstart developed **the *Lactation Management Curriculum: A Faculty Guide for Schools of Medicine, Nursing and Nutrition* (LMCG),** now in its fourth edition.

The LMCG was developed to facilitate the integration of lactation management knowledge and skills into the curriculum of medicine, nursing and nutrition programs. It is a competency based tool and provides guidance in curriculum assessment, content suggestions and resources for three levels of professional responsibility. **Level I** provides basic knowledge needed by all health care providers to be supportive of normal mothers and their healthy full term infants. **Level II** includes more clinical detail for complex situations and is targeted at those who practice one of the perinatal specialties (pediatrics, obstetrics, family medicine, neonatology, etc). **Level III** is designed for those who will specialize in breastfeeding medicine and will serve as key faculty in leadership positions. (Figure 3)

Content Focus of Modules	**Level I** Basic Knowledge Needed by All Health Care Providers	**Level II** Perinatal Care'I. Providers	**Level III** Breastfeeding Medicine Specialists and Faculty
Module 1 Scientific Basis			
Module 2 Clinical Management			
Module 3 Professional Practice			

Figure 3. Lactation Management Curriculum - Schematic Diagram

Level I

All health professionals regardless of whether or not they specifically provide care for breastfeeding mothers and infants should attain **Level I** knowledge and skills during their initial preparatory (preservice) program. Before entering the practice of their profession, they should have an understanding about the scientific basis for encouraging and supporting breastfeeding, the physiology and basics of clinical management of lactation for normal mothers and newborns and the societal influences on lactation and breastfeeding promotion. They should be able to provide health care that supports breastfeeding initiation and maintenance, and avoids creating barriers. While they need to be aware of the principles of lactation management, they do not necessarily need to attain clinical expertise in the area.

Lactation Management Self-Study Modules, Level I

Though the LMCG achieved considerable success, limitations of available time in a preservice health provider curriculum led to a recommendation by early users that a level I tool be developed that could be completed in a few hours and at a time and place of the student's choosing. With further support from The Maternal Child Health Bureau of the Health Resources and Services Administration, a set of three clinically oriented,competency based, self-study modules was developed to help students achieve **Level I** knowledge. Initially published in 2000, the *Lactation Management Self-Study Modules, Level I* have been revised and updated twice (2005 and 2009) to incorporate important new evidenced based knowledge and skills

These modules are particularly focused on the breastfeeding component of optimal infant and young child feeding. Scientific evidence for recommending breastfeeding, a review the physiology and basic management strategies to support lactation and breastfeeding and solutions to common problems are included. They provide a self-contained unit of basic knowledge that can be utilized by faculty, students, and other health care professionals in a variety of settings. They can be assigned during clinical rotations in pediatrics, family medicine, nutrition, obstetrics, and community health or as an elective course. Each institution can decide where the modules would have the most impact in their curriculum. They can also be used by those already in practice whose professional training did not include these topics or wish to have a review of the basics.

For this Third Edition, an annex has been added which provides a number of useful reference documents. These include an updated summary of key clinical points from the Modules called *Highlights, WHO's 2009 Acceptable Medical Reasons for Use of Breastmilk Substitutes, Infant feeding in Emergencies, Ten key points of The International Code of Marketing of Breastmilk Substitutes and Relevant World Health Assembly Resolutions, How to Store Human Milk (Protocol #8 from The Academy of Breastfeeding Medicine), Guidelines for Hand Expression* and *Websites of Interest.*

As was said in the opening paragraph of this Foreword to the Third Edition of the Self-Study Modules, establishing breastfeeding as a biologically normal reproductive process and way to feed human infants and young children will have a major impact on improving individual, family and community health globally. Knowledgeable health care providers are fundamental to achieving this goal and preservice education is the foundation to this knowledge. In order to encourage this "revolution" in preservice education, Wellstart International has made a decision to provide this Third Edition on it's web site as a downloadable teaching/learning tool without charge. We only ask that users take this opportunity seriously: read the material carefully and assume responsibility for providing the evidence based care that is explained and recommended. Become part of the solution that will help of children and their families survive and live life to the fullest.

References

1. Black,RE, Morris, SS, Bryce, J. Where and why are 10 million children dying every year? (2003) The Lancet; 316;2226-2234
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3. Ip. S, Chung, M, et al. (2007) Breastfeeding and Maternal and Infant Health Outcomes in Developed Countries. Evidence Report/Technology Assessment No 153. AHRQ Publication No 07-E007. Agency for Healthcare Research and Quality.
4. Wellstart International and the University of California San Diego(1999). Lactation Management Curriculum: A Faculty Guide for Schools of Medicine, Nursing and Nutrition, Fourth Edition. San Diego,California; Wellstart International
5. World Cancer Research Fund/American Institute for Cancer Research (2007). Food, Nutrition, Physical Activity, and the Prevention of Cancer: A Global Perspective. Washington, DC: AICR, 2007

Lactation Management Self-Study Modules, Level I
Faculty Guide

These **Level I** Modules are designed to be used during the beginning of clinical assignments or by those who have not had previous exposure to **Level I** content. They have also been useful as a review of the basics. They can be used as the entire content of a course or as a part of a course. For example, this material may be assigned as part of required clinical experiences in newborn and/or maternal care or as part of an elective or independent study. The manner in which these tools are used is up to the responsible faculty. Faculty are also encouraged to incorporate local or regional concerns into the experience of the participants. For example, in some areas of the world, HIV and AIDs are a major concern and may warrant more detailed special attention. Or perhaps the most commonly used human milk substitute is cow milk rather than a commercial formula requiring appropriate information and comparisons.

Regardless of whether they are used as a course or are part of a course, the Modules can be studied by the users at a time and place most convenient for the user. Though faculty involvement is not required, experience with the first and second editions suggests that users are likely to gain greater knowledge when guided by an interested faculty member. Experience has also indicated that medical students and residents are most responsive when the responsible faculty member and role model is a physician. For nursing students, a faculty member from the school of nursing is most effective.

While the modules can be done independent of one another, they are best reviewed in sequence. Thus a student may have time to complete Module 1 and later undertake Module 2 and even later, Module 3. A test of knowledge is included in the tool as well as answers that are briefly explained. Many faculty have found it useful to have students take the test as a pre-test and then a post test for comparison with the pre test scores. In addition, each module has a set of references that can be utilized for selecting assigned readings if so desired by responsible faculty.

The format of the modules provides application of the material by means of short case exercises. The information in the modules and the case exercises will be enhanced by a structured clinical experience such as bedside rounds where students can apply their new knowledge to a realistic setting. A clinical instructor, experienced in lactation management, should help the student carry out the breastfeeding assessment and problem solving steps.

Experience with the first and second edition has indicated that the three modules can be completed within a 6 to7 hour time frame including reviews of two or three short DVDs or videos. Additional time will be required for the clinical experiences, essential to enhance application of the knowledge to real mother/infant situations.

Faculty Preparation

Faculty members who will direct or coordinate this self-study learning experience need to work through the modules to become familiar with the content, exercises, and accompanying materials. Ideally responsible faculty who plan to use this tool should be prepared at Level II or III. If faculty do not feel adequately prepared, enrollment is recommended in one of the workshops frequently provided by several organizations including the Academy of Breastfeeding Medicine (ABM), American Academy of Pediatrics (AAP), La Leche League's Physician's Seminar or other faculty development workshops. For those who will be working with students who intend to pursue certification by the International Board of Lactation Consultant Examiners, the workshops carried out by International Lactation Consultant Association (ILCA) workshops would be helpful. These workshop opportunities are announced by the sponsors on their organizational websites provided in annex G.

If enrollment in such workshops is not possible, the course, *Increasing Breastfeeding Success: Why It Matters and What the Research Shows* prepared by the Physician Lactation Education Collaborative of Washington State provides much Level 2 information and is made available at minimal cost. Information about obtaining this material can be obtained at: www.withinreachwa.org. Recently the AAP made their Residency Curriculum available on their web site (www.AAP.org/breastfeeding) . Much of this material is available without charge, though some recommended items (such as training videos/DVDs can be obtained for a fee from other sources. This would also help prepare faculty at Level II. Though neither the Washington State Physician's Collaborative nor the AAP Residency Curriculum material is intended to be a self-study course, both offer information and tools that can be helpful to someone who is already reasonably knowledgeable.

Teaching Resources

1. Textbooks

It is also recommended that faculty assigned to direct or coordinate an experience using the Wellstart Self-Study Modules, have the following references available. The first three texts are particularly intended for physicians. The reference by Jan Riordan is also very often used in physician training but especially useful in programs focused on nursing students.

a. American Academy of Pediatrics and the American College of Obstetricians and Gynecologists (2006) *Breastfeeding Handbook for Physicians*. AAP, Elk Grove Village, Il and ACOG, WDC.

b. Hale, TW. Hartman, PE. (2007) *Textbook of Human Lactation, First Edition*, Amarillo, TX. Hale Publishing, L.P.

c. Lawrence RA and Lawrence RM (2005) *Breastfeeding, A Guide for the Medical Profession, Sixth Edition*, St. Louis, MO: Mosby, Inc.

d. Riordan J (2005) *Breastfeeding and Human Lactation, Third edition,* Boston, MA: Jones and Bartlett Publishers, Inc

2. References

At the end of each of the three modules a list of relevant references for the content of the particular module is provided. These have also been put together as an alphabetized list in the annex included at the end of this tool.

WHO has recently developed and made available a "Model Chapter on Infant and Young Child Feeding" for textbooks for medical students and allied health professionals. This material is intended for perinatal health professionals. The chapter can be reviewed and downloaded without charge at the following website:

www.who.int/nutrition/publications/infantfeeding/9789241597494/en/index.html

3. DVDS

Having an opportunity to visualize some of the techniques and skills described in Modules 2 and 3 of this Level I Self-Study tool can be particularly helpful to user of this tool. Several short DVDs regarding immediate breastfeeding at birth and how to assist a new mother-baby couple with achieving an effective, comfortable attachment or latch-on are available. Medical and nursing schools frequently maintain a library of teaching tools and may already have something appropriate in their collections. If that is not the case, faculty responsible for directing a program in which the Self Study Modules will be utilized are urged to consider reviewing and possibly obtaining one or two of the several relevant DVDs that are currently available. Titles and web sites where further information may be obtained include:

a. *Initiation of Breastfeeding by Breast Crawl*
    i. http://breastcrawl.org/video.htm

b. *Delivery Self Attachment with Dr. Lennart Righard*
    i. www.geddesproduction.com/breast-feeding-delivery-selfattachment.php

c. *Baby-Led Breastfeeding: The Mother Baby Dance with Christina M. Smiley, MD*
    i. www.geddesproduction.com/breast-feeding-baby-led.php

d. *Making Enough Milk, the Key to Successful Breastfeeding: Planning for Day One* with Jane Morton, MD
    i. www.breastmilksolutions.com/making_enough.html

e. *Latch 1,2,3: Troubleshooting Breastfeeding in the Early weeks*
    www.healthychildren.cc (note: from the menu on the left select "Breastfeeding Information Links" to find information regarding this DVD)

Module One

Breastfeeding: A Basic Health Promotion Strategy in Primary Care

Objectives

After completing this module, you will be able to:

1. Describe the reasons why breastfeeding is important as well as evidence based risks of not breastfeeding for the infant, mother, family and community at large.
2. Identify factors that contribute to the breastfeeding decision.
3. Counsel a woman about breastfeeding.

Introduction

All mothers want to provide what's best for their babies and often turn to their health care provider for advice. This module will help prepare you for this discussion by reviewing human milk composition and some of the major benefits of breastfeeding for infant, mother, family and the community. Some of the factors that influence how women make their infant feeding choice will also be described.

Case Exercise

Veronica, a 26-year-old woman, has come for a prenatal visit. You join her in the consultation room and begin to review the history form she filled out in preparation for her visit with you. You note that she has not answered the question regarding how she plans to feed her new baby. When you inquire about this, she responds that she hasn't thought about it as yet and would like to talk about what would be best. Many of her friends have told her that it really doesn't matter how she feeds her baby…

What do you need to know to advise this mother?

Aren't baby formulas nearly the same as mother's milk?

The answer is of course "no". Human milk is specific to the human species, a dynamic and complex biological fluid containing over 200 active constituents including immuno-protective agents, enzymes, hormones, vitamins, growth and other factors as well as essential nutrients in perfect balance for the growth and development of human infants. It changes in composition during a feed, from feed to feed during the day, and over time as the growing infant's needs change.

WELLSTART INTERNATIONAL
Breast milk changes in appearance over time.

Human Milk Composition

Colostrum

Colostrum is a thick, yellowish fluid present in the breast during pregnancy and for about the first 2 to 4 days after birth. It differs from mature milk in many respects (**Table 1-1)** and is a blend of prepartum breast secretions, which begin to accumulate in the breast from about the twentieth week of pregnancy (lactogenesis stage I), and new secretions resulting from the effects on the breasts of hormonal changes surrounding labor and delivery. Though small in quantity (40-50 cc during the first 24 hours), colostrum provides an ideal nutrient and immunological substance to help assure the newborn's successful transition from the protected sterile intra-uterine environment to the non-sterile extra-uterine environment. Colostrum contains much more protein and much less fat and lactose compared to mature milk and is particularly rich in beta-carotene, a precursor of vitamin A, which gives colostrum its yellow color. Vitamin A is important for protection against infection and for early retinal development. It also contains white cells which also help prevent infection in the newborn.

TABLE 1-1
Comparison of Colostrum (day 1) and Mature Human Milk*

Constituent (**per liter**)	**Colostrum**	**Mature Milk**
Energy (k cal)	670	750
Lactose (g)	20.0	35.0
Protein (g)	32.0	9.0
Fat (g)	12.0	38.0

*Data adapted from Lawrence and Lawrence (2005), pp 110 and tables 4-5 and 4-7, pp113

The protein content of colostrum is largely a concentration of immunoglobulins, especially secretory immunoglobulin A (sIgA). As noted in **Table 1-2**, during the first twenty-four hours after delivery, colostrum includes an estimated 80 mg of IgG, 120 mg of IgM and 11,000 mg of sIgA, and can provide the breastfed infant with a powerful passive immunization against bacterial and viral infections. Although the concentration of immunoglobulins decreases in transitional and mature milk, a significant quantity of immunological protection continues to be transmitted to the infant throughout the duration of breastfeeding.

TABLE 1-2
Immunoglobulins in Human Milk

	Output - mg/24 hours		
Day Postpartum	**IgG**	**IgM**	**IgA**
1	80	120	11,000
3	50	40	2,000
7	25	10	1,000
8 – 50	10	10	1,000

Adapted from: Remington JS and Klein JO (2001) *Infectious Diseases of the Fetus and Newborn, Fifth Edition.* Philadelphia, WB Saunders Co.

Breastfeeding immediately after birth and receiving the protection of colostrum.

Colostrum also provides lactose which prevents hypoglycemia and facilitates the passage of meconium, which in turn aids in the excretion of bilirubin. Even if a mother decides not to breastfeed, it is desirable to encourage her to provide colostrum to

assure that her infant receives the transitional protection only available in this maternal substance. Colostrum is often considered the “first immunization”.

Mature Human Milk

The development of the breast tissue and secretion colostrum and milk actually begins about the 12th week of pregnancy and extends until shortly after delivery. This first stage is known as lactogenesis I. Lactogenesis II begins to occur between the 2nd and 4th postpartum day and is characterized by the milk “coming in” in greater quantity. The mother notes that her breasts feel full, and the baby’s swallowing pattern becomes more distinct.

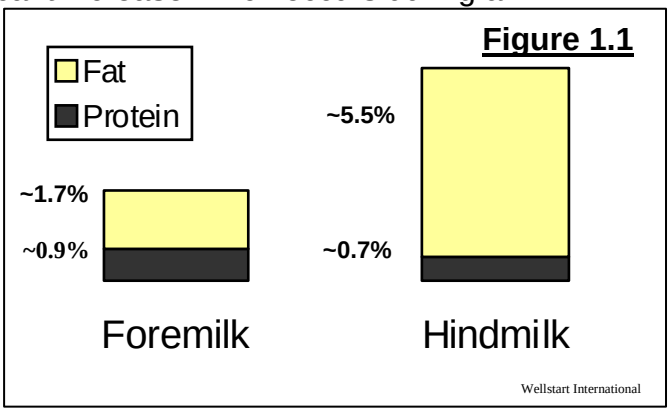
Approximately 7 to 10 days after delivery, milk is defined as ”transitional”. By 14 days milk is considered “mature”. A volume of 600-900 ml can eventually produced every 24 hours and has a biochemical composition as summarized in **Table 1-1**. Important aspects include the following:

- **Water** - As is true of most mammal milks, water is the major constituent of human milk. Even in hot climates, human milk, which is 87% water, provides sufficient water for the exclusively breastfed infant to remain adequately hydrated. Only if the infant is unable to nurse effectively as needed or has an unusual health problem (e.g. diabetes insipidus) would additional fluids be required.

- **Lipids** - About 50% of the calories in human milk come from lipids. The primary fats identified in human milk are phospholipids and triacylglycerols. Some 167 fatty acids have been identified in human milk, many of which are long chain, polyunsaturated fatty acids unique to human milk. Human milk contains omega-3 fatty acids, including docosahexaenoic acid (DHA), important for brain and retinal development and function. Cholesterol, important to the development of membranes, is also present in significant quantities.

  While the content of milk fat in mature human milk usually ranges from 3.5% to 3.8%, it is important to recognize that these figures represent an average fat content. In reality, the fat content is variable and influenced by a number of factors. Of particular clinical importance is the significant increase which occurs during a feeding from the low fat content of the milk of about 1.5 to 2.0 % which has accumulated in the breasts since the previous feeding (known as “foremilk”) to the higher fat levels present in milk secreted during a feeding. Fat content in milk available near the end of a feeding (“hindmilk”) can be as much as 5 or 6% **(Figure 1.1)**. Allowing an infant to nurse until there is an indication of satiation is important if full

Figure 1.1



fat (and thereby caloric and fat-soluble vitamin) intake is to be achieved.

- **Proteins** - The total protein content of human milk, 0.9%, is the lowest amount identified among the many mammal milks which have been studied to date. This low protein content is well matched with the still developing renal function of the neonate and young infant. The low renal solute load of human milk places less excretory burden on the immature system while providing optimal growth and development.

  Milk protein can be divided into two major components, whey and casein. Milk curd, which forms from the casein when the milk pH (normally ranging from 6.7 to 7.4) drops below 5.0, is an insoluble calcium caseinate-calcium phosphate complex. The liquid that remains after the curds are formed is whey. Whey contains water, electrolytes and important proteins that contribute to disease resistance including alpha-lactalbumin, lactoferrin, lysozyme and the immunoglobulins. Human milk protein is predominantly whey. When acidified (such as occurs in the stomach), human milk results in a flocculent suspension allowing for easy digestion and absorption of nutrients as well as rapid transit through the intestinal tract of the human infant. This results in the normal pattern of frequent feeding and stooling characteristic of breastfed infants.

  In commercial substitutes for human milk the ratio of casein to whey has been adjusted from the predominant casein of cow's milk. Even with this adjustment, the feeding frequency, stools and stool patterns of formula-fed infants are not the same as breastfed infants. In addition, stools of formula fed infants are firmer than those of breastfed infants.

  It is important to note that there are a number of nitrogen containing compounds in human milk with bioactive roles important to the newborn and young infant. These include:

  - epidermal growth factor - contributes to the development and function of the intestinal mucosa
  - taurine - a free amino acid associated with bile acid conjugation and neurotransmission
  - nucleotides - metabolic and immune functions
  - carnitine - needed in the lipolysis of long-chain fatty acids

- **Carbohydrates** - Lactose, synthesized in the breast, is a disaccharide consisting of galactose and glucose. At concentration levels of 7.2 g/dl, it is the major carbohydrate in human milk and is essential as a source of glucose. Lactose is also the source of galactose needed to produce galactolipids for infant brain development. Other carbohydrates found in human milk include monosaccharides, oligosaccharides and glycoproteins. The oligosaccharides and glycoproteins, known collectively as the "bifidus factor", are important in stimulating the growth and colonization of the newborn gut with *Lactobacillus bifidus*, a non-pathogenic bacteria which protects against invasive enteropathogens. Oligosaccharides also prevent the adherence of bacteria to the mucosal surface and are considered a prebiotic.

- **Minerals** - While the profile of minerals found in mammal milks is similar, the concentrations, ratios, and bioavailability are highly species specific. In general, all minerals needed for newborn and infant growth are present in, and well absorbed from human milk. (**Table 1-3**). The lower quantities of minerals in human milk result in a substantially lower solute load to the infant's immature renal system.

TABLE 1-3
Minerals in Mature Human Milk

Mineral (per deciliter)	
Sodium (mg)	15
Potassium (mg)	57
Calcium (mg)	35
Phosphorus (mg)	15
Iron (microgram)	100
Zinc (microgram)	120

Adapted from table 4-19, pp 139 and description of zinc in human milk, pp 144-145, Lawrence and Lawrence (2005)

Is the iron content of human milk sufficient to meet the needs of the growing infant?

Although the quantity of iron in human milk is not large (100 µg/liter), studies have demonstrated that the absorption from human milk is superior compared to cow milk and iron fortified formula (**Table 1-4**). Lactoferrin contributes to iron bioavailability in human milk. It is a complex protein found in whey where it binds iron and makes it available for digestion and absorption by the infant. (This binding of iron also inhibits bacterial growth by making the iron unavailable to iron dependent organisms.) Normal full-term infants can be "exclusively breastfed" (no other foods or fluids) for six months without becoming iron deficient. After six months, with the continuation of breastfeeding and the gradual addition of appropriate iron-containing complementary foods, term infants continue to have normal iron stores and hemoglobin. Preterm infants or term infants with perinatal blood loss may need additional Fe before while still exclusively breastfed.

Zinc is another essential mineral for humans and is important to enzyme activity. Like iron, it is well absorbed from human milk (**Table 1-4**). Zinc deficiency, demonstrated in the form of intractable diaper and perioral rash, is very rare in breastfed infants whose mothers have adequate Zn intake. Both iron and zinc are important to normal brain development and function.

TABLE 1-4
Iron and Zinc Absorption

	Iron	**Zinc**
Human milk	49%	41%
Iron fortified formula	4%	31%
Cow milk	10%	28%

Data abstracted from Lawrence and Lawrence (2005), pp 143-144

- **Vitamins** - Human milk, particularly colostrum and early transitional milk, is a major source of *vitamin A*, betacarotene, and *vitamin E* **(Table 1-5)**. As previously mentioned, *vitamin A* is important for protection against infection and for early retinal

development. *Vitamin E* protects the red cell against hemolysis. The quantity of *vitamin D* in human milk, which occurs in both fat-soluble and water-soluble forms, is sufficient when maternal diet is adequate and there is sufficient maternal and infant exposure to sunlight. Maternal deficiency during pregnancy can result in newborns with reduced stores of *Vitamin D*. In recent years, cases of rickets have been reported in breastfed infants with limited exposure to sunlight. Infants with darker skin pigment seem to be at greater risk. In order to assure that no infants develop rickets, the American Academy of Pediatrics currently recommends that all breastfed infants should receive 400 IU/day beginning in the first few days of life and continuing until they are ingesting or exposed to sufficient Vitamin D from other sources..

- The *Vitamin K* is poorly transported prenatally via the placenta to the fetus and is also limited in human milk. Newborns whether breastfed or not are at risk for hemorrhagic disease, a life threatening disease. Thus it is recommended that all newborns receive an intramuscular injection of 0.5 to 1.0 mg of *vitamin K*. Where an oral form is available the first dose (2.0 mg) is given at birth and repeated at 1 to 2 weeks and again at 4 weeks of age.

TABLE 1-5
Selected Vitamins in Colostrum and Mature Human Milk
Micrograms per liter

	Colostrum	Mature Milk
Fat Soluble		
A	151	75.0
Beta carotene	112	23.0
D	---	0.04
E (mg)	1.5	0.25
K	---	1.5
Water soluble		
B 1	1.9	14.0
B 6	---	15.0
C (mg)	5.9	5.0

Food and Nutrition Board National Research Council, National Academy of Sciences, Recommended Dietary Allowances, 10th ed. Washington, DC 1989

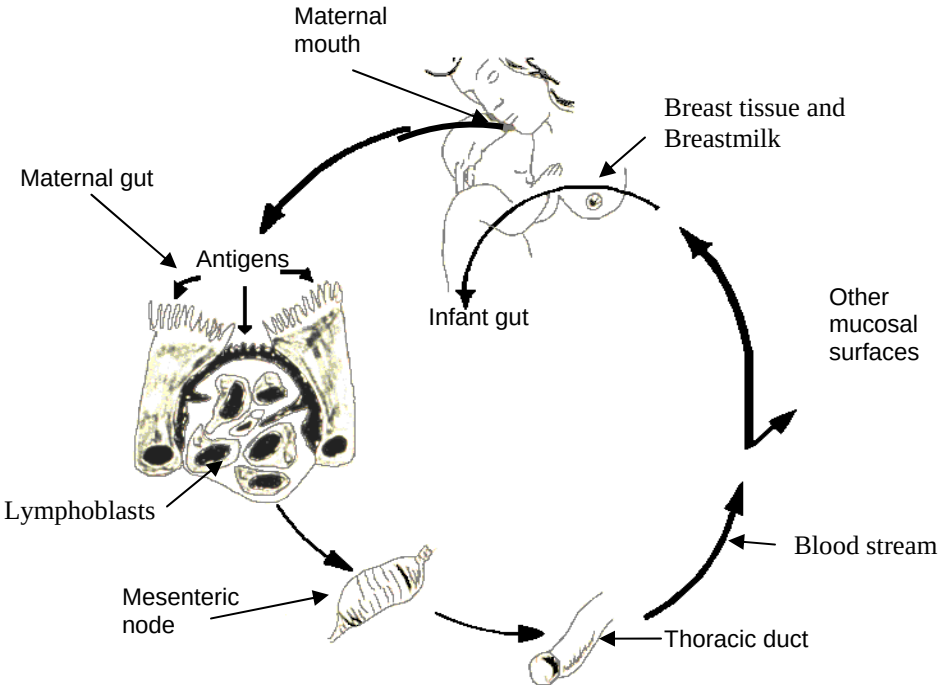
- **Enzymes** - Over 20 bioactive enzymes have been identified in human milk. Some enzymes function in the synthesis of milk, some compensate for digestive enzymes needed but not yet produced in adequate quantity by the newborn, some help transport minerals, and others are anti-infective. For example, lipase in breast milk works synergistically with lingual lipase and gastric lipase to form an efficient system for complete digestion of human milk fat. This is particularly important during the months after birth when pancreatic enzyme and bile salt levels are low.

- **Other Important Components** - Human milk contains numerous peptide and non-peptide bioactive hormones: thyroxine, prolactin, erythropoetin, epidermal growth

factor, insulin, leptin and gastrin. Prostaglandins, also present, influence gastrointestinal motility.

- **Cellular Components** - Human milk is a living tissue. It contains about 4000 cells per cubic mm including neutrophils, macrophages, and lymphocytes. These cells are most concentrated in colostrum but continue to be present in transitional and mature milk. Neutrophils help prevent infection of the breast tissue while macrophages (2000 to 3000 per cubic mm) and lymphocytes (400 per cubic mm) are actively involved in providing immuno-protection for the newborn and young infant. Macrophages secrete lysozyme, kill bacteria, and are active in phagocytosis.

- **Enteromammary Pathway** - Maternal lymphocytes, both T and B cells, synthesize immunoglobulins and are thought to originate in lymphoid tissue located along the maternal gut and bronchial system. The developing lymphoblasts are sensitized by the antigenic material (bacteria, viruses) ingested by the mother and coming into contact with the particular mucosal surface. As the lymphoblasts mature they migrate into the lymphatic system and are ultimately distributed throughout the body including breast tissue. During lactation these cells and the immunoglobulins they



Enteromammary Pathway

secrete become components of the milk and are transferred to the nursing infant. Thus the infant is provided with a nearly continuous passive immunization to protect against whatever organisms are present in the environment shared by the mother and infant. While the concentration of cells and immunoglobins is greatest in colostrum, significant bioactive amounts are present throughout lactation.

Table 1-6
Summary of Major Differences Between Human Milk and Commercial Substitutes Marketed for Normal Term infants

	Human milk	**Commercial Substitutes**
Protein	Appropriate (species specific) quality/quantity, easier to digest	Corrected in quantity but not in quality (not species specific)
Fat	Appropriate quality/quantity of essential fatty acids, lipase present	Lipase absent
Vitamins	Adequate except for vitamins D and K in some situations (see text)	Vitamins added
Minerals	Correct amount	Partly corrected
Anti-infective properties	Present	Absent
Growth factors	Present	Absent
Digestive enzymes	Present	Absent
Hormones	Present	Absent

Adapted from WHO/CDR/93.6. and further modified, 2009

Infant Benefits of Breastfeeding and the Risks of Not Breastfeeding

As is evident from the brief review of human milk composition, breastfeeding helps to ensure the neonate's successful transition from intra-uterine to extra-uterine life.

There is strong evidence that substitute feeding, in both industrialized and developing countries, increases otitis media and diarrhea **(Figure 1.2).**

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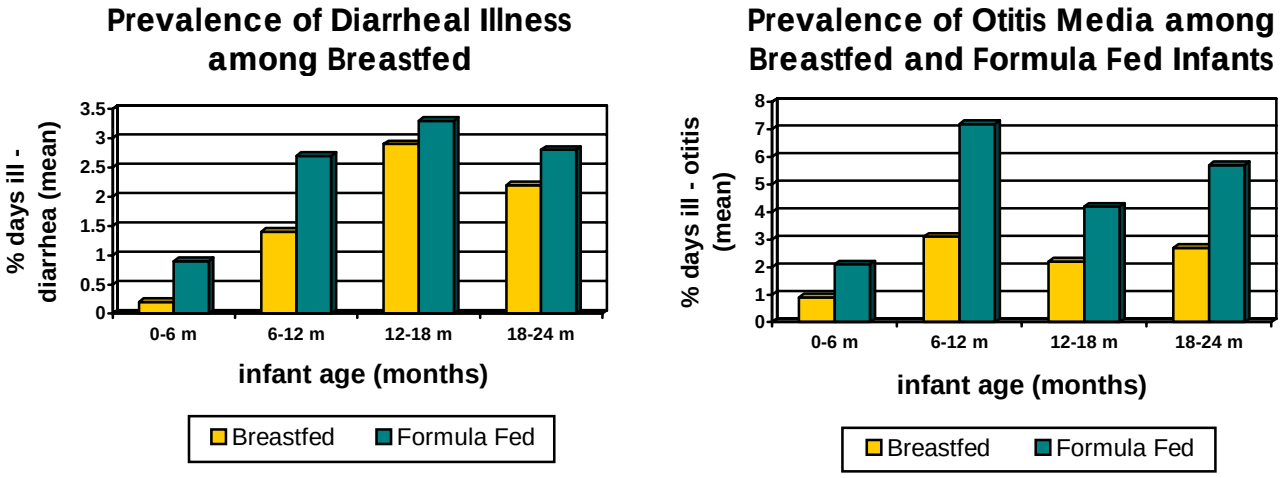
Figure 1.2



Adapted from: Dewey et al (1995): 699-700

A recent review of the relevant literature by Ip et al indicated that non-breastfed infants had significantly increased risk of non-specific gastroenteritis, severe lower respiratory tract infections, atopic dermatitis, asthma, and necrotizing enterocolitis as well as sudden infant death syndrome (SIDS). Research also suggests that not breastfeeding is associated with a higher risk of dental caries and several chronic, serious conditions including type I diabetes, obesity, Crohn's and celiac disease, ulcerative colitis, lymphoma and leukemia.

Additionally, there is a correlation between exclusive breastfeeding for 6 months and a lowered risk of allergic disease including atopic dermatitis, rhinitis, reactive airway disease, and food allergies. This appears to be related to the sIgA, which binds foreign food macromolecules and prevents their absorption during the first several months after delivery when the infant's own production of IgA is not yet fully activated.

The relationship between breastfeeding and psychosocial development has received a great deal of attention. Recent animal, as well as human, studies suggest the hormones of lactation, particularly oxytocin, play an important role in bonding between infant and mother. With every feeding, maternal oxytocin levels rise. This not only results in the let-down of milk, satisfying the hungry infant, but also provides the mother

with pleasant, enjoyable feelings. Thus both mother and baby are rewarded by breastfeeding, and the emotional bonding process is strengthened. Additionally evidence is beginning to accumulate that the risk of maternally perpetrated child abuse may be lower among breastfed infants.

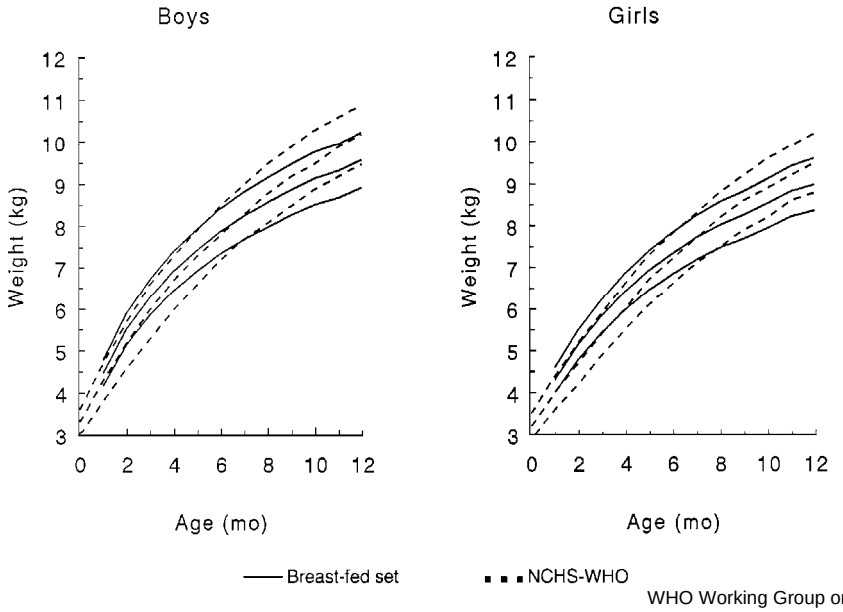
Studies have also suggested that breastfeeding is associated with a small but consistent increase in I.Q. scores and improved school performance. This may be the result of specific nutrients found only in human milk, of the close supportive relationship between mother and infant, of the increased opportunities for interaction between the mother and her infant and/or the lowered risk of a variety of illnesses which temporarily interfere with learning capacity. It is likely that all of these are important to an infant's cognitive development.

Growth Patterns of Breastfed Infants

Growth charts still in use all over the world were developed some years ago on a sample of infants who were formula fed and thus reflected the growth parameters of such infants. When normal breastfed infants are charted on such charts they do not follow the formula feeding curves but gain more rapidly during the first 3 to 4 months and slow down in the latter half of the first year (**Figure 1.3**). The breastfed infants

Figure 1.3

Weight Quartiles of infants breastfed at least 12 Months (N=226)

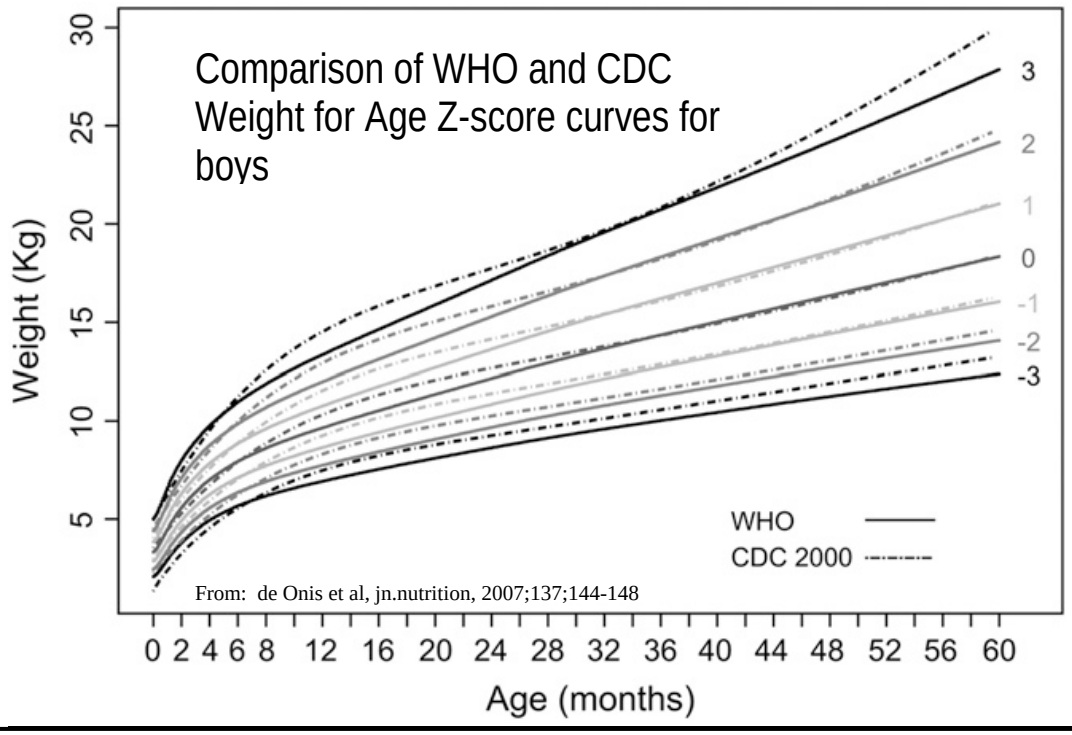


WHO Working Group on Infant Growth (1994)

are healthy but become leaner. Because of this normal growth pattern they are all too often are judged as faltering in their growth The pediatric growth charts more recently released by the United States Center for Disease Control (CDC) are an improvement but represent an average growth pattern of breast-fed and formula-fed infants, both sick and well (4).

Because of the clear biologic differences in growth patterns, the World Health Organization sponsored an international collaboration to develop appropriate *standards of growth* for healthy breastfed infants. The results of this collaboration were completed in 2006 and indicate how healthy breastfed infants should grow. An example of a resulting growth chart (for boys) is given in **Figure 1.4.** As is evident in the figure, the WHO charts (healthy breastfed infants) are quite differed from the CDC charts. A full set of the new WHO growth standards for boys and girls may be obtained from the WHO web site: www.who.int/childgrowth/en.

Figure 1. 4



Other Risks of Using Breast Milk Substitutes

Besides the loss of specific benefits associated with breastfeeding and already described, additional risks to infant health are associated with the use of human milk substitutes (e.g. cow milk, goat milk, formula). These include manufacturing errors, mixing mistakes, contamination during preparation and overfeeding. In addition, even though powdered formula is made from pasteurized milk, contamination can occur during the later stages of manufacturing. Thus powdered formula is not actually sterile. Reports have been published regarding illness and deaths among preterm infants due to Enterobacter sakazakii found to be present in the powdered formula used in neonatal intensive care units.. There are also reports of powered formula contamination with various strains of Salmonella.

Maternal Benefits of Breastfeeding and the Risks of Not Breastfeeding

In addition to the many risks to infant health associated with not being breastfed there are a number of important health concerns for mothers who do not breastfeed.

- Oxytocin secreted during breastfeeding not only brings about milk let-down but also:
  - decreases postpartum blood loss
  - results in more rapid uterine involution
  - enhances bonding, attachment and maternal parenting behaviors
  - reduced vulnerability to stress

- Mothers who do not breastfeed are likely to lose their prenatally acquired weight more slowly than mothers who do breastfeed.

- Recent studies suggest an increased risk of type 2 diabetes and ovarian and breast cancers among women who have not breastfed. The explanation for these risk relationships is not yet clear.

- Breastfeeding plays a role in child spacing. Whereas nonlactating women may ovulate by 6 weeks postpartum, women who exclusively or predominantly breastfeed usually do not ovulate until at least 6 months after delivery. Full nursing during the first 6 months with no signs of menstruation reduces the likelihood of pregnancy to less than 2%. Exclusive breastfeeding with those conditions reduces the likelihood even further to 0.5%.

- Breastfeeding has also been reported to decrease the risk of serious postpartum depression and maternally caused child abuse and neglect.

Family Benefits of Breastfeeding and Risks of Not Breastfeeding

- The use of breastmilk substitutes is more costly to families. Though breastfeeding mothers need to eat a little more than those who do not nurse their infants, the cost of foods to provide the extra calories need not be great and is far exceeded by the savings achieved by not buying substitutes and bottles. There is no need to use costly energy sources to heat substitutes and clean containers. More importantly, there will be a greater expenditure in money and in family time for medical care for a sick child. Babies who are exclusively breastfeed during the first six months of their lives rarely become sick during that time. In addition the higher incidence of illness in the non-breastfed infant increases parental absence from work and lost income.

Community Benefits of Breastfeeding and Risks of Not Breastfeeding

Though most of the benefits and risks reviewed in this module were described in terms of individual infants and mothers, these issues assume community-wide importance.

There is increasing evidence that not breastfeeding increases the risk of childhood obesity, both types I and II diabetes as well as hypertension and subsequent cardiovascular disease. Breastfeeding reduces the waste and pollution created by discarding the by-products of formula feeding, is renewable resource and an environmentally friendly "green" activity.

Economically, breastfeeding can be a major source of saving community funds. In the US alone, it has been estimated that if the US breastfeeding goals for 2010 can be realized, it has been estimated that 3.6 billion dollars will be saved.

In addition, globally, breastfeeding provides more child-spacing than all other family planning efforts combined. Because of the natural infertility that accompanies optimal breastfeeding, it is unique among the many programs undertaken to decrease morbidity and mortality. It simultaneously and naturally limits population growth.

Current Recommendations for Breastfeeding

Because of the many benefits of human milk and breastfeeding and the significant risks of not breastfeeding and using a substitute for human milk the World Health Organization (WHO), UNICEF, the United States Centers for Disease Control and Prevention (CDC) and a number of other organizations concerned with improving maternal and infant health including the American Academy of Family Practice (AAFP), American Academy of Pediatrics (AAP), The American College of Obstetrics and Gynecology (ACOG), recommend:

> ***Infants should be exclusively* breastfed for six months and continue breastfeeding, with the introduction of appropriate complementary foods, through the second year** of life and beyond******.*

*Exclusive breastfeeding = only human milk . Exceptions include drops or syrups of vitamins, minerals, or medicines or rehydration solution. The infant can be breastfed by his or her mother or a wet nurse or fed expressed milk.

** The AAP recommends that breastfeeding be continued through the first year of life and beyond. The Committee on Nutrition of the AAP prefers exclusive breastfeeding be recommended for four to six months.

***Note: no recommendation regarding the age of completion of breastfeeding is provided in this statement. It is considered acceptable and normal for mothers to breastfeed their children until two years and beyond for the many nutritional, immunologic and developmental benefits.

This recommendation should be the goal for all health providers who care for mothers, infants and their families. Our professional task is to help mothers and families make an informed decision and then provide appropriate evidence-based care that will help them achieve their decision.

If breastfeeding is so great, why doesn't everybody do it?

Some women do not choose to breastfeed. Very often they lack information. It can be an emotional decision, and only one of the many decisions a parent needs to make. Some women may be embarrassed by the idea of breastfeeding or may lack the confidence that they can be "successful". There may also be cultural factors that play a role. Friends and family members may not be supportive. In many cases, simply providing information will help a woman make her decision. Other influences on the decision to breastfeed include;

- **Formula Marketing** – It is a commonly held belief that formula is equivalent to human milk. Formula advertising is intended to support that conclusion and convince families that bottle-feeding is normal. If mothers heard the facts about human milk they would be better prepared to make an informed decision about feeding their infants.

- **Work** – After their babies are born, many women enter or re-enter the formal work force. Ideally, women should be able to delay returning to work until at least 6 months when they are no longer exclusively breastfeeding. If this is not possible, there are several strategies mothers can use to continue to provide their milk.

  These strategies include:

  - ✓ making arrangements to take the baby to work,
  - ✓ finding a child-care setting near work,
  - ✓ arranging part-time, flex-time or job sharing,
  - ✓ expressing their milk by hand or mechanical means and storing the milk for daily or future use by their baby. Ideally, such expression is best begun after a month postpartum and breastfeeding is established. (Guidelines for hand expression can be found in Annex F)

  Many countries have legislation requiring employers to provide time for nursing breaks and/or time and space for milk expression. Several states in the U.S. have recently passed similar legislation.

- **Restriction on Activity -** Mothers these days are involved in many activities, and in some cultures women feel breastfeeding will "tie them down". They fear a loss of freedom if they are the only ones who can feed their child. In fact, infants are very portable and can be easily taken along on most outings. It is possible to feed discretely with a light blanket or shawl draped to preserve modesty if necessary. In some countries, laws specifically protect the right of mothers to breastfeed in public locations. In the United States some states have similar laws in place.

Aren't there some situations when a mother shouldn't breastfeed?

While there are some controversies surrounding breastfeeding, there are very few true contraindications.

- **Illness and other health conditions -** There are no nutritional reasons to deny infants breast milk unless they have special health problems such as **galactosemia, maple syrup urine disease and phenylketonuria (PKU),** very rare metabolic conditions. In the case of **phenylketonuria**, because of the low content of phenylalanine in human milk, some carefully monitored breastfeeding is possible.

  Mothers may be advised to discontinue breastfeeding, either permanently or temporarily, in a few circumstances:

  - In the U.S., the Centers for Disease Control and Prevention (CDC) recommends that mothers infected with **HIV** not breastfeed because of the risk of transmissionof HIV to the infant through human milk. The recommendation of WHO for such mothers is: "if replacement feeding is acceptable, feasible, affordable, sustainable and safe (AFASS)' replacement feeding should be advised.

  - International evidence is accumulating indicating that if an **HIV** infected mother chooses to or must breastfeed, it is essential to **exclusively** breastfeed in order to avoid the possibility of contaminants that may come with formula or other foods and cause gut inflammation allowing HIV organisms to reach the submucosal tissue. Advances in the treatment of the mother and infant during the perinatal period may also change the risk to the infant. The reader is encouraged to follow the international research and watch for updated WHO information and guidelines at: www.who.int/entity/nutrition/publications/hivaids

  - In the case of **active maternal tuberculosis** the mother and infant should be separated only until the mother is considered noninfectious. The infant should be placed on preventive therapy immediately. The infant can continue to receive expressed breast milk while separated. Medications used to treat tuberculosis, including INH, are compatible with breastfeeding.

  - **Hepatitis** often brings up questions about beginning or continuing breastfeeding. Breastfeeding is permitted with all three major types (**A, B,** and **C**). In the case of **Hepatitis B**, the infant can begin breastfeeding before receiving HBIG and the first dose of the Hepatitis B vaccine series which can be given up to 7 days after birth.

- **Medications -** Most medications taken by the mother are considered safe. The risk of affecting the infant is highest during the first 2 months of life (especially the first month) and decreases markedly after that time. Drugs of low molecular weight or low protein binding more readily pass into breast milk. This does not necessarily

result in harm to the infant but suggests careful monitoring is warranted. New medications that have not been tested for their effects on the infant or on the milk supply should be closely monitored or alternatives should be selected if possible. Sometimes one drug can be substituted for another. Drugs of abuse are contraindicated. Mothers maintained on the proper dose of methadone or a long acting opioid can usually breastfeed. Infant withdrawal symptoms are usually less severe if breastfeeding is allowed. Both mother and baby should be monitored closely. Most radioactive compounds used for diagnostic purposes often require a temporary cessation of breastfeeding, while those used for therapeutic purposes may preclude breastfeeding.

Because of frequent additions to available drugs as well as changes in recommendations, readers should consult one or more of the following sources regarding specific recommendations:

(1)American Academy of Pediatrics. The Transfer of Drugs and other Chemicals into Human Milk. Pediatrics. 2001 Sep;108(3): 776-789.

(2) Hale T (2008) *Medications and Mothers' Milk*, Amarillo: Hale Publishing. LP.

(3) LactMed, National Library of Medicine data base. A free frequently updated internet service accessed at: www.toxnet.nlm.nih.gov/egi-bin/sis/html.gen?LACT

- **Alcohol –** Occasional and limited use of alcohol is not a contraindication to breastfeeding. Alcohol passes quickly into the mother's bloodstream and into her milk equilibrating with maternal blood level. General advice is to avoid breastfeeding for at least 2 hours after one or two alcoholic drinks to allow time for the alcohol levels to fall in both maternal plasma and milk. There is no need to express and discard milk that has accumulated during the waiting time. The alcohol present in the milk will have been reabsorbed into the plasma and metabolized by the mother's liver. Because of the differences in interpretation of the terms "occasional" and "limited", a mother should be individually counseled regarding her alcohol intake.

- **Caffeine** – Caffeine is excreted into breast milk. The amount contained in breast milk after one cup of coffee is insignificant. However, caffeine is not well metabolized by the young infant and may accumulate in infants of mothers who consume large amounts of caffeinated beverages (such as several cups of coffee or cola drinks daily); the use of caffeine-free beverages is suggested for these mothers.

- **Smoking –** For general health reasons in both mother and baby, women are encouraged to cut down or quit smoking during pregnancy and lactation and to avoid exposing the baby to smoke. For those who cannot stop, cigarette smoking is not a contraindication to breastfeeding. In fact the benefits of human milk to a baby who lives in a smoking environment are important to protect against respiratory infection and reactive airway disease. Women who cannot stop smoking should be counseled to smoke only after nursing (but not around the baby) to provide the least amount of nicotine to the baby via the milk. Maternal smoking diminishes the milk

supply, and the growth of their infants should be carefully monitored because the rate of growth can be decreased. Infant exposure to cigarette smoke has also been reported to be related to Sudden Infant Death Syndrome (SIDS).

- **Body Image** - There may be other concerns, such as sagging breasts. Breasts may lose elasticity as a result of pregnancy and years passing, irrespective of whether a woman breastfeeds. Concerns about body image should be addressed as they are identified.

- **Fitness –** There are usually no contraindications to exercise in moderation during lactation. Breastfeeding prior to exercise and wearing a supportive bra is recommended. There have been reports that increased lactic acid in the milk for about 30 – 90 minutes following strenuous exercise has led to a temporary rejection of the milk by some babies. This has been attributed to a change in the taste of the milk. If it occurs, mothers could postpone feeding or offer previously expressed milk.
- **Diet -** Some women feel that in order to breastfeed they must eat a "perfect" diet. Breastfeeding mothers like everyone else need to eat a nutritious diet and consume enough additional calories (approximately 300 to 500 calories per day depending on the size and activity level of the mother) to provide energy and make milk. It is also recommended that prenatal vitamins be continued during lactation. There are no lists of foods to avoid. Poor maternal nutrition is not a contraindication to breastfeeding.

  - ✓ Mothers make nourishing milk for their infants from all kinds of food.
  - ✓ There are no foods that must be avoided, unless mother or baby develops an allergic reaction.
  - ✓ Breastfeeding mothers have an increased thirst that usually maintains an adequate fluid intake; no data support the assumption that increasing fluid intake will increase milk volume.
  - ✓ Mothers do not need to drink milk to make milk; thirst can be satisfied from a variety of nourishing beverages, including water.
  - ✓ Calcium is available not only in milk and milk products but in many other foods, such as broccoli, spinach, kale, bok choy, and collard, mustard and turnip green, almonds, canned fish.

...Returning to Veronica at her first prenatal visit...

You recall she left blank the question about how she plans to feed her baby.
This is your chance. Are you convinced about the importance of breastfeeding as a primary health care strategy? For each of us there are different features of human milk and breastfeeding that capture our interest.

What are the three most important things you would like Veronica to know about breastfeeding?

1. _____

_____

2. _____

_____

3. _____

_____

You may have included the fact that breast milk and formula are not the same, that breastfeeding provides many benefits to both mother and baby, and that there are very few contraindications**.** You may have mentioned details within each of these categories.

How would you provide a mother with breastfeeding information?

You may ask her what she has heard about breastfeeding, answer her questions, and address any misconceptions. Studies have shown it is not the length of the "lecture" on breastfeeding, but the number of times the topic is introduced and the support for breastfeed. Since prenatal care usually spans several months, there are many opportunities to discuss the topic. Concerns can be elicited and individual suggestions made to help the mother adapt the information to her own needs. It is also important to consider if and what cultural influences are likely to affect her decision and to engage the father of the baby or another significant family member or support person in the counseling sessions.

Prenatal Counseling Questions

The answers to the following questions provide a good background:

- **Have you thought about how you will feed your baby?**
- **What have you heard about breastfeeding?**

Open-ended questions provide the opportunity to continue the discussion.

If the patient has previous breastfeeding experience:

- **How long did you breastfeed a previous child?**
- **Why did you stop at that time?**
- **Did you have any problems?**

Often mothers stopped breastfeeding earlier than they planned because of a problem. This would be a good time to reassure the mother that there is a lot of new information, and help is available to prevent the problem or solve it if it recurs.

- **What is your breastfeeding plan for this child?**
- **Do you plan to return to work/school?**

Many mothers would like to know the current recommendations for the duration of breastfeeding so they can think about how to fit it into their lives. If mothers will be returning to work or school they can be advised in general terms that it is possible to continue breastfeeding and that more detailed information will be available when they are ready to consider it. Many countries (and states in the US) now have maternity protection laws that provide time for milk expression at work. The local situation should be investigated.

- **Are your family (your mother, the baby's father and the fathers mother) and friends supportive of breastfeeding?**
- **Were you breastfed?**
- **Was the baby's father breastfed?**

It is helpful for the mother to identify supportive people in her family. Grandmothers who breastfed may be a good source of support. People close to the mother who are not supportive could be invited to learn more about the advantages breastfeeding confers on both mother and baby. It is also important to explore any cultural and religious attitudes that may influence a mother's decision about how she plans to feed her baby.

Mother's history:

- **Have you had previous breast surgery?**
- **Have you had previous breast problems?**
- **Are you taking regular medications?**

Mothers may be concerned there is something wrong with their breasts that will make breastfeeding difficult. If the mother has had problems with her breasts, she may need some help with breastfeeding. Alerting mothers to ask for assistance as soon as possible postpartum will be helpful. Most medications are compatible with breastfeeding and the mother can be reassured; the few

medications that are not compatible could be reviewed and an alternative chosen.

Augmentation and reduction surgery are not always revealed in prenatal history. Neither are contra-indications to breastfeeding. Implants are rarely a problem. Reduction surgery may result in increasing the risk of low milk production. In both situations, lactation progress and indicators of adequate milk intake need close monitoring.

- **Do you have a family history of allergies, breast cancer or diabetes?**

Breastfeeding seems to provide protection from all of these conditions. A mother with a family history of such conditions may be motivated to breastfeed in order to lower the risks for herself and her children.

- **Would you like information about a breastfeeding class?**

It is very helpful to give the patient either a brochure with information about available classes (date, time, location) or to write out this information for sharing with the father of the baby or other family members.

What resources for breastfeeding information are usually available in communities?

Community Resources

Many hospitals provide childbirth education classes and printed information as part of their maternity services; often breastfeeding is discussed as part of the childbirth preparation class or there may be a separate breastfeeding class available. In addition, organizations with local offices, such as Red Cross, YWCA and local NGOs offer classes. It is important for health care providers to investigate the classes and review the literature offered by the hospital and other organizations in order to ensure that consistent, up-to-date information is being offered to families.
Note: Although educational resources offered by formula companies on the topic of breastfeeding do not always include clear advertisements for the company, it is important to remember that a formula company's goal is to sell formula. They are skilled at implying that substitutes are as good as breastmilk. It is best to seek other materials that do not have this conflict of interest.

In the United States the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) for lower income families encourages breastfeeding by counseling about nutrition and offering practical lactation management advice to WIC clients. Breastfeeding clients also receive special supplemental foods.

La Leche League International has long been a source of information and support for breastfeeding mothers. Their mother-to-mother approach provides individual problem solving, classes, written information, videotapes, and equipment.

Several international professional organizations with a specialized interest in lactation and breastfeeding promotion can also be helpful such as the Academy of Breastfeeding Medicine (ABM) and the International Lactation Consultant Association (ILCA). These organizations can be contacted for information for local specialists and consultants. (see the appendix for web site contact information.)

There are numerous web sites that address the topic of breastfeeding available to families on-line. Prior to recommending one, be sure to review it for accuracy. Not everything on the Internet is up-to-date and accurate.

Bookstores may carry a selection of breastfeeding books in their Parenting Section. You may wish to review the choices and have one or two recommendations in mind for parents.

What resources for breastfeeding information and support are available in your community?

1._____

2._____

3._____

You may have investigated the patient breastfeeding education opportunities within your hospital, used the Yellow Pages to find breastfeeding resources, or inquired about classes offered by community organizations.

Conclusion

Each woman brings her own frame of reference to the pregnancy and motherhood experience. Asking, "Have you thought about breastfeeding?" during the obstetric phase of care provides the opportunity to present information, elicit concerns, solve potential problems and refer the mother to resources in the community. Asking about breastfeeding during prenatal visits provides the opportunity to give anticipatory guidance, recognize problems early and assist the mother to initiate and continue breastfeeding for as long as she wishes. If she indicates that she is not interested, it may be best to postpone this discussion and bring it up again at a later visit. Getting mother and newborn off to a good start in the postpartum period is covered in Module Two: Basics of Breastfeeding.

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Module Two

Basics of Breastfeeding: Getting Started

Objectives

After completing this module, you will be able to:

1. Describe the process of milk production and removal.
2. Recognize correct attachment and effective suckling at the breast.
3. Identify components of anticipatory guidance for all women.
4. Recognize the impact of perinatal hospital practices on breastfeeding.

Introduction

Although the mother's body produces milk as a normal part of the reproductive cycle, the technique of breastfeeding is a learned skill enhanced by practice and support. While parents need helpful information prenatally to know what to expect, the opportunity postpartum to practice attaching the baby to the breast and assessing the baby's breastfeeding effectiveness can provide the family with confidence as they embark on this particular experience of parenthood.

The key to helping new breastfeeding families is an understanding of the basic anatomy of the breast and physiology of the milk production and removal process. This module will focus on the science of lactation and practical clinical skills to help mothers get started. The module is applicable to both the obstetric and pediatric sides of the equation, as the management of the peripartum course and newborn care can profoundly affect the early breastfeeding experience and later infant feeding outcomes. As far as breastfeeding is concerned, the mother and baby are a unit; whatever influences one affects the other.

Case Exercise

As a result of the prenatal discussions of the benefits of breastfeeding, Veronica, our 26 year-old first-time mother, has chosen to breastfeed her baby. She experienced a normal spontaneous vaginal delivery (NSVD) about 24 hours ago, producing a healthy term infant male weighing 3.5 kg. She will be going home within the next 24 hours. You encounter her in the postpartum unit on your regular morning rounds. She has attempted to breastfeed three times. Her baby fell asleep each time she tried to nurse. She says she doesn't have any milk and she is afraid her baby isn't getting enough to eat. She is asking for formula to give her baby.

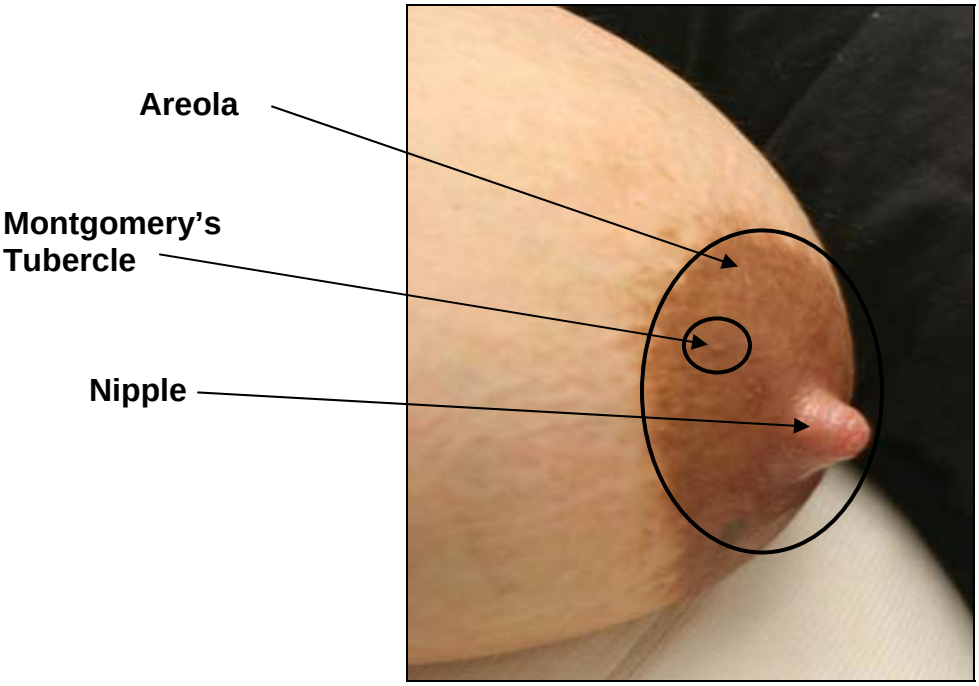
What do you need to know to advise this mother?

Anatomy

Major structures of the breast include the nipple and areola, subcutaneous tissue, alveoli (divided into lobules), ducts, myoepthileal cells, blood and lymphatic vessels, Cooper's ligaments and fat. Fat gives the breast size and shape. Milk production is unrelated to breast size. Also essential to the milk producing function of the breast is the sensory innervation originating primarily from the 3rd, 4th, 5th and 6th intercostal nerves.

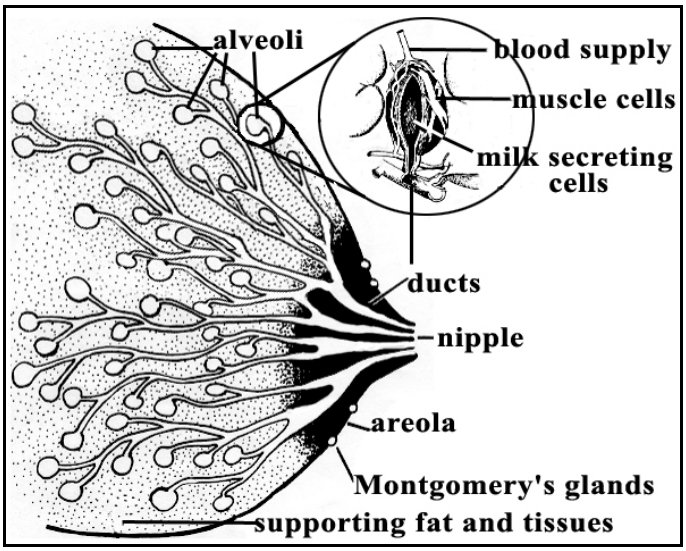
Early in pregnancy, the mother notes changes in her breasts, including fullness, tenderness, and a more prominent venous pattern. As the pregnancy progresses, she sees the areola enlarge and darken in color. Montgomery's tubercles, small nodules within the areola, become more prominent and prepare to secrete a lubricating substance that protects and conditions the nipple and areola (Figure 2.1). The nipple is located in the center of the areola and contains about 5-9 milk duct openings.

Figure 2.1



Each duct extends beneath the areola and into a mammary lobule where milk is produced in the alveoli. The nipple contains smooth muscle fiber and sensory nerve endings. The size and shape of nipples vary from woman to woman. The areola also vary in size from woman to woman.

Figure 2.2



Adapted from UNICEF/WHO: Promotion and Support in a Baby-Friendly Hospital, 20 hour Course 2006

The mammary lobules are composed of alveoli, the grape-like clusters where milk is produced in response to prolactin. The alveoli are surrounded by myoepithelial cells, string-like structures that respond to oxytocin by contracting and squeezing the milk out of the alveoli into the ducts toward the nipple (Figure 2.2).

The Physiology of Milk Secretion

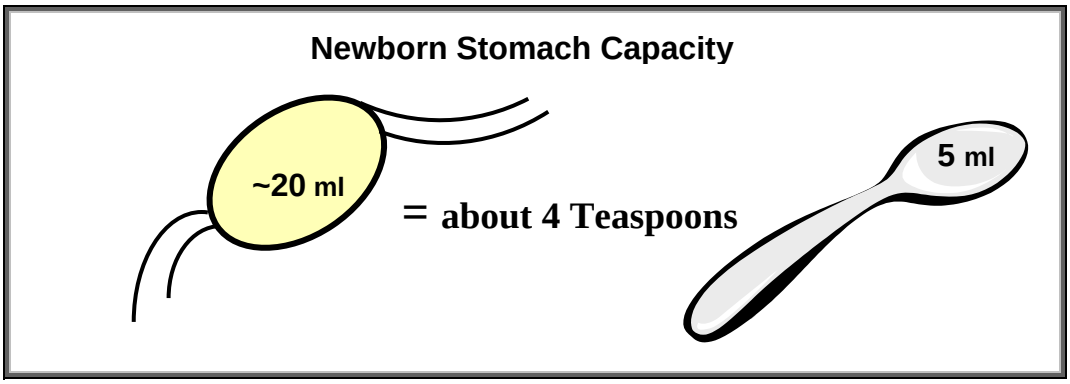
How does it work?

Estrogen, progesterone and prolactin are the three major hormones of pregnancy. The elevated levels of estrogen and progesterone during pregnancy and for a day or two after delivery prevent prolactin from stimulating milk secretion. With the removal of the placenta, estrogen and progesterone levels fall dramatically, while the prolactin level remains elevated. This is the signal to the breast to begin milk production. Prolactin receptors in the breast have an increased affinity for prolactin immediately after birth.

Immediately postpartum, colostrum, which has been present in the breast since about the twentieth week of pregnancy, (**lactogenesis, stage I**) is available to the newborn for the first few days of life until the milk "comes in" in greater quantity. The normal newborn infant is born with suckling and swallowing reflexes that enable him to feed immediately after birth.

The total amount of colostrum available the first day is small (40-50 ml) to match the newborn's small stomach capacity, about 20 ml (about 4 teaspoons) or 5 ml/kg (Figure 2.3)

Figure 2.3



The average total amount of colostrum available during the first 24 hours is small (40-50 ml) which matches the newborn's small stomach capacity, about 20 ml (about 4 teaspoons) or 5 ml/kg

Milk will appear a few days postpartum (**lactogenesis stage II**) whether the woman breastfeeds or not, but the stimulus of the infant suckling at the breast builds and maintains milk production. Breast milk production is **"baby driven"**, that is, the normal full term baby indicates when he is hungry and when he has had enough. Breast milk is easily digested, so the infant signals his need to eat about every two to three hours (sometimes more often), or at least eight times every 24 hours, in the early weeks. Some normal babies cluster their feedings into one particular part of the 24 hours and feed less frequently during the remaining 24.

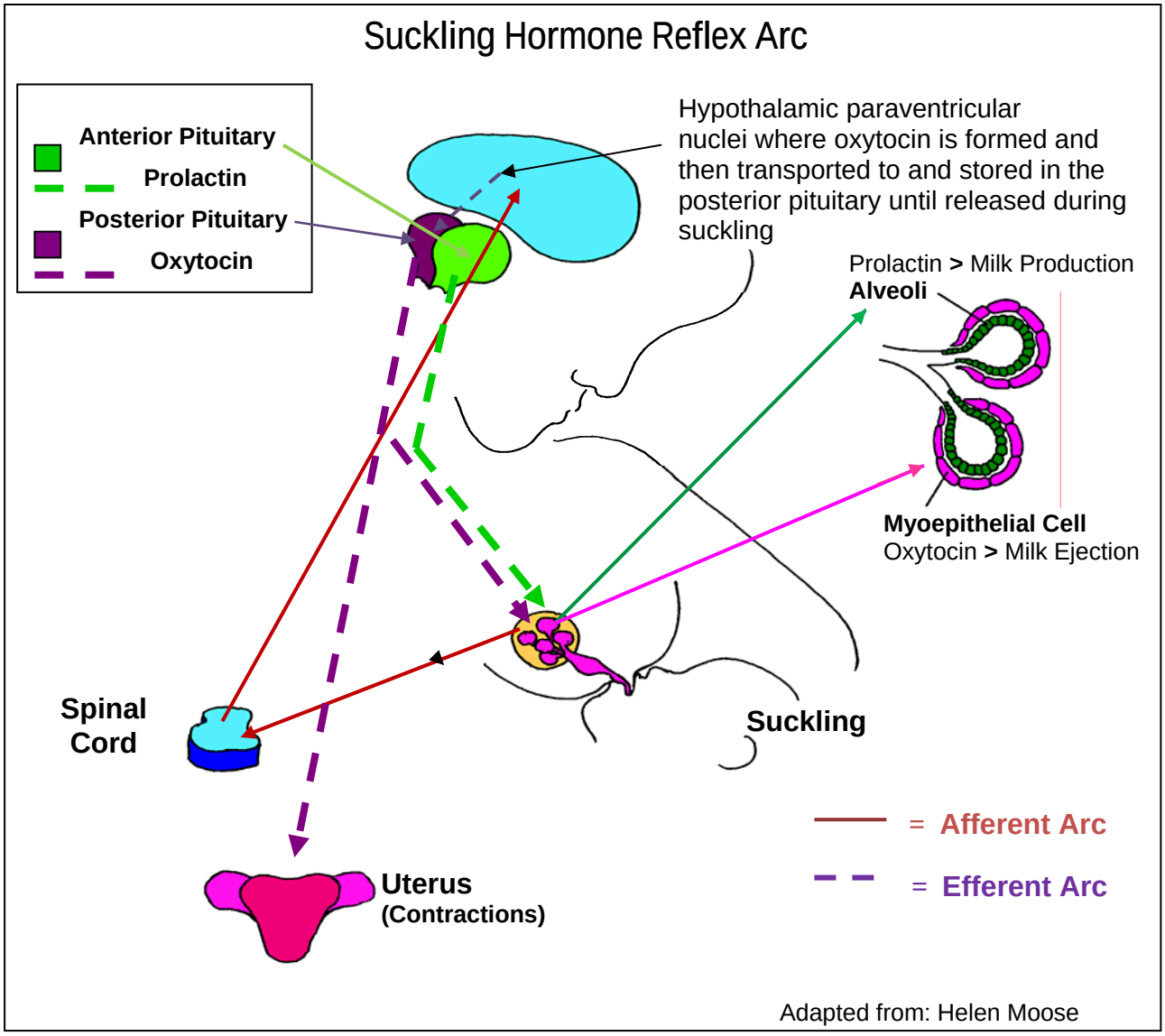
Breastfeeding involves a set of reflexes and hormones that also drive the milk supply . Milk production is influenced positively by early frequent and effective milk removal and negatively by late infrequent feeds or by the feeding the baby other liquids or foods before six months of age.

As illustrated in Figure 2.4 each time the baby suckles at the breast he stimulates the release of prolactin (milk production hormone) from the anterior pituitary and oxytocin (milk ejection hormone) from the posterior pituitary. It is the oxytocin that stimulates the myoepithelial cells to contract around the alveoli, sending the milk down through the ducts. The milk ejection reflex, or let-down reflex, may be noticeable to the mother as a physical sensation such as "pins and needles" or a flush of heat. Some women do not describe feeling anything, but they may see the milk dripping from the nipples. When the let-down reflex occurs, the baby changes the way he moves his mouth, going into a pattern of wide excursions of his jaw and peristaltic or undulating movements of his tongue musculature. The flow of milk causes the baby to swallow in a slower rhythmic, audible manner that sounds like a quiet "cuh". Swallowing is the best indication the milk is being effectively removed by the baby.

The baby may stimulate several let-down reflexes on each breast during the feeding. Each time the milk lets down it contains a little more fat. As noted in module 1, the milk that is present in the breast at the beginning of the feed ("foremilk") contains about 1.5 to 2% fat while the milk present at the end of the feed contains about 5-6% fat. Allowing

the baby to feed without time limits enables him to get more of the higher fat “hindmilk”, providing fat-soluble vitamins, calories to gain weight, and the ability to wait 2-3 hours from the start of one feeding to the start of the next.

Figure 2.4



The frequency of feeding regulates milk supply. The more often a baby removes the milk, the higher the prolactin level and the greater the milk supply. Conversely, a baby who sleeps many hours at a time in the early weeks or feeds less than an average of eight times in 24 hours does not have the opportunity to stimulate the breast, causing the milk supply to drop. This is referred to as the “law of demand and supply”. Because each breast responds to the amount of milk demanded by the infant, it is possible to exclusively breastfeed more than one baby at a time or to use only one breast.

Initially, if the milk is not removed the breast becomes full and eventually engorged. At that point, a local factor, a whey protein known as the feedback inhibitor of lactation (FIL) begins to decrease milk secretion. The exact mechanism of FIL is still under study.

The Importance of Skin to Skin Contact

Evidence has been accumulating indicating that mother-baby pairs who have an opportunity for the unclothed newborn infant to be placed on the skin of the mother beginning immediately after birth, skin to skin ("*S2S"*), experience fewer breastfeeding problems (Figure 2.5). Milk production is enhanced and infants are more contented. Unmedicated newborns exhibit crawling behavior that helps them reach their mother's breast and some, though not all, will feed within the first hour. Studies also suggest that extending S2S beyond the immediate newborn period continues to support successful breastfeeding. Even babies born by caesarian section can be allowed S2S experience on the chest area as soon as the mother is alert. Babies who are placed S2S after delivery also have less difficulty with subsequent attachment

Figure 2.5

Skin to skin immediately after birth

Continuing S2S contact in hospital and after discharge improves milk output. Hospitals can help encourage S2S by supporting continuous rooming-in. Prenatal and discharge counseling should include this topic. Fathers and other adult family members can also participate in holding the infant S2S, allowing the mother time to sleep, bathe or take care of other needs.

Getting Together: Position and Attachment

How do mother and infant get together?

There are a variety of positions for both mother and baby. The way a mother holds her baby to breastfeed may also be influenced by cultural.

Positioning

Whatever position the mother chooses should be comfortable for the mother and safe for the infant.

- Infant should be in light (REM) sleep or in a quiet alert state but not crying. A sleepy baby may not respond with a rooting reflex and may not take the breast. Unwrapping and undressing a baby may help awaken a sleepy baby. A gentle massage of the soles of the baby's feet may also help.
- Infant should be held on the same level as mother's breast, turned so the baby's abdomen faces the mother's abdomen ("tummy to tummy"), held close and well supported with pillows.
- Mother should sit comfortably, with her back well supported, and bring baby in close to her. She offers her breast to the baby in a way that promotes good attachment of the baby's mouth to the breast. She may support her breast with all four fingers below and thumb resting lightly atop the breast.This is often called a"C hold".
- Her thumb and fingers should be away from the areola so that baby can grasp the nipple and areola area without interference. Often we see mothers offering the breast to the baby using a "scissors" hold, with the nipple between the forefinger and middle finger. If her fingers block the areola, the baby cannot attach properly. (Figure 2.6)

Figure 2.6

Common Positions for Infants

Cradle (cross-chest):

The baby lies across mother's lap; baby's head is in the crook of her arm.

Modified cradle:

The baby lies across the mother's lap; mother's opposite arm supports the baby's back and neck.

Side-sitting:

In the Side-sitting position:
baby and mother sitting up; baby sits facing mother with his legs under mother's arm; mother's hand supports baby's back and neck. This position is comfortable after a Cesarean delivery because the baby's weight is away from the incision. Sleepy babies tend to stay awake and feed better in this upright position.

Side-Lying:

The mother and baby lie side by side.

Attachment

The way the baby grasps the nipple/areola area and pulls it into his mouth for feeding is referred to as "attachment" or "latch". Comfortable and effective breastfeeding requires correct attachment. **Correct attachment may be the MOST important factor for preventing problems.**

The infant is born with a "rooting reflex" that prompts him to open his mouth and turn toward the breast when hungry. A light touch to the middle of the infant's upper lip will help elicit this reflex. The infant opens his mouth wide and brings his tongue down and forward over the lower gum to pull the nipple into his mouth. A crying baby will need to be calmed, since the tongue is usually elevated during crying and the baby's tongue needs to be down in order to breastfeed. When properly attached the baby's lips are flanged outward over the much of the areola as illustrated in Figure 2.7 below.

Figure 2.7

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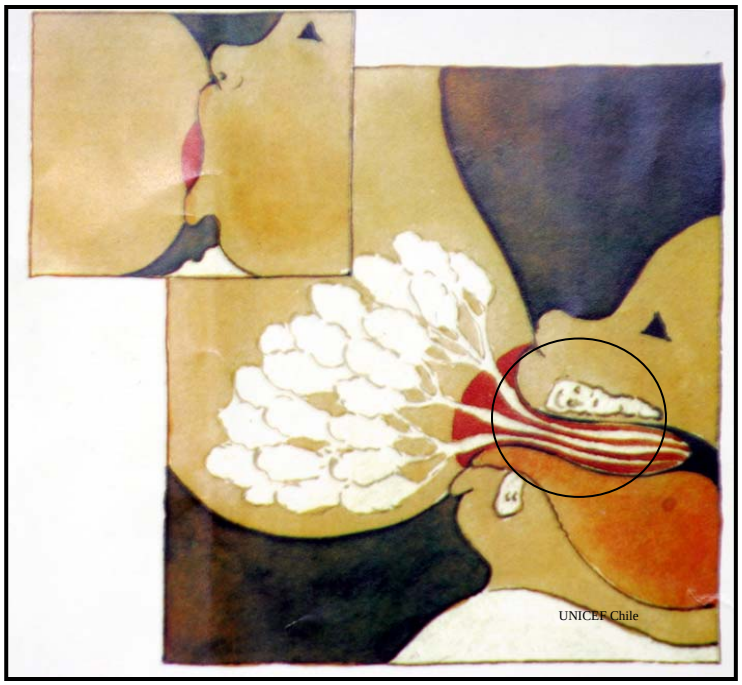


Suckling is a rhythmic pattern as the tongue presses the elongated nipple/areola against the hard palate and massages the milk from the lactiferous ducts beneath the areola. The stimulus for the infant to begin suckling is the nipple touching the junction of the hard and soft palate.

Assisting a mother to learn how to help her baby attach or latch-on effectively is very important to preventing problems and achieving breastfeeding success. (Note: Always observe breastfeeding before intervening. Mothers and babies may be doing fine and need only encouragement.)

Step 1: Elicit the rooting reflex by touching the baby's upper lip with mother's nipple.

Step 2: Bring baby into the breast so that baby gets a large mouthful of nipple and areola.

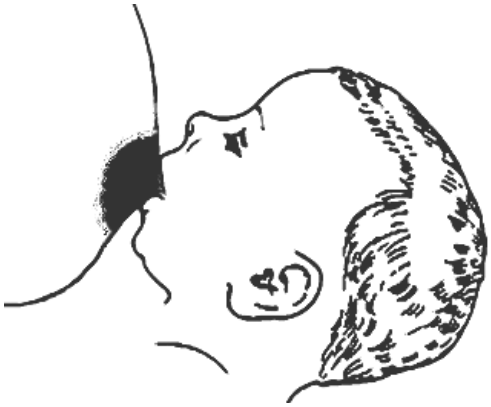
Once attached correctly, the infant's

- *nose* just touches the breast,
- *lips* are flanged out,
- *chin* is against the breast. If the mother has a large areola, more of the areola is visible above the upper lip than below the lower lip. This is known as an "asymmetrical latch".

Good Attachment (Lips flanged out, nose touching breast)

Poor Attachment (Lower lip curled in, nose not touching breast)

Poor Attachment



Adapted from WHO/UNICEF 20 hour BFHI Course

Poor attachment reflected by:

- tight pursed lips
- space between chin and breast
- space between breast and nose
- infant's lower lip pulled in
- mother may feel pain
- nipple may be flattened after a feeding
- nipple abrasions and/or cracking

Poor suckling technique reflected by:

- lack of sounds of swallowing
- short, quick (flutter)sucking movements only
- mother may feel pain

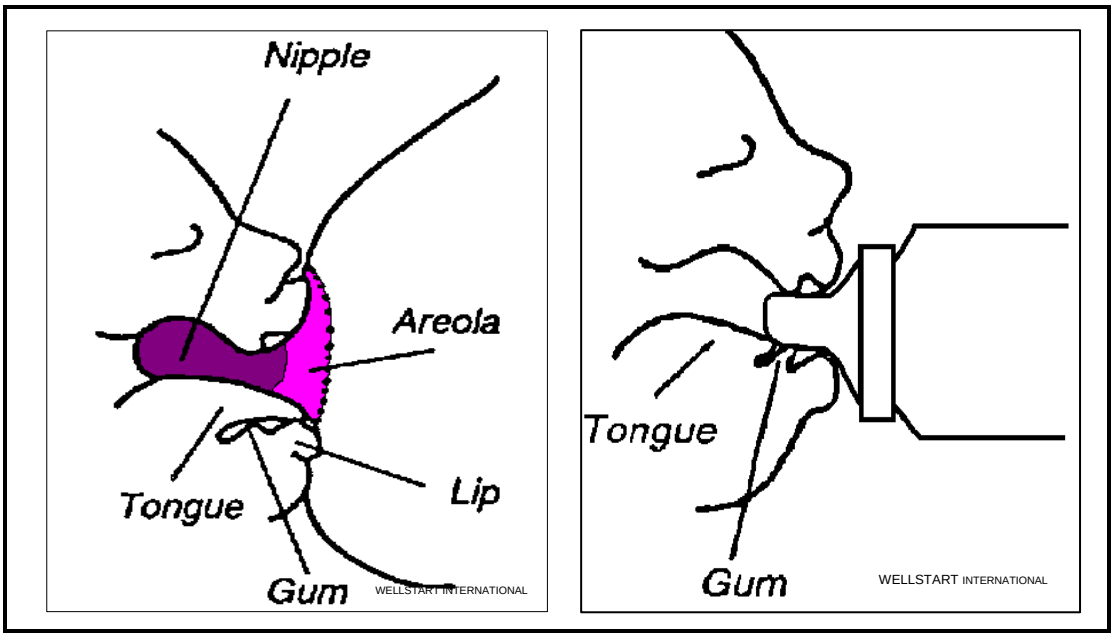
If someone is assisting the mother with getting the baby attached, the helper's hand should support the head, neck and shoulders below the occiput. Forward pressure to the back of the head causes the baby to arch making it difficult for the baby to attach effectively.

What's the difference between breastfeeding and bottle-feeding?

There are significant differences between what is necessary for a baby to remove milk from bottle in contrast to effectively breastfeed (Figure 2.8). Breastfeeding requires the coordination of sucking, swallowing, and breathing as well as coordination of the tongue, gums, and cheeks. The newborn uses it's mouth very differently when feeding from a bottle. Milk flows from a bottle by simple compression and gravity. Until the baby is a master-feeder and the milk supply is established, it is better to avoid artificial nipples, including pacifiers, so the oral stimulus is consistent. Once a newborn has mastered breastfeeding (by three to four weeks of age) many babies will very likely be able to manage both methods and should be able to obtain expressed breast milk in a bottle without difficulty.

If breastfeeding is temporarily not possible, cup feeding can be done if necessary. This helps to avoid the problem of becoming adapted to bottle feeding technique and refusing to return to breastfeeding.

Figure 2.8



Evaluation of a Breastfeed

…How do we know if the baby is getting milk…?

Mothers breastfeed successfully without knowing all the following details, but these techniques have proven successful and should be tried if the mother is experiencing problems:

Observe breastfeeding before suggesting interventions. Interventions should be suggested only if a problem (pain, nipple trauma, ineffective milk removal, failure to gain appropriately) exists.

Signs of suckling effectiveness:

- non-nutritive suckling: 2 to 3 sucks per swallow at the beginning of a feed, without significant milk transfer. This stimulates the let down reflex.
- nutritive suckling: is slower and more rhythmical, 1:1 or 2 sucks per swallow, , and milk is transferred
- audible swallowing (a quiet “cuh” sound)

Length (Duration) and Frequency of Feeding

… How long should a breastfeed last? …

- Breastfeeding is “baby driven”. The baby asks to feed when hungry and stops when it is satisfied. Feeding “on demand” allows the infant to indicate when he or she is hungry. Crying is a late sign of hunger. Breastfeeding should be initiated in response to early hunger cues:
  - waking up
  - bringing hands to it’s mouth
  - rooting
  - mouthing movements

Breastfeeding should also reflect the needs of the mother and she may try to get the baby to feed if her breasts are becoming uncomfortably full.

- Feeding patterns vary greatly among babies; some feed quickly, others slowly. The important thing is to feed long enough to obtain the hindmilk. Milk has slightly more fat with each let-down ejection.

- Let the infant finish feeding on the first breast, burp baby to see if displacing air makes baby interested in taking more, then offer the second side. The baby signals it is finished when he or she spontaneously releases the breast, falls asleep with the nipple in it’s mouth, or discontinues suck/swallow patterns. Sometimes one breast is sufficient. Switch starting sides at each feeding.

- Mothers have variable amounts of milk fat and total milk volume throughout the day, so the baby may feed for different lengths of time from one feeding to the next.

- Every mother/infant pair is different. The baby’s style of feeding and the flow of the mother’s milk vary from pair to pair. Very long or very short feeds may indicate a problem and should be evaluated. The best way to evaluate the baby’s effectiveness is to observe a feeding. Look at how the baby is attached, listen for swallows, and assess whether the mother is comfortable throughout and baby is content after the feed.

- If a mother needs to release her baby from the breast during a feeding, she can break the suction created by feeding using a finger to press on her breast at the junction of the baby's lips or by putting a clean finger into the corner of the baby's mouth. This gentle manner of helping the baby off the breast can help prevent sore nipples. The nipples should appear as they did before the feeding; i.e., round, not reshaped or flattened.

What is a typical breastfeeding pattern for a newborn?

- The healthy newborn should be given the opportunity to breastfeed immediately after birth – a time when normal non-medicated term babies are most alert. The initial alert period is usually followed by a period of sleep. Though many newborns initiate breastfeeding within the first 60 minutes of birth, not every normal baby does this. Some simply nuzzle and do not attach until a bit later. As noted earlier, studies suggest that the opportunity for S2S contact is important to breastfeeding success.

- A newborn usually signals the need to feed every 1-3 hours (timed from the start of one feeding to the start of the next). Newborns often feed most frequently during first 2-7 days, when lactogenesis occurs. A daily frequency of 10 to 12 feeds is ideal, especially in the early weeks of life. Many normal babies seem to breastfeed more at night especially during the first week or so.

- During the first 2-7 days, intervals of greater than 3 hours are not recommended. The mother should awaken the infant and offer the breast if he sleeps longer than 3 hours, or if mother feels too full.

- If the infant is sleepy, remove blankets and extra clothing so he is not too warm. Feed in a more upright position, such as side-sitting. This helps him maintain a state of alertness so he can feed better. "Skin to Skin" may also help awaken a sleepy baby.

- Once lactation is established, a pattern of at least 8 feedings/24 hours (day and night) is common. Sleeping longer stretches at night may be a pattern seen after about six weeks of age. A baby who sleeps all night in the beginning is probably not getting enough calories. Since prolactin levels are highest at night, night feeds are important to ensure adequate stimulation for milk production and for suppression of ovulation.

- Some babies will "cluster feed" that is feed very frequently at times and extend the time between other feedings. If the baby is gaining well this is a normal variation.

… How do we know if the baby is getting enough? …

A trained observer (health care provider/lactation specialist or consultant) should watch a feeding to evaluate position and attachment and the newborn's effectiveness. The main concern of most parents is whether the baby is getting enough milk. If the mother is taught to watch for signs of adequate intake, she can feel more relaxed when the baby exhibits the following criteria; conversely, if the infant falls outside these parameters, he deserves an evaluation:

- Frequent, soft bowel movements (3-4 or more/24 hours by day three, yellow stools by day four) during the early weeks. After 5 or 6 weeks some normal breastfed babies do not stool for several days.
- Wet diapers: 6 or more/24 hours by day three. Diaper count may not be accurate if newer absorbent diapers are used but a normal infant will urinate at least 6 times in 24 hours.
- Sounds of swallowing during a feed
- Contented infant between feeds
- Average weight gain of 20 – 30 gm. (¾ - 1 ounce) per day or 100 – 200 gm (5-7 oz) .per week. Recent studies indicate that velocity of weight gain varies with birth weight, smaller babies gaining more slowly than larger babies. Full term infants should start to gain weight by the third to fifth day of life; most infants regain birth weight by about seven to ten days after birth. Infants who lose 7-8% or more of their birth weight need careful evaluation and follow-up to be sure there isn't really a problem. Babies who breastfeed early regain their birth weight earlier,

Additional signs for the mother:

- Mother's breasts feel full before a feed and softer afterward
- Let-down sensation in mother's breasts (not all mothers experience this sensation)
- Uterine cramping may be felt for the first few days with every breastfeeding. This is a sign of oxytocin release and let-down.

Anticipatory Guidance

It is helpful to talk to mothers about their knowledge of breastfeeding and about their individual situation in order to know best how to provide information and support.

- What information about breastfeeding do you already have? It is helpful to know her baseline breastfeeding knowledge and if she is aware of the risks of not breastfeeding. A prenatal breastfeeding class provides the foundation for the mother and baby getting off to a successful breastfeeding experience. Then the

short time from delivery to discharge can be utilized for the lactation staff to help with the mechanics of breastfeeding and with newborn care. Also a mother may have watched breastfeeding videos, read books, and talked to family and friends. Some women do not avail themselves of prenatal breastfeeding information because they think "it's a natural process" so what is there to learn? Health care providers can be instrumental in this situation..

- Are family members and friends supportive of your interest in breastfeeding? Unsupportive family members and friends easily undermine a new mother's confidence.

- Will someone be at home to help you in the early weeks? All new mothers can use help at home in the early days. She will need time to eat, sleep and feed the baby frequently. It is most helpful if someone else can help with housework and/or errands. With no help, a new mother is at high risk for early weaning since the first couple of weeks can be overwhelming.

- Do you have any special medical problems that require medications? Though there are a few drugs that are contraindicated during breastfeeding (see module I) most medications are compatible with breastfeeding. The mother's regular medications should be reviewed and alternative selections made if necessary.

- What is your breastfeeding plan? Some mothers have preconceived ideas about the length of time breast milk should be provided, and these ideas may be based on a misunderstanding of the current recommendations. A family can be encouraged to breastfeed for as long as possible. Potential barriers and ways to overcome them can discussed, such as the return to work or school. Current recommendations by many agencies and organizations suggest 6 months of exclusive breastfeeding. Solid foods should be introduced at 6 months along with continued breastfeeding for two years of life and beyond for as long as mutually desired by mother and child.

- Are you planning to return to work/school? Mothers may believe breastfeeding and work/school are not compatible. They can be advised that breastfeeding can continue, perhaps in a modified form, and that this can be discussed in more detail at a later time. If a mother decides to express her milk and leave it for the caregiver to feed the baby, she needs to have the information prior to returning to work/school so she can learn to hand express her milk or obtain a pump and store some milk ahead of time. (Ideally this discussion is started prenatally.)

- Have you had any breast problems or surgery in the past (to increase or decrease breast size, biopsies etc) Previous surgery does not necessarily indicate that there will be any difficulties with breastfeeding but more careful follow-up may be warranted.

In addition to the questions listed above, a multipara who has some breastfeeding experience should be asked the following:

- How long did you breastfeed before? Why did you stop at that time?
  A mother may have begun breastfeeding a previous infant but stopped because she experienced problems. This is a good time to let her know that most problems are preventable and there are resources in the hospital and community to help. She should be praised for choosing to breastfeed this new baby. This mother should be given extra attention to make sure things are going well in the hospital and beyond. A consult with a lactation specialist may be indicated.

Of course, as a part of thorough prenatal care, a careful examination of breasts should be done. Observations of importance include variations in breast or nipple shape and breast changes consistent with pregnancy. The examination offers a good opportunity to discuss any concerns that the mother may have about her ability to successfully breastfeed her baby and provide reassurance.

Early Hospital Routines

Hospital policies and practices influence breastfeeding outcomes by encouraging or discouraging optimal breastfeeding behaviors. Mothers who choose to breastfeed their newborns should be helped to assure a good start.

In 1989, a document titled **"Protecting, Promoting and Supporting Breastfeeding: *The Special Role of Maternity Services"*** was issued as a joint statement by the World Health Organization (WHO) and United Nations Children's Fund (UNICEF) to provide guidelines for hospitals and maternity centers. This document described *Ten Steps to Successful Breastfeeding.* The evidence-based **"*Ten Steps*"** now comprise the basis for the international Baby-Friendly Hospital Initiative (BFHI), a UNICEF/WHO sponsored hospital centered voluntary program of training and policy development to support the breastfeeding mother and newborn. At the time of the preparation of this 3rd Edition of the Self-Study Modules, nearly 20,000 hospitals around the world had been designated as Baby Friendly. In addition, many hospitals, though not as yet designated, are now working on policies that include the **"Ten Steps".**

The first two of the **"*Ten Steps"*** provide the foundation by requiring a hospital policy that supports breastfeeding and trained staff who can assist the mother. Specific clinical practices are then delineated:

Step 1: Have a written breastfeeding policy that is routinely communicated to all health care staff.

The Academy of Breastfeeding Medicine offers a model hospital policy (Protocol #7) which can be downloaded without charge and adapted as needed by hospitals and maternity services. (see Annex G, Web Sites of Interest)

Step 2: Train all health care staff in skills necessary to implement this policy.

A course to provide basic training for health care staff has been designed by WHO and is available for downloading without charge from the WHO website (see Annex G: Web Sites of Interest)

Step 3: Inform all pregnant women about the benefits and management of breastfeeding.

- Women need to know early in pregnancy the benefits of breastfeeding in order to make an informed choice about infant feeding.
- The mother's previous experience with breastfeeding should be elicited in order to correct misconceptions or to prevent problems she experienced before.
- Pregnant women should know what to expect in the first few days postpartum and the basics of continued breastfeeding.
- Even mothers with a disability can be assisted with breastfeeding and should be informed about the benefits and management of breastfeeding.

Step 4: Help mothers initiate breastfeeding within an hour of birth.

- The baby should be given an opportunity to breastfeed immediately after a normal delivery. The suckling reflexes are present at birth, and colostrum in the mother's breasts is full of immunoglobulin and vitamin A. Colostrum is considered by many to be the baby's "first immunization". As noted earlier this first breastfeed should be "skin to skin".
- A mother who has had a Cesarean birth should start to breastfeed within one hour of being able to respond to her newborn.

Step 5: Show mothers how to breastfeed and how to maintain lactation even if they should be separated from their infants.

- The mother should be shown how to position and attach her baby correctly and a breastfeed should be observed and evaluated by a knowledgeable observer.
- Every mother should be shown how to hand express her milk. If she is separated from her baby she can maintain her milk supply and in many cases the milk can be saved and given to the baby.

Step 6: Give newborn infants no food or drink other than breast milk, unless *medically* indicated.

- Supplementation with breast milk substitutes should be given only if medically indicated*.If supplement are considered necessary, human milk is best. If a

non-human milk supplement is required, hydrolyzed cows milk is best to avoid allergy

- As a rule, infants need only human milk for the first 6 months of life.
- Even in hot, dry climates, human milk contains sufficient water for a young infant's needs. Additional water, sweet drinks, or teas are not needed.
- If the baby is supplemented, there is a missed opportunity to practice breastfeeding skills and baby ingests less breast milk.
- With less human milk intake there is less immunological protective effect.
- If substitutes for human milk are introduced, there is a risk of allergies (soy-based formula is probably no better than cow's milk -based formula).

*Note: In early 2009 WHO and UNICEF completed an updated statement of *Acceptable Medical Reasons for Use of Breast- milk Substitutes* . A copy is included in the annexes of this Self-Study tool as annex B". It may also be obtained from WHO, the Departments of Child and Adolescent Health and Nutrition for Health and Development. www.who.int/child_adolescent_health and www.who.int/nutrition.

Step 7: Practice rooming-in and allow mothers and infants to remain together 24 hours a day.

- Minimizes separation.
- Provides practice for the mother in the skill of breastfeeding.
- Mother can respond to her baby's needs right away and start to build her milk supply
- It is a prerequisite for a baby-driven feeding pattern.

Step 8: Encourage breastfeeding on demand.

- Frequent suckling is the stimulus to produce enough breast milk for the baby's needs.
- Frequent effective feedings stimulate passage of meconium and help minimize physiologic jaundice.

Step 9: Give no artificial nipples or pacifiers to breastfeeding infants.

- Use of these devices introduces the possibility of reinforcing poor suckling technique.
- In addition, they may be a source of re-infection.
- The breast both pacifies and nourishes the infant.

Step 10: Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic.

- Support groups provide information and socialization.
- Help mother identify the supportive people in her environment (e.g., family, friends and community support groups).

- Encourage mothers to get help from family and friends during the early postpartum period. Rest and relaxation are helpful both to recover from the delivery and for successful lactation and breastfeeding.

Further information regarding BFHI can be obtained from UNICEF or WHO via their web sites provided in Annex G.

International Code of Marketing of Breastmilk Substitutes

During the 1960s intense marketing of substitutes for human milk and breastfeeding began to be observed in parts of Africa and other regions in the early stages of economic development. Health care providers working in these areas noted that the use of these substitutes was associated with increases in infant malnutrition, diarrhea and mortality in the target regions. Much concern was expressed by international agencies, governments and the general public. In 1981, after a number of international meetings and legal actions, the member countries of the World Health Assembly (WHA) with the exception of the United States, approved a resolution known as *The International Code of Marketing of Breastmilk Substitutes.* This document, updated every two years through resolutions of the WHA, provides guidelines for the companies that make and market substitutes and bottles and nipples (teats), the health professionals who may advise the use of substitutes for their patients and governments who are responsible for the health of their citizens.

In 1992, when UNICEF and WHO developed an international voluntary program to assess and designate hospitals that put the "***Ten Steps"*** into place as the core of the Baby Friendly Hospital Initiative. Evidence of being "Code Compliant" was incorporated into the assessment criteria. As a result the *International Code of Marketing of Breastmilk Substitutes* is considered by many to be an Eleventh Step. Among criteria of being "Code Compliant" is that the hospital can no longer receive free supplies of formula but must purchase formula for use in the hospital. In addition, the marketing method of giving free formula company "gift" packs to new mothers as they are being discharged from the hospital is not allowed.

A summary of ten major provisions of the Code of Marketing can be found in Annex D. A more detailed guide regarding specific responsibilities of health professionals under the Code has recently been revised and published by the International Code Documentation Center (ICDC). Copies of this document may be ordered from the IBFAN Office in Penang, Malaysia.

Additional detailed information regarding the Code of Marketing can be obtained from the following websites:

International Baby Food Action Network : www.ibfan.org

World Alliance for Breastfeeding Action (WABA): www.waba.org.my

Baby Friendly Communities

Because of the success of the "Ten Steps" and the Baby Friendly Hospital Initiative in supporting mothers and families who wish to be able to achieve optimal feeding for their infants and children, there has been an increasing interest in expanding these concepts beyond hospitals. Communities that have begun to explore this idea are adapting the "Ten Steps" to other non-hospital health care facilities. They are also working on legislation and regulations that accommodate working breastfeeding mothers such as bringing babies to work, day care facilities that are prepared to support their breastfeeding mother-baby pairs and time and an appropriate place to express or pump milk while at work.

Discharge Planning .

- Observe a breastfeed before discharge
- Arrange follow-up for mother and infant at three to five days of age (and within 48-72 hours of hospital discharge); check infant's weight, voiding and stooling patterns, perform a physical exam and observe a feeding. At this and future routine visits, ask about breastfeeding to reinforce successful feeding or to identify problems early.
- If a problem develops before the follow-up visit, mothers should be instructed whom to contact and urged to do so.

……..Veronica is still waiting for you on the postpartum unit.
She delivered 24 hours ago. She is worried about her sleepy baby and what she believes to be lack of milk. The nurse tells you she has asked for formula to give the baby. As you enter her room, you see the baby, wrapped snuggly in his blanket, beginning to stir. What are three things you will do to help this mother and baby?

1._____

_____

2._____

_____

3._____

_____

_____

You may have answered in following ways:

1. Find out how breastfeeding has gone so far by talking to the mother, to the staff, and reading the medical records (check urine and stool output, weight).

2. Examine the baby. The baby should be beyond the normal postpartum sleepy period now. The fact that he is stirring may indicate a readiness to feed. Your exam will also stimulate him!

3. Leave the baby undressed except for his diaper and assist the mother to use the side-sitting (modified football) position. Unbundling the baby and using the upright position for feeding helps the baby stay awake.

4. Observe a feeding, noting position, attachment, and whether the baby is effectively feeding (listen for swallows). Make adjustments to improve position/attachment as needed.

5. Review with the mother the landmarks for good attachment and point out the quiet sounds of swallowing.

6. Review with the mother the signs of adequate milk intake (contented baby, weight gain, stooling and urination).

7. Review with the mother the basics of building and maintaining a milk supply (frequent breastfeeding, milk removal stimulates milk production, leave baby on first side until he signals he is full then offer second side). Without a clear medical indication, formula use can interfere with building a milk supply.

8. Referral to a lactation specialist/consultant or to a hospital staff member with formal lactation training if mom and baby are having breastfeeding problems. Mother and baby should not be discharged until feeding is going well.

9. Discharge instructions should include the following:
    - ◈ If discharged early, less than 48 hours of age, baby must be seen within 48 hours of discharge
    - ◈ If discharged after 48 hours, the baby should be seen in 2-3 days
    - ◈ A 24 hour helpline phone number
    - ◈ Information for mothers on when to call for help from primary care provider or lactation specialist/consultant
    - ◈ A breastfeeding “intake and output” form
    - ◈ Printed information on breastfeeding support groups in the community

Conclusion

An understanding of the anatomy and physiology involved in the natural process of breastfeeding is essential in order to provide care that supports optimal breastfeeding

practices. The basic breastfeeding routines are based on physiologic principles, and adhering to them prevents problems from developing. Helping a mother and infant off to a good start is one of the best investments in time and effort.

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Module Three

Common Breastfeeding Problems

Objectives

After completing this module, you will be able to:

1. Discuss causes and prevention of common breastfeeding problems.
2. Recognize that infants and mothers with special health care needs can breastfeed.
3. Recommend treatment options compatible with breastfeeding
4. Recognize when and how lactation can be sustained during mother/infant separation.

Introduction

From time to time, mothers encounter problems with breastfeeding. Most problems are preventable with good breastfeeding practices: *correct positioning and attachment, frequent unlimited feeds, and attention to the effectiveness of the infant's suckling.* When problems do occur, early recognition and treatment enable a mother to begin or continue to enjoy breastfeeding and help reach the recommended goals of exclusive breastfeeding for six months and continued breastfeeding for a year and beyond.

Maternal Problems

Case #1: Inverted Nipples

Ann is 20 weeks pregnant. She has read about the advantages of breastfeeding and wishes to nurse her child, but her mother and sister both have inverted nipples and were not successful at breastfeeding their babies. Today, at her prenatal appointment she would like to find out if she has inverted nipples and wants your opinion on whether she should try to breastfeed or not.

What are "inverted nipples"?

Inverted nipples are often a family trait, present from birth, and caused by failure of the mammary pit to elevate during fetal development. One or both nipples may be affected. This condition may hinder the newborn's ability to grasp enough nipple/areola to suckle effectively.

WELLSTART INTERNATIONAL

Inverted Nipple

Can a woman with inverted nipples breastfeed?

Yes, however the mother and baby often need a little extra help.

The natural hormonal changes during pregnancy that affect the breast often cause the nipple to protrude to some degree. Some babies are able to pull out the inverted nipple and feed well and with every breastfeed they bring the nipple out a little more. When only one side is involved, the mother may elect to continue breastfeeding primarily or exclusively from the unaffected side.

Other newborns need the stimulation of a longer nipple before they will begin suckling. In this case, the mother can use a pump to gently draw the nipple out before each feeding. She will need help with position and attachment from a knowledgeable person in the early postpartum period. The helper should teach the mother to evaluate the feed by providing her with indicators of adequate breast milk intake and give her resources for additional assistance after discharge from the hospital.

As a last resort, an ultra-thin silicone nipple shield can be temporarily used. It is best to avoid bottles and pacifiers in the case of inverted nipples because the baby can get used to the feel and flow of the longer artificial nipple and may refuse the breast.

Can Ann do anything during pregnancy to evert her nipples?

Until recently women with inverted nipples were told to use a variety of exercises (called Hoffman's Maneuvers) and devices to try to evert the nipple. The latest clinical trials demonstrated that these strategies are ineffective. In fact, women who did nothing to prepare their nipples prepartum had the best results. Current advice, then, is to alert the mother that she should request assistance with breastfeeding at the time of delivery and postpartum until the baby is feeding well.

At Ann's visit today, what 3 points would you like to be sure to cover to answer her questions?

1. _____

_____

2. _____

_____

3. _____

_____

You may have selected from the following:

1. Women with inverted nipples can breastfeed; they may need more help postpartum.

2. There is nothing special she needs to do during pregnancy.

3. She should request assistance with breastfeeding as soon as possible after delivery.

4. After delivery a breast pump might be useful to help evert the nipples. In some countries, if a pump is not available, a 20 ml syringe with the adaptor end cut off and plunger inserted backwards is used to help draw out a nipple.

5. Avoid bottle and pacifier use so the baby does not become accustomed to the longer artificial nipple which feels and flows differently.

6. When all else fails, an ultra-thin silicone nipple shield can be tried temporarily.

Case #2: Sore Nipples

Jane is 7 days postpartum. She has been breastfeeding every two or three hours. Her nipples have been getting progressively more tender with each breastfeeding session. Today she notices scabs on both nipples. She had heard that breastfeeding hurts in the first few days and she expected to have to "toughen" her nipples, but this is too much! She has come to you for advice.

What are the most common causes of painful nipples?

Nipple Trauma

WELLSTART INTERNATIONAL

Among the many myths of breastfeeding, the most common is that "breastfeeding hurts". Although painful nipples is a major reason given for early cessation of breastfeeding, today there are an increasing number of health care providers and lactation consultants with the skills and knowledge to assist mothers in avoiding nipple problems.

Transient Pain

Nipple tenderness and sensitivity will usually subside within a few days if positioning and attachment are corrected.

Intense Prolonged Pain

- Usually related to physical trauma (mechanical)
- Infection

Causes of physical trauma to nipples

- Improper position and attachment
  - ✓ Engorgement
  - ✓ Not breaking suction when removing baby from the breast.
  - ✓ Ankyloglossia (tongue-tie)
  - ✓ Mandibular asymmetry or torticollis resulting from intra-uterine positioning
  - ✓ Delivery related issues which may cause alterations in the baby's oral motor behavior:
    - ✓ prolonged pushing
    - ✓ traumatic delivery

- ✓ forceps or vacuum delivery
- ✓ intra-partum drugs transferred from mother to infant before delivery.

What can be done to alleviate painful nipples due to physical trauma?

- Examine the breasts before and after a feeding.
- Observe a breastfeeding to evaluate and correct position and attachment. With correct position pain will often decrease and mother can continue to breastfeed while nipples heal.
- Check baby's mouth for ankyloglossia . A frenotomy may be necessary to allow appropriate tongue movements and to avoid chronic nipple trauma.
- Ensure feeding frequency to avoid engorgement.
- A change of position of the baby at each feeding may help.
- The use of nipple creams and ointments or the application of expressed breastmilk to the nipples after feeding to alleviate sore nipples is of questionable value. Some mothers find the use of hydrogel pads to be helpful in treatment of ulcerated fissures

Candidiasis as a cause of nipple pain

Candida albicans (yeast that causes thrush) thrives in moist environments like the vagina, nipples, areola of breastfeeding mothers, and infant's mouth and diaper areas. An overgrowth of yeast is often the result of either mother and or baby receiving antibiotics. Mother and baby need to be treated simultaneously even if symptoms are present in only one of the dyad.

Mother: Nipple and Areola Candidiasis

- Nipple may appear red and dry.
- Areola may be shiny, pink, depigmented, and flaky or there may be no visable signs.
- Breasts may feel itchy or feel burning throughout and after a feed.
- Pain may radiate into the breast and to the mother's back.

Maternal Treatment for Candidiasis

Antifungal medication

Mycostatin (Nystatin) (though mycostatin has been commonly used for first line treatment of Candidasis, increasing resistance and poor absorption often favors other medications.

Miconazole (Monistat) not well absorbed.

Ketaconazole (Nizoral)

Fluconazole (Diflucan) (Although this drug is not approved by the US Federal Drug Administration (FDA) for this purpose, it is sometimes used if other treatments are unsuccessful or if candida reappears.

Gentian violet is a purple dye which when applied to affected area works quickly to kill candida. It must be diluted to an aqueous solution of 0.25 for the infant's mouth and 0.5% for the mother's nipples.

.

- Other important aspects of treatment of Candidiasis:
  - Continue to breastfeed.
- Good hand washing
- Ibuprofen can be used for pain
- If an antifungal is prescribed, it is important to complete the course of treatment
- Use disposable or clean, dry nursing pads
- Wash bras and night clothes in dilute bleach or sun dry
- Air dry breasts as much as possible.
- All pump parts touching milk or breast should be washed and boiled daily.
- Eliminate alcohol and minimize sugar in the diet.
- Add acidophilus in the form of yogurt, pills or acidophilus milk to diet to assist normal colonizing of bacterial flora.

Baby: Oral Thrush

White cheesy patches on tongue, palate, buccal and gingival surfaces—mother may think it's milk. Yeast is difficult to remove without causing bleeding—while milk is easily removed. Baby may be irritable and not feed well.

Treatment

- Continue to breastfeed
- Wash hands thoroughly
- After breastfeeding apply antifungal medication to tongue and all areas of mouth using a clean cotton swab.
- Wash, boil or discard all objects touching infant's mouth; i.e., pacifier, bottles, nipples.

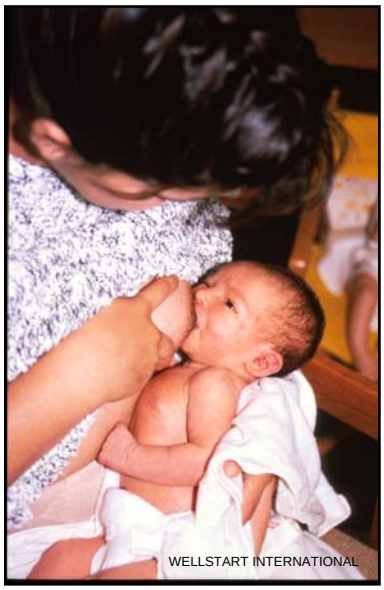
Baby: Candida Diaper Rash

It is important to examine the infant for signs of a candida diaper rash. The rash maybe fiery red, wet appearing with sharp demarcated edges and satellite lesions. Baby is irritable and fussy and may not feed well. If the treatment of candidiasis of the nipple and areola is to be successful, the diaper rash must be simultaneously treated.

Treatment

- Does not respond to usual diaper rash treatments
- Change diapers often
- Rinse diaper area with warm water and air dry
- Apply a local antifungal treatment to the area as directed.
- If rash persists the infant a systemic medication be needed/
- Good hand washing

…Jane and her baby await your assistance. The infant's weight is a few ounces below his birth weight. He is alert. Jane tells you he has many wet diapers and about 4 yellow stools every day. There are no risk factors for candidiasis and no signs of the infection in either the mother or infant. You ask Jane to feed the baby. You notice scabs in the center of each nipple. She tells you the pain began the first day postpartum and has become worse, not better. She holds the infant across her lap. The infant is lying partially on his back with his face turned up toward the mother. There is quite a lot of areola visible around the baby's mouth. Jane winces as the infant begins to suckle.



What do you think is causing Jane's sore nipples?

What will you do to help Jane?

1. _____

_____

2. _____

_____

3. _____

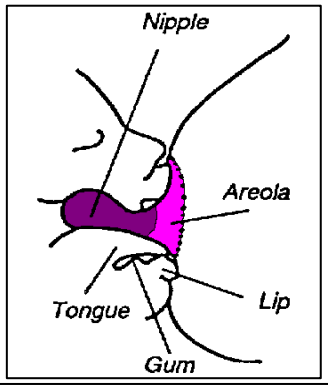
_____

You may have done the following:

1. Make adjustments to the position and attachment. If these changes ease Jane's pain ask her to practice helping her baby attach a few times so she is more comfortable and confident that she can do this at home. In the commonly used cradle hold the baby should be lying on his side facing the mother (so called "tummy to tummy") His body should be on a 45 degree angle and well supported in his mother's arms.

2. Appropriate attachment can be attained by:
   Baby in REM or quite alert state.
   Position baby's nose at the level of the mother's nipple.
   Stimulate baby's upper lip with mother's nipple which will cause the baby to open it's mouth wide.
   Bring the baby quickly onto the breast leading with the chin first.

- Attached correctly, the infant's:
  - ✓ Head tilted slight up and back
  - ✓ *nose* just touches the breast
  - ✓ mouth is wide open
  - ✓ more areola visible above the upper lip than below the baby's lower lip
  - ✓ *lips* are flanged out
  - ✓ *baby's chin* is against the breast.



Case #3: Engorgement

Carmen asks for advice about her 4-day-old infant. He had attached well during postpartum feedings in the hospital and his first day at home. He is now refusing to attach to the breast and feed. She can feel that her milk has come in, and her breasts are swollen and tender. She is quite uncomfortable.

Breast Engorgement

What is the most common cause of engorgement?

The most common cause of engorgement is infrequent or ineffective milk removal. At the time when the "milk comes in" at 3 to 5 days postpartum, the rapid increase in milk volume can cause vascular congestion and edema. This can also happen if mother or baby skips a feeding. The breasts become swollen and have a shiny appearance. They may be tender, often feel hot and have diffuse redness. In addition, the Feedback Inhibitor of Lactation (FIL) begins to decrease milk production.

The treatment is milk removal, and the most sensible strategy is for the baby to attach and feed! Sometimes engorgement may be so severe that the breast and areola become swollen and hard and the nipple flattened. The infant has a difficult time pulling the nipple into his mouth.

Helpful strategies to reduce the swelling include:

- A warm shower or warm moist packs to the area may help the mother relax and enhance milk flow.
- Gentle massage and hand expression to soften the areola and facilitate attachment of the infant onto the breast.
- More frequent and effective feedings (every 2-3 hours or more frequently if the baby is willing).
- If baby will not nurse frequent and effective emptying of breasts by hand or breast pump until engorgement is resolved.
- Cold packs after feeding (for about 5 minutes) to relieve heat, congestion, and pain.
- A supportive bra helps alleviate the heaviness associated with engorgement.

What will you do to help Carmen today?

1. _____

_____

2. _____

_____

3. _____

_____

You may have done some of the following:

1. Explain to Carmen that engorgement is a temporary problem and the treatment is to get the milk to flow.

2. Apply warm, moist compresses, such as washcloths wrung out in warm water. Ask her to gently massage the areola and hand express milk to soften the area so the baby can attach.

3. Help with position and attachment and observe the baby for signs of effective nursing.

4. If the baby is not able to suckle effectively, the mother may need to use hand expression or a breast pump until the engorgement is resolved. (The expressed milk can be given to the baby some other way.) If expression is effective the baby should be able to feed directly from the breast within a few hours

5. Apply cool compresses for 5 minutes after feeding or pumping.

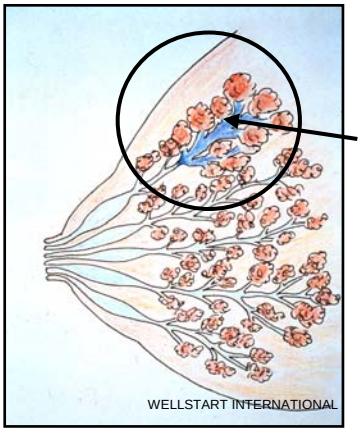
6. Frequent feeding or pumping (about every 2-3 hours) will prevent reoccurrence of engorgement.

7. If engorgement persists longer than 24 hours or if the infant cannot attach and nurse effectively, refer the mother to a health care professional with expertise in lactation and breastfeeding issues.

Case #4: Obstructed Lactiferous Duct

Maria has been breastfeeding her six week old son. Yesterday she noticed a tender area in her left breast. She felt a lump in the same area. She feels well otherwise. Her baby recently began sleeping a six-hour stretch at night. During the day she wears a nursing bra with under-wire support.

What is an obstructed duct?



An obstructed duct presents as a localized, red, firm and tender area in the breast. The obstruction is a result of improper drainage of milk from a lactiferous duct. Inspisated milk can sometimes actually be seen as a white dot or bleb at the duct opening on the nipple. The blebs often cause excruciating pain.

What causes a duct to drain improperly?

- Infrequent nursing
- Ineffective milk removal (usually caused by poor attachment)
- Local consistent pressure on the breast, caused, for example, by tight clothing

What can be done to relieve the obstruction?

- Continue breastfeeding.
- Ensure proper position and attachment.
- Gentle downward massage from blocked area to the nipple during feeding may be helpful.
- Start feeding from the affected breast (when baby is hungry and feeding vigorously) to increase the chance that the duct is completely emptied.
- Change the position of the baby at each feeding to encourage more complete emptying of the ducts and increase the chance of removing the obstruction.
- Cease wearing underwire bras and any other constrictive clothing.

- Empty the affected breast as completely as possible, either by feeding or milk expression.
- Sometimes warm moist compresses to area 3-5 minutes before feeding is helpful.

What care can you provide for Maria today?

1. _____

_____

2. _____

_____

3. _____

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By now you get the drift…you will examine the mother's breasts and watch a feeding. During the visit you may have made the following suggestions:

1. Have the mother gently massage the breast over the lump.

2. Apply warm, moist compresses to the affected area,

3. Observe the feeding noting position and attachment; make suggestions as needed.

4. Advise the mother to continue feeding frequently, every two or three hours, until the lump is resolved. In this case, the new longer sleep pattern of the baby may have contributed to the development of the obstructed duct. The breasts will adjust to minor changes in frequency; in the meantime Maria could continue with the treatment you have discussed.
5. Note the appearance of the breasts. Are there marks on the skin that would suggest the bra is too tight? Suggest she remove the underwire in the bra if it appears to be a mechanical obstruction.

6. If the lump does not resolve after a few days of the treatment described above, she should return for reassessment of the situation because an unresolved blocked duct may lead to mastitis.

Case #5: Mastitis

Amanda and her 5 week-old son have come to see you today. Amanda has been breastfeeding her baby and a week ago developed a cracked nipple on her right breast. For the last 12 hours she has noticed flu-like symptoms (body aches, fatigue, fever to 101 F) She almost skipped her appointment today because she has been busy cleaning the house in preparation for her mother-in-law's visit, but she is feeling quite miserable now.

What is mastitis?

Mastitis is a bacterial infection in the breast, manifested by elevated temperature, flu-like symptoms and/or localized heat, redness and tenderness usually restricted to one breast. It may occur in the mother has missed some feedings or has not been feeding as often as before perhaps because the baby has been sleeping through the night or because of blockage to the milk flow from tight clothing. The most common organisms are staphylococcus aureus, E. coli, and (rarely) streptococcus. The portal of entry is often through a break in the nipple skin. Recurrent mastitis may also be associated with an over-abundant milk supply.

Mastitis

The mother usually complains of breast pain, fever, and headache. She may also notice a red wedge-shaped area on the affected breast.

Can a mother with mastitis breastfeed?

Yes! The infection is a form of mammary cellulitis. The infection is rarely in the milk, and infants do not become ill from sporadic mastitis in the mother. Continued breastfeeding or breast milk removal will avoid engorgement and facilitate vascular and lymphatic drainage and is an important part of treatment. Inadequate treatment of mastitis may lead to a breast abscess, a complication usually requiring surgical intervention.

There is a saying that "flu-like symptoms in a breastfeeding mother should be considered mastitis until proven otherwise." To differentiate the diagnosis, ask the mother if she has nasal discharge, cough, or other symptoms of respiratory illness. If she does not, it is most likely mastitis.

There is some evidence that stress plays a role in the development of mastitis, because it seems to occur around especially hectic times in the mother's life when there is an

increase in activities, such as in Amanda's case, getting ready for a visit from a relative. It may also be because she may miss a feeding or may breastfeed for only a short time due to preparations for the visit.

How do you manage a case of mastitis?

- Continue breastfeeding
- Apply warm, moist compresses to the area 3 to 5 minutes before feeding or pumping breast.
- Frequent milk removal (every 2 ½ to 3 hours or sooner) by feeding, hand expression or pumping of the effective side is most important.
- Encourage mother to enlist family and friends to help while she goes to bed for 24 hours. This will also facilitate feeding.
- Encourage the mother to rest as much as possible for 24 hours
- Encourage the mother to drink extra nourishing fluids and water to meet her thirst needs.
- Treat nipple trauma as described above in Case #2.
- A mild analgesic, such as acetaminophen or ibuprofen is helpful in relieving pain if needed.
- Prescribe antibiotic therapy as appropriate usually for 10 to 14 days:

    - Dicloxacillin for those not penicillin sensitive or erythromycin for those who are penicillin sensitive.

    - Clindamycin, trimethoprim or sulfamethoxazole are often used in communities where methacillin resistant S. aureaus (MRSA) is prevalent.

  Remind the mother to finish the full course of antibiotics. Most antibiotics are safe for the baby but when in doubt, check with one of the suggested sources given on page 16 of Module 1.

  Many clinicians will send a mother home with a prescription but suggest that she be diligent about going to bed, applying warm moist compresses and frequent emptying of the breasts. If she is not feeling better after 24 hours, she should fill the prescription and take all of the antibiotic. If she is not better in 24 hours after starting antibiotics, she should call her health care provider.

- Instruct the mother to continue breastfeeding; if her breast or nipples are too sore to breastfeed directly, she should hand express or use a pump to ensure **frequent, effective milk removal.** Antibiotics are less effective when milk is not removed.
- Ensure proper positioning and attachment of the baby to the breast to be sure he is effectively removing milk.

What advice do you have for Amanda?

1. _____

_____

2. _____

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3. _____

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Examination of the breasts confirms the diagnosis of mastitis. You may have recommended the following:

1. Continue frequent breastfeeding, or at least milk expression, at least every 2 ½ hours or sooner.

2. Rest as much as possible for 24 hours and have a relative or friend help with meals and household activities. Emphasize that rest is an important part of the treatment

3. Antibiotics for 10 to 14 days and an analgesic as needed. (Recent reports suggest that if milk is removed effectively antibiotics may not be needed)

4. Evaluate position and attachment as a contributing factor to the cracked nipples; manage as indicated.

5. If her condition has not improved after48 hours, she should contact her healthcare provider.

Case # 6: "Not Enough Milk"

Monica is 6 weeks postpartum. She has been breastfeeding her son, John, since birth. She breastfed about 7 times each day because she needed her 8 hours of sleep at night. Her husband gave a bottle of formula at night. Lately John has been fussy, especially in the early evenings, and they have been providing a second bottle of formula because the baby does not seem satisfied with her milk. She had planned to breastfeed for six months and is worried she is losing her milk. . .

What factors contribute to "not enough milk"?

- The most common cause of low milk supply is ineffective suckling and/or infrequent feeding routines that do not adequately stimulate milk production and milk removal.
- Early introduction (before three weeks of age) of bottles which require that the baby use a different type of feeding effort or suckling technique and may cause the baby to have difficulty nursing or refuse to breastfeed.
- Introduction of formula supplements often decreases the number of times the baby breastfeeds thereby reducing breast stimulation and thus milk supply.
- Conditions of the baby, such as illness or ankyloglossia may cause ineffective suckling (ineffective suckling reduces the milk supply).
- Condition of the mother such as fatigue, stress, use of certain medications (i.e., estrogen-containing oral contraceptives that inhibit milk production), psychological inhibition, pregnancy, and smoking.
- Mother lacks confidence in her ability to produce enough milk, or her baby is fussy or cries more during what is often referred to as an "appetite spurt" or "growth spurt". These are transient periods of time when the baby demands to feed more frequently. This seems to occur several times in the first 3 months. The mother thinks she has lost her milk supply because the baby suddenly wants to feed more often ("perceived" low milk supply). Physiologically, more frequent feeding stimulates a larger milk supply, and the baby is content until the next "growth spurt".
- At around 4 weeks postpartum, lactating breasts may no longer become very full before a feed; this change leads mothers to believe they have "lost their milk".

Monica and John (cont)

. . .John's weight is normal for his age and his physical exam is normal. Monica is well and is not taking any medications. You ask Monica to breastfeed John so you can assess the situation. He feeds effectively.

What is the most likely cause of Monica's low milk supply?

_____

_____

_____

What advice will you give Monica today?

1._____

_____

2._____

_____

3._____

_____

The most likely cause of Monica's problem is lack of adequate breast stimulation because of the introduction of formula (without extra milk removal by hand or a pump). Your advice may have included the following:

- Reassure Monica that she can build up her milk supply by breastfeeding more frequently, 8 or more times in 24 hours; review with her the principles of demand and supply that drive breast milk supply.
- Feed the baby frequently, day and night, to stimulate milk production. Studies show that prolactin levels are higher at night, and night feeding is important to maintaining a good milk supply. Around six to eight weeks of age some babies start to sleep longer at night and will feed more often during the day to maintain about 8 or more feedings in 24 hours.
- Review with Monica the possibility of an "appetite spurt" or "growth spurt" in a baby John's age, and reassure her John's requests for more frequent feeding are normal, temporary, result in an increased milk supply, and will recur.

Case #7: Jaundice in the breastfed baby

Alice is 5 days postpartum. Her newborn son, Kevin, born at term by Cesarean section for "failure to progress in labor", has been a sleepy baby, waking to feed about 6 times a day and falling asleep after about 5 minutes on each breast. He has had 2 dark-colored stools per day since hospital discharge on day 3. They are here for their routine check-up 48 hours after hospital discharge. ..

Jaundice in Normal Breastfeeding Newborns

Many normal healthy breastfeeding newborns to have an elevated unconjugated bilirubin during the first several days after birth. Some of these infants become mildly jaundiced. This phenomenon (referred by some as "physiologic jaundiced") in normal babies is related to the exposure of the fetus to the lower intra-uterine oxygen level and compensatory development of more red cells before birth. At birth, the ambient oxygen is higher and there is no longer a need for these extra red cells. The additional cells are broken down in the reticulorendothelial system. The resulting hemoglobin is further enzymatically degraded to heme, iron and carbon monoxide (CO). Iron is reutilized in new red cells and other iron containing tissues, CO is excreted by the lungs and heme is enzymatically converted initially to biliverdin and then to fat soluble *unconjugated* (indirect) bilirubin which is released into the circulation. There it is quickly bound to albumin and transported to the liver. In the liver the unconjugated bilirubin is *conjugated* and becomes water soluble. It is then excreted via the biliary tract to the intestinal tract and removed in the stool of the baby. Because of liver immaturity conversion from unconjugated to conjugated bilirubin is slower in the newborn than older children and adults resulting in a build up of bilirubin in the tissues. Any additional breakdown of erythrocytes (e.g. ABO or Rh incompatibility, bruising or hematomas occurring from delivery) will increase the bilirubin and thus the jaundice. In addition, conjugated bilirubin excreted into the intestinal tract is subject to reconversion back to the unconjugated form and reabsorbed and recirculated to the liver via the enterohepactic circulation. The combination of liver immaturity and recirculation of unconjugated bilirubin results in a transient elevation of serum bilirubin during the first week after birth. When the level of unconjugated bilirubin rises above about 5 mg% it becomes visible as a yellowish color to the skin, jaundice**,** beginning with infant's head and moving down the body. If the infant is not feeding effectively and actively moving meconium and stool from the GI tract reconversion and reabsorbtion is increased. This has been termed *Breastf**eeding** Jaundice.* The treatment of choice is effective feeding 8 or more times in 24 hours. The resulting adequate caloric and nutrient intake promotes maturation of liver function and also stimulates the passage of meconium and the excretion of bilirubin. Under these circumstances, the increase in bilirubin reaches a mean peak of 5.5 mg/dL (93.5 *u*mol/L) at 3 to 4 days and will not have serious consequences.

Occasionally the level rises considerably higher and is of concern. Close follow-up is warranted particularly if the infant is considered late preterm or has experienced problems at or shortly after delivery (hypoxia, hypoglycemia, infection). More extensive treatment may be needed and consultation with someone experienced in the care of

neonatal hyperbilirubinimia is indicated in such cases. Whatever the cause of jaundice, babies benefit from receiving their mother's milk unless the infant has galactosemia.

Some normal breastfed babies have slightly higher levels *(*≤10 to 12 mg/dL, 170-204*u*mol/L*)* of unconjugated bilirubin and be visibly jaundiced for several weeks. As long as the infant is well, growing and thriving and pathologic causes have been excluded, this prolonged jaundice (called Breast**milk** Jaundice) needs no intervention and mothers should continue to breastfeed. The cause of "breast**milk**" jaundice is still unclear.

To minimize jaundice:

- The infant should receive adequate fluid and caloric intake. Effective breastfeeding 8 or more times in 24 hours is the ideal way for the baby to have adequate fluid and caloric intake
- If an infant is not suckling well, consider having the mother pump after feeds and give the baby supplements of this expressed milk. Supplemental water or glucose water does not lower serum bilirubin and should not be given.
- Early follow-up should be arranged, particularly in cases of early discharge.

….Alice and her son Andrew are ready for their visit with you. The baby is 11% below birth weight. His temperature is normal. His skin looks jaundiced to about the level of his legs. He is sleepy but roots when aroused. You ask Alice to feed the baby. He is dressed and is wrapped in a blanket. He attaches to the breast and nurses with only a few audible swallows for about 3 minutes before falling asleep.

Andrew at 5 days of age

What will you do in this situation?

1. _____

_____

2. _____

_____

3. _____

_____

You may have done the following:

- You will want to check the bilirubin level and evaluate the jaundice; but whatever the cause, this baby needs more oral intake. Increase the frequency of effective breastfeeding.
- Ask mother if her milk has "come in" and how she is doing. Arrange for mother to receive care if needed.
- Since the baby does not appear to be feeding well, Alice must express her milk and give it to the baby. Alternatives to using an artificial nipple for giving the baby breast milk include syringe feeding, supplemental nursing units or cup feeding. A bottle may be used if any of these methods are not appropriate for the mother. If adequate breast milk cannot be expressed or otherwise provided from a milk bank, formula supplementation will be needed.
- Provide Alice with a plan for feeding the baby and recording intake and output for the next 24 hours. This may include putting the baby to the breast every 3 hours or sooner and offering supplemental expressed breast milk or formula after nursing.
- Arrange for follow-up in your office or by a home health provider the following day to check the baby's weight and assess his ability to feed effectively.
- Since jaundiced babies are often sleepy, offer Alice suggestions for stimulating the baby such as less bundling, side sitting position for feeding, burping, and changing the diaper.
- Consider referral to an experienced professional knowledgeable in management of lactation problems.

These recommendations are focused on achieving adequate intake for the breastfeeding infant. A more detailed discussion of neonatal jaundice is beyond the scope of this Level 1 tool. For the interested reader who wishes to explore this topic, thorough reviews are available in the suggested textbooks by Lawrence and Lawrence or Hale and Hartmann.

Breastfeeding the Infant with Special Medical Problems

As previously mentioned, with rare exceptions, breast milk provides the best nourishment for nearly all infants (refer to Module 1). If there is a question, the risk/benefit of human milk and the risk/benefit of not receiving the milk in a given medical condition must be weighed. In the case of structural defects such as cleft lip/palate, breastfeeding can be accommodated with an adjustment in the position, or can be assisted with a variety of feeding devices. The anti-infective benefits of breast milk to the child with a cleft are especially important, as these infants are at increased risk of otitis media.

Late Preterm Infants (Previously called "Near Term" Infants)

The late preterm infant (34 0/7 to 36 6/7 weeks of gestation) frequently has trouble getting started with breastfeeding. They are often considered more capable than they are. These babies are often sleepy, fatigue easily and have difficulty with attachment and coordination of suck-swallow-breathing. They are at risk for hypothermia, hypoglycemia, hyperbilirubinemia, dehydration or excessive weight loss. They are also frequently separated from their mothers.

Mothers of late preterm infants often have multiple births and/or a medical condition such as diabetes or pregnancy induced hypertension with a subsequent pitocin induced delivery or c-section. Skilled lactation support is indicated for both mother and baby. Such support needs to be ongoing not only while they are in hospital but after discharge.

Maternal Medical Problems

Women can breastfeed through most medical illnesses and conditions including colds and flu. Babies benefit from the immune protection breast milk provides. The few exceptions (such as HIV, active tuberculosis prior to treatment, herpes lesion on the breast, substance abuse) are discussed in detail in several references listed at the end of this module .

There is a very short list of drugs contraindicated during lactation and breastfeeding.. The drugs may either pose a risk to the infant ingesting them or affect the mother's milk supply. Again, the risk/benefit is weighed in making the choice. In almost all cases, there is an alternative drug that can be used, or the drug can be given with close observation, so breastfeeding can continue. For more information on drugs and lactation refer back to Module 1 or see the references listed at the end of this module.

Breastfeeding During Emergency Situations

Emergency situations (earthquakes, tsunamis, hurricanes, forest fires, blizzards, floods and wars) occur all over the world affecting hundreds and thousands of people, including

mothers and infants, every year. Though it is not possible to predict exactly what and when these situations will happen, it is predictable that a major emergency event will happen some place in the world several times each year. It is very important to support breastfeeding during such emergencies. Breastmilk not only provides clean, nourishing food and water for the infant, it offers immunoglobulins and other protective factors that actively help prevent infection. Breastfeeding provides warmth and a secure environment for babies during stressful situations. Contrary to folklore, lactating women can continue to produce milk during stressful events. Even mothers who have elected not to breastfeed or have already weaned can often be assisted with relactation during such events. A description of ***Infant Feeding in Emergency Situations*** can be found in appendix C for the interested reader.

Contraception during Breastfeeding

Suppression of ovulation is an effect of exclusive breastfeeding in the first six months postpartum. Women who do not exclusively breastfeed and others who wish to use another contraceptive method may choose from a variety of non-hormonal methods. Non-hormonal methods include IUDs, condoms, spermicides, diaphragms and cervical caps. Hormonal methods compatible with breastfeeding include progestin-only pills, injectables and implantables. Combined oral contraceptives should be avoided during lactation because the estrogen component interferes with milk production. Clinical experience suggests that even progestin-only hormonal methods may interfere with the early stages of milk production and breastfeeding. If possible, hormonal methods should not be initiated until 6 weeks postpartum after an adequate milk supply has been established. Barrier methods can be recommended during this time. Other non-hormonal methods include IUDs, spermicides, diaphragms and cervical caps

Extensive studies of the suppression of ovulation during lactation indicate that this postpartum phenomenon is reliable enough to be accepted as a method of contraception (Lactational Amenorrhea Method or LAM) If guidelines* are adhered to during the first six months postpartum, the risk of pregnancy is less than 2%. The studies also indicate that if *true exclusive* breastfeeding is done for the first six months the risk of pregnancy drops to 0.5%.

***LAM Guidelines**

Baby less than six months old
No return of menstruation (no bleeding after the 56th day postpartum)
No regular supplements
Feeding at least 8 times in 24 hours
Night feedings

Separation of Mother and Infant

A mother who chooses to provide breast milk for her baby when they are separated needs the help and encouragement of her family, healthcare providers, friends, caregiver, co-workers, and anyone else that mother and baby encounter. If at all

possible, the mother and baby should remain together even if the mother is returning to school or work. If one of the other of them is hospitalized, many hospitals allow a breastfeeding mother baby pair to remain together.

If separation is necessary the mother will need help with planning for maintaining her milk supply, milk expression, storage and transportation of the milk. The physiology of breastfeeding dictates that more stimulation and emptying of the breast yields more milk. Milk should be expressed and stored ahead of time if possible

Good hand washing is essential while pumping and handling her milk. The mother can express her milk by hand or with the use of a pump. Breast pumps come in a variety of manual and electric models to suit the particular needs of the individual mother.

The mother should express her milk around the time she would ordinarily be breastfeeding. The exact schedule depends on the baby's age, feeding pattern, and the mother's situation at that time. Expressed milk should go into a BPA free hard plastic or glass container with an airtight lid. Specific milk storage bags may be used but for short periods of time as they may leak, spill or become contaminated or some of the components of the milk may be lost in long time storage. Milk should be stored in amounts that the baby would take. Several expressions with-in the same day can be combined. Expressed breast milk can stay at room temperature for around 6 to 8 hours up to 77° F (25°C), but it's best to refrigerate the milk. The newly expressed or warm milk needs to be chilled before adding to cold, refrigerated milk. Refrigerated breast milk should be used within 5 days; milk can be frozen up to six months in the freezer section of a two-door refrigerator. Place the container away from the door and from the self-defrosting fan in a frost-free freezer. The temperature should be checked with a freezer thermometer (-4° F).

Thaw milk overnight in the refrigerator or place the milk container in a bowl under warm running water. Warm milk to room temperature. Never use a microwave to thaw or warm milk. Offer only the amount of milk that baby is likely to take at a feeding. Once a bottle of milk has been in the baby's mouth the remaining milk must be discarded.

In the case of a hospitalized infant, the mother should follow the policies of the institutions to label and store the milk. (see annexes E and F for additional information regarding expressing and storing of human milk)

Resources

When mothers encounter problems with breastfeeding they often turn to their physician or other health care provider. The amount of knowledge and experience among physicians and nurses is quite variable. Identify knowledgeable and experienced colleagues in your community.

Your community may have lactation specialists and consultants available to mothers through organized health systems or through individuals in private settings. Identify and familiarize yourself with the lactation service providers as you would any other specialists to whom you would refer your patients. Provide information as part of the

referral and request feedback in order to build your own experience with lactation management. If your medical center provides lactation services, try to arrange a clinical learning experience in prenatal, postpartum and outpatient health care settings.

Conclusion

Most breastfeeding problems can be prevented by providing women with helpful information during the prenatal period so they know what to expect and providing perinatal care for mother and infant that follows physiologic principles. In spite of providing information and good care, problems do occur. Information about when and how to seek assistance if problems develop is essential. Early intervention can help breastfeeding families on the path toward exclusive and continued breastfeeding.

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Annexes

A. Highlights from Lactation Management Self-Study Modules, Level I

B. Acceptable Medical Reasons for Use of Breastmilk Substitutes, World Health Organization/UNICEF 2009

C. Infant Feeding in Emergency Situations

D. Ten Major Provisions of the International Code of Marketing of Breastmilk Substitutes

E. ABM Protocol # 8: The Human Milk Storage information for Home Use for Healthy Full- term Infants

F. Wellstart International's Guidelines for Hand Expression

A. **Lactation Management Self-Study Modules: Highlights**

This material provides a summary of some of the important clinical points contained in the Self-Study Modules. For those who like to have clinical reminders in their handheld electronic device or pocket notebook, the format allows these summaries to be easily transferred or clipped and inserted into a small notebook.

Recommendations for Adequate Breastmilk Intake:

- Breastfeeding at least 8 times in 24 hours

Indicator of Adequate Intake (early weeks):

- Bowel movements: 3-4 or more every 24 hrs.
- Urination: 6 or more times every 24 hrs.
- Baby is content between feedings
- Average weight gain: 5-7 ounces/week (100 - 200 gms per week)

Signs of Effective Milk Removal:

- Sounds of baby swallowing during a feed
- Breasts full before feeding, softer afterward (early weeks)
- "Let-down sensation" or milk dripping

Questions for the Breastfeeding Mother

- Why did you decide to breastfeed your baby?
- What information about breastfeeding do you already have?
- Are family members supportive of your interest in breastfeeding?
- Will someone be at home to help you in the early weeks?
- Do you have any special medical problems that require treatment or medications? Have you ever had breast surgery? If so for what problem?
- How long do you plan to breastfeed?
- Do you plan to return to work/school?
- (If has breastfed other children before) How long did you breastfeed before? Why did you stop at that time? Did you have any problems?

Why Do Mothers Stop Breastfeeding?

Time and Reason	**Counseling Points**
First 2 weeks:	
Problems such as sore nipples	Attachment assessment and help
Lack of Support	Where to go for help Support groups
At 3-4 weeks:	
Mother's breasts no longer feel firm between feedings	The milk supply has adjusted to baby's needs
At 3-6 weeks:	
"Appetite spurt" or "growth spurt"	More frequent feeding will increase the milk supply and satisfy the baby until the next spurt
Return to work or school	
Belief that breastfeeding and work/school are not compatible	Strategies to continue breast feeding: Express & store breast milk, feed during breaks at nearby childcare facility, take baby to work
At 5-7 months	
Eruption of teeth	Gentle motion of baby's tongue over the lower gum are unchanged when teeth have erupted
6 months	
Introduction of solids	Breast milk continues to provide nourishment and protection from infection

Summary of Differences Between Human Milk and Commercial Substitutes Marketed for Normal Term Infants

	Human milk	**Commercial Substitutes**
Protein	Correct quality/quantity, easier to digest	Partly corrected
Fat	Appropriate quality/quantity of essential fatty acids, lipase present	Lipase absent
Vitamins	Adequate except for vitamins D and K	Vitamins added
Minerals	Correct amount	Partly corrected
Anti-infective properties	Present	Absent
Growth factors	Present	Absent
Digestive enzymes	Present	Absent
Hormones	Present	Absent

Acceptable Medical Reasons for Supplementation*

- Inborn errors of metabolism, i.e., galactosemia, phenylketonuria, maple syrup urine disease.(rare)
- Very low birth weight (< 1500 g) and infants born before 32 weeks gestational age
- Infants at risk for potentially severe hypoglycemia. (small for gestational age, preterm, intra-partum stress, diabetic mothers) and blood sugar does not respond to breastfeeding or breastmilk feeding.
- Mothers who are infected with HIV (if replacement feeding is acceptable, feasible, affordable, sustainable and safe.
- Mother who is severely ill postpartum to pump, i.e., psychosis, eclampsia, unresponsive or shock.
- Mothers taking medications contraindicated when breastfeeding (rare).

When supplementing, mother's milk supply should be maintained in most cases.

*note: these medical reasons for supplementation are consistent with the 2009 approved WHO recommendations.

Ten Steps to Successful Breastfeeding

Every facility providing maternity services and care for newborn infants should:

1. Have a written breastfeeding policy that is routinely communicated to all health care staff.
2. Train all health care staff in skills necessary to implement this policy.
3. Inform all pregnant women about the benefits and management of breastfeeding.
4. Help mothers initiate breastfeeding within a half-hour of birth.
5. Show mothers how to breastfeed and how to maintain lactation even if they should be separated from their infants.
6. Give newborn infants no food or drink other than breast milk, unless *medically* indicated.
7. Practice rooming-in (allow mothers and infants to remain together) 24 hours a day.
8. Encourage breastfeeding on demand.
9. Give no artificial nipples or pacifiers to breastfeeding infants.
10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic.

Common Breastfeeding Problems

Breastfeeding problems are usually easily prevented and treated. For the problems listed here, the continuation of breastfeeding is not only safe, but can help remedy the problem.

Engorgement

Common cause:

- Insufficient frequency of breastfeeds
- Insufficient emptying of the breast
- Poor positioning or poor attachment to the breast

Treatment:

- Express breastmilk by hand, or pump, before feeds to soften the areola
- Breastfeed more frequently and/or for longer periods
- Improve infant positioning and attachment
- Use moist heat and gentle massage before feeding; cool packs after.

Cracked/Sore Nipples

Common cause:

- Poor positioning and attachment of infant on the breast
- Inappropriate suckling technique
- Candidiasis mother and baby

Treatment:

- Assist with positioning and attachment
- Continue breastfeeding
- Treat both mother and baby for Candidiasis

Common Breastfeeding Problems

Breastfeeding problems are usually easily prevented and treated. For the problems listed here, the continuation of breastfeeding is not only safe, but can help remedy the problem.

Mastitis

Common cause:

- Nipple abrasions
- Milk stasis

Treatment:

- Treat nipple abrasions and assure effective suckling.
- Nurse more frequently (mastitis is an infection of the breast, not the milk).
- Apply moist heat for several minutes before each feeding
- Relieve inflammation, pain and fever.
- Take appropriate antibiotics as prescribed for 10 to14 days.
- Rest as much as possible for at least 24 hours.
- Drink more fluids to meet thirst needs.

"Not enough Milk"

Common cause:

Ineffective and/or infrequent suckling

Treatment

Check for effective suckling position
Increase feeding frequency, and feed both day and night
Apply moist heat before feeding
Gentle stimulation of nipple and areola
Massage breasts before and during feeding
Reassurance

B. Acceptable Medical Reasons for Use of Breast-Milk Substitutes,

World Health Organization and UNICEF 2009

The teaching materials and assessment criteria of the WHO/UNICEF The Baby Friendly Hospital Initiative , begun in 1992, have recently been updated to incorporate the most recent research. Among the documents relevant to the concerns of users of the Level I Self-Study Modules are the revised criteria for the appropriate use of breastmilk substitutes. The following material includes the 2009 approved WHO/UNICEF statement regarding this matter.

WHO/NMH/NHD/09.01
WHO/FCH/CAH/09.01

Acceptable medical reasons for use of breast-milk substitutes

World Health Organization

unicef

Preface

A list of acceptable medical reasons for supplementation was originally developed by WHO and UNICEF as an annex to the Baby-friendly Hospital Initiative (BFHI) package of tools in 1992.

WHO and UNICEF agreed to update the list of medical reasons given that new scientific evidence had emerged since 1992, and that the BFHI package of tools was also being updated. The process was led by the departments of Child and Adolescent Health and Development (CAH) and Nutrition for Health and Development (NHD). In 2005, an updated draft list was shared with reviewers of the BFHI materials, and in September 2007 WHO invited a group of experts from a variety of fields and all WHO Regions to participate in a virtual network to review the draft list. The draft list was shared with all the experts who agreed to participate. Subsequent drafts were prepared based on three inter-related processes: a) several rounds of comments made by experts; b) a compilation of current and relevant WHO technical reviews and guidelines (see list of references); and c) comments from other WHO departments (Making Pregnancy Safer, Mental Health and Substance Abuse, and Essential Medicines) in general and for specific issues or queries raised by experts.

Technical reviews or guidelines were not available from WHO for a limited number of topics. In those cases, evidence was identified in consultation with the corresponding WHO department or the external experts in the specific area. In particular, the following additional evidence sources were used:
-*The Drugs and Lactation Database* (LactMed) hosted by the United States National Library of Medicine, which is a peer-reviewed and fully referenced database of drugs to which breastfeeding mothers may be exposed.
-*The National Clinical Guidelines for the management of drug use during pregnancy, birth and the early development years of the newborn*, review done by the New South Wales Department of Health, Australia, 2006.

The resulting final list was shared with external and internal reviewers for their agreement and is presented in this document.

The list of acceptable medical reasons for temporary or long-term use of breast-milk substitutes is made available both as an independent tool for health professionals working with mothers and newborn infants, and as part of the BFHI package. It is expected to be updated by 2012.

Acknowledgments

This list was developed by the WHO Departments of Child and Adolescent Health and Development and Nutrition for Health and Development, in close collaboration with UNICEF and the WHO Departments of Making Pregnancy Safer, Essential Medicines and Mental Health and Substance Abuse. The following experts provided key contributions for the updated list: Philip Anderson, Colin Binns, Riccardo Davanzo, Ros Escott, Carol Kolar, Ruth Lawrence, Lida Lhotska, Audrey Naylor, Jairo Osorno, Marina Rea, Felicity Savage, María Asunción Silvestre, Tereza Toma, Fernando Vallone, Nancy Wight, Anthony Williams and Elizabeta Zisovska. They completed a declaration of interest and none identified a conflicting interest.

Introduction

Almost all mothers can breastfeed successfully, which includes initiating breastfeeding within the first hour of life, breastfeeding exclusively for the first 6 months and continuing breastfeeding (along with giving appropriate complementary foods) up to 2 years of age or beyond.

Exclusive breastfeeding in the first six months of life is particularly beneficial for mothers and infants.

Positive effects of breastfeeding on the health of infants and mothers are observed in all settings. Breastfeeding reduces the risk of acute infections such as diarrhoea, pneumonia, ear infection, *Haemophilus influenza*, meningitis and urinary tract infection (1). It also protects against chronic conditions in the future such as type I diabetes, ulcerative colitis, and Crohn's disease. Breastfeeding during infancy is associated with lower mean blood pressure and total serum cholesterol, and with lower prevalence of type-2 diabetes, overweight and obesity during adolescence and adult life (2). Breastfeeding delays the return of a woman's fertility and reduces the risks of post-partum haemorrhage, pre-menopausal breast cancer and ovarian cancer (3).

Nevertheless, a small number of health conditions of the infant or the mother may justify recommending that she does not breastfeed temporarily or permanently (4). These conditions, which concern very few mothers and their infants, are listed below together with some health conditions of the mother that, although serious, are not medical reasons for using breast-milk substitutes.

Whenever stopping breastfeeding is considered, the benefits of breastfeeding should be weighed against the risks posed by the presence of the specific conditions listed.

INFANT CONDITIONS

Infants who should not receive breast milk or any other milk except specialized formula

- Infants with classic galactosemia: a special galactose-free formula is needed.
- Infants with maple syrup urine disease: a special formula free of leucine, isoleucine and valine is needed.
- Infants with phenylketonuria: a special phenylalanine-free formula is needed (some breastfeeding is possible, under careful monitoring).

Infants for whom breast milk remains the best feeding option but who may need other food in addition to breast milk for a limited period

- Infants born weighing less than 1500 g (very low birth weight).
- Infants born at less than 32 weeks of gestation (very preterm).
- Newborn infants who are at risk of hypoglycaemia by virtue of impaired metabolic adaptation or increased glucose demand (such as those who are preterm, small for gestational age or who have experienced significant intrapartum hypoxic/ischaemic stress, those who are ill and those whose mothers are diabetic (5) if their blood sugar fails to respond to optimal breastfeeding or breast-milk feeding.

MATERNAL CONDITIONS

Mothers who are affected by any of the conditions mentioned below should receive treatment according to standard guidelines.

Maternal conditions that may justify permanent avoidance of breastfeeding

- HIV infection[1]: if replacement feeding is acceptable, feasible, affordable, sustainable and safe (AFASS) (6). Otherwise, exclusive breastfeeding for the first six months is recommended.

Maternal conditions that may justify temporary avoidance of breastfeeding

- Severe illness that prevents a mother from caring for her infant, for example sepsis.
- Herpes simplex virus type 1 (HSV-1): direct contact between lesions on the mother's breasts and the infant's mouth should be avoided until all active lesions have resolved.
- Maternal medication:
  - sedating psychotherapeutic drugs, anti-epileptic drugs and opioids and their combinations may cause side effects such as drowsiness and respiratory depression and are better avoided if a safer alternative is available (7)**;**
  - radioactive iodine-131 is better avoided given that safer alternatives are available - a mother can resume breastfeeding about two months after receiving this substance;
  - excessive use of topical iodine or iodophors (e.g., povidone-iodine), especially on open wounds or mucous membranes, can result in thyroid suppression or electrolyte abnormalities in the breastfed infant and should be avoided;
  - cytotoxic chemotherapy requires that a mother stops breastfeeding during therapy.

Maternal conditions during which breastfeeding can still continue, although health problems may be of concern

- Breast abscess: breastfeeding should continue on the unaffected breast; feeding from the affected breast can resume once treatment has started (8).
- Hepatitis B: infants should be given hepatitis B vaccine, within the first 48 hours or as soon as possible thereafter (9).
- Hepatitis C.
- Mastitis: if breastfeeding is very painful, milk must be removed by expression to prevent progression of the condition(8).
- Tuberculosis: mother and baby should be managed according to national tuberculosis guidelines (10).
- Substance use[2] (11):
  - maternal use of nicotine, alcohol, ecstasy, amphetamines, cocaine and related stimulants has been demonstrated to have harmful effects on breastfed babies;
  - alcohol, opioids, benzodiazepines and cannabis can cause sedation in both the mother and the baby.

  Mothers should be encouraged not to use these substances, and given opportunities and support to abstain.

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[1] The most appropriate infant feeding option for an HIV-infected mother depends on her and her infant's individual circumstances, including her health status, but should take consideration of the health services available and the counselling and support she is likely to receive. Exclusive breastfeeding is recommended for the first six months of life unless replacement feeding is AFASS. When replacement feeding is AFASS, avoidance of all breastfeeding by HIV-infected women is recommended. Mixed feeding in the first 6 months of life (that is, breastfeeding while also giving other fluids, formula or foods) should always be avoided by HIV-infected mothers.

[2] Mothers who choose not to cease their use of these substances or who are unable to do so should seek individual advice on the risks and benefits of breastfeeding depending on their individual circumstances. For mothers who use these substances in short episodes, consideration may be given to avoiding breastfeeding temporarily during this time.

References

(1) *Technical updates of the guidelines on Integrated Management of Childhood Illness (IMCI). Evidence and recommendations for further adaptations.* Geneva, World Health Organization, 2005.

(2) *Evidence on the long-term effects of breastfeeding: systematic reviews and meta-analyses.* Geneva, World Health Organization, 2007.

(3) León-Cava N et al. *Quantifying the benefits of breastfeeding: a summary of the evidence*. Washington, DC, Pan American Health Organization, 2002 (http://www.paho.org/English/AD/FCH/BOB-Main.htm, accessed 26 June 2008).

(4) Resolution WHA39.28. Infant and Young Child Feeding. In: *Thirty-ninth World Health Assembly, Geneva, 5–16 May 1986. Volume 1. Resolutions and records. Final.* Geneva, World Health Organization, 1986 (WHA39/1986/REC/1), Annex 6:122–135.

(5) Hypoglycaemia of the newborn: review of the literature. Geneva, World Health Organization, 1997 (WHO/CHD/97.1; http://whqlibdoc.who.int/hq/1997/WHO_CHD_97.1.pdf, accessed 24 June 2008).

(6) *HIV and infant feeding: update based on the technical consultation held on behalf of the Inter-agency Task Team (IATT) on Prevention of HIV Infection in Pregnant Women, Mothers and their Infants, Geneva, 25–27 October 2006.* Geneva, World Health Organization, 2007 (http://whqlibdoc.who.int/publications/2007/9789241595964_eng.pdf, accessed 23 June 2008).

(7) *Breastfeeding and maternal medication: recommendations for drugs in the Eleventh WHO Model List of Essential Drugs.* Geneva, World Health Organization, 2003.

(8) *Mastitis: causes and management.* Geneva, World Health Organization, 2000 (WHO/FCH/CAH/00.13; http://whqlibdoc.who.int/hq/2000/WHO_FCH_CAH_00.13.pdf, accessed 24 June 2008).

(9) *Hepatitis B and breastfeeding*. Geneva, World Health Organization, 1996. (Update No. 22).

(10) *Breastfeeding and Maternal tuberculosis*. Geneva, World Health Organization, 1998 (Update No. 23).

(11) *Background papers to the national clinical guidelines for the management of drug use during pregnancy, birth and the early development years of the newborn.* Commissioned by the Ministerial Council on Drug Strategy under the Cost Shared Funding Model. NSW Department of Health, North Sydney, Australia, 2006.
http://www.health.nsw.gov.au/pubs/2006/bkg_pregnancy.html

Further information on maternal medication and breastfeeding is available at the following United States National Library of Medicine (NLM) website:
http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?LACT

For further information, please contact:

Department of Nutrition for Health and Development
E-mail: nutrition@who.int
Web: www.who.int/nutrition

Department of Child and Adolescent Health and Development
E-mail: cah@who.int
Web: www.who.int/child_adolescent_health

Address: 20 Avenue Appia, 1211 Geneva 27, Switzerland

C. Infant Feeding in Emergency Situations: Guidelines from Wellstart International

Since the first edition of these Self-Study modules, several devastating international emergency situations have occurred: the Tsunami in northern Indonesia, hurricane Katrina in Louisiana and the surrounding region in the United States, the fires in California and earthquakes in China. For many reasons, breastfeeding is the best infant feeding method under such conditions. Breastmilk provides essential nutrients and fluids, prevents GI and respiratory infections common under emergency conditions, provides babies with a sense of security and is stress reducing for both mothers and babies. Anyone, at any time, may be involved in or called upon to respond to emergency situations. Thus all health care providers regardless of their area of professional practice, need to understand the importance of breastfeeding and assist in supporting and sustaining this essential modality. These brief Wellstart Guidelines include six most important concepts as well as a triage tool from the Emergency Nutrition Network. Further details are available from their website: http://www.ennonline.net/ife.

Infant and Young Child Feeding in Emergency Situations

Infants and young children are particularly vulnerable to serious illness in emergency situations and feeding must be carefully done. Because of the increased risk of diarrheal diseases and other infections, supporting the continuation of breastfeeding is particularly important. In addition, the security and warmth provided by breastfeeding is crucial for both mothers and children in chaotic circumstances of an emergency. The risks associated with bottle and formula feeding are dramatically increased due to poor hygiene, crowding and limited water and fuel. The role of breastfeeding is even more important in emergency situations where it may be the only sustainable element of food security for infants and young children. Exclusive and prolonged breastfeeding is often the only form of family planning available to women in emergency situations. Last but not least, women need validation of their own competence, BF is one of their important traditional roles that can be sustained during a stressful situation.

Misconceptions about breastfeeding in emergencies

1. Women under stress cannot breastfeed
2. Malnourished women don't produce enough milk
3. Weaning cannot be reversed
4. General promotion of BF is enough
5. Human milk substitutes (infant formula and/or milk) are a necessary response to an emergency

1. Women under stress *CAN* successfully breastfeed

Milk release (letdown) is affected by stress. Milk production is NOT. Different hormones control these two processes. The treatment for poor milk release is increased suckling which increases the release of oxytocin, the *letdown* hormone. Research suggests that lactating women have a lower response to stress, so helping women to initiate or continue to BF may help them relieve stress.

2. Malnourished women *DO* produce enough milk

It is extremely important to distinguish between true cases of insufficient milk production (rare) and perceptions. Milk production is relatively unaffected in quantity and quality except in extremely malnourished women (only 1% of women). When women are malnourished it is the mother who suffers, not the

infant. The solution to helping malnourished women and infants is to ***feed the mother not the infant.*** The mother will be less harmed by pathogens and she obviously needs more food. By feeding her, you are helping both the mother and child and harming neither. Remember that giving supplements to infants can decrease milk production by decreasing suckling. The treatment for true milk insufficiency is increased suckling frequency and duration.

3. A mother who has weaned *CAN* redevelop her milk supply

With enough nipple stimulation and milk removal, it is possible for women to re-lactate, that is to redevelop a milk supply. The stimulation can be provided by a willing baby or even older child, by hand expression and stimulation and/or pumping. The process may take several days or even a couple of weeks. Mothers need much encouragement, a reasonable supply of food and water and protection from stress to the extent possible. Babies, of course, need to be fed in the safest manner until the milk supply returns.

4. Breastfeeding women need *SPECIFIC ASSISTANCE*; general promotion of breastfeeding is not enough.

Lessons learned in development programs show that most health practitioners have little knowledge of breastfeeding and lactation management; these lessons apply equally to emergency programs. Women who suffer through violent situations leading to displacement and emergency situations are at increased risk of breastfeeding problems. Mothers need help, not just motivational messages. Relief agencies and field workers need training in milk production physiology and on how to counsel mothers to help them optimally breastfeed; how to assess proper positioning and effective suckling and remedy when needed. In some situations, breastfeeding specialists may be useful. Maternal perception of risk of breastmilk insufficiency is an important factor in a women's decision for early termination of breastfeeding. These perceptions may be intensified by the stress of emergency situations. Our first concerns should be ensuring optimal breastfeeding behaviors, which may require the selective feeding of lactating women and trauma counseling for women who may believe they don't have enough milk. Policies and services which undermine optimal feeding such as giving food supplements to infants <6 months and using bottles for Oral Rehydration Solution, should be avoided. Successful breastfeeding will contribute to the restoration or enhancement of woman's self-esteem, critical to her ability to care for herself and her family.

5. Human milk substitutes (infant formula and/or milk) are *NOT* always needed

Providing infants and young children caught in an emergency situation with substitutes for human milk is extremely risky. It should be undertaken only after

careful consideration and full awareness of the problems that may result. Human milk substitutes must be:

- ✓ *limited to the special circumstances of the emergency;*
- ✓ *guaranteed for the lifetime of emergency;*
- ✓ *accompanied by additional health care resources, clean water, fuel, and means to treat diarrhea;*
- ✓ *include plans for the re-establishment of optimal feeding from the outset of the emergency*.
- ✓ *supervised by the local public health authorities.*
- ✓ *be provided in accordance with the International Code of Marketing of Breastmilk Substitutes*

These guidelines should be disseminated and followed by all agencies working in emergency situations.

1. **Optimal Feeding Practices in Emergencies:**

- ✓ Initiation of breastfeeding within one hour of birth
- ✓ Effective infant positioning (latch-on)
- ✓ Frequent, on-demand feeding until about 6 months of age
- ✓ Exclusive, breastfeeding until 6 months of age
- ✓ Continuation of breastfeeding after beginning the addition of appropriate weaning foods at 6 months of age
- ✓ Sustained breastfeeding well into the second year of life or beyond
- ✓ Increased breastfeeding frequency and continued feeding during illness.
- ✓ Increased breastfeeding frequency after illness for catch up growth.

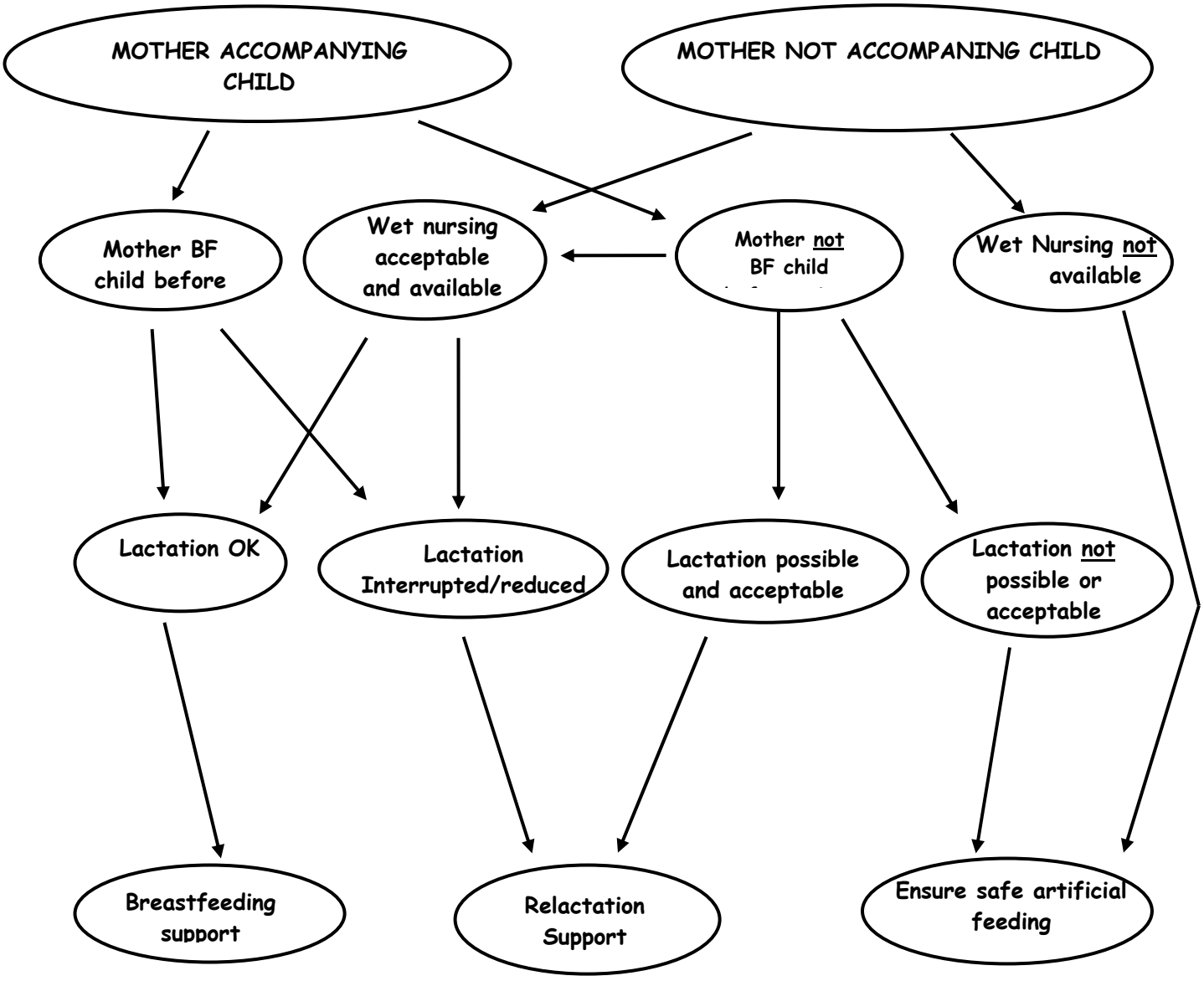
Feeding Infants Under Six Months in Emergencies: A Triage Approach to Decision-Making

Emergency situations are usually initially confusing and chaotic. Determining who needs what is an essential early step. For protecting and supporting breastfeeding, the first step is to identify infants who are or should be breastfed and further noting any infants who are temporarily or permanently without their mother. Ultimately three groups can be established:

1. one needing only breastfeeding support,
2. a second requiring more intensive re-lactation help
3. a third in which substitute feeding is deemed necessary and will need to be very carefully managed and monitored.

The following triage diagram may be helpful. It is from: *Infant Feeding in Emergencies: Policy, Strategy & Practice, Report of the Ad Hoc Group on Feeding in Emergencies, May 1999.* This tool is available from the Emergency Nutrition Network on their website: www.ennonline.net/ife . The Emergency Nutrition Network has a large amount of useful information and tools regarding emergency situations and frequently updates the content of the web site. The interested reader is encouraged to review this material.

Decision Making in Emergencies:
A Triage Approach for Feeding Infants Under Six Months of Age



D. Ten Major Provisions of the WHO International Code of Marketing of Breastmilk Substitutes and Subsequent World Health Assembly Resolutions

The following list summarizes the major provisions of the WHO Code of Marketing and the subsequent resolutions passed by the World Health Assembly (WHA). The original Code, passed by WHA resolution in 1981 has 11 articles. Through a process of reviews and resolutions undertaken by the WHA every two years, the Code has continued to remain current as a international guiding document. There are now 14 WHA resolutions. Over the years it has been made clear that it applies to any food that is marketed as suitable for infants (all formulas, juices, commercial semisolid weaning foods) as well as feeding bottles and nipples (teats).

D. Ten Major Provisions of the WHO International Code of Marketing of Breastmilk Substitutes and Subsequent Resolutions of the World Health Assembly

1. **No advertising or promotion of breastmilk substitutes and products within the scope of the code and relevant WHA resolutions to the General public.**
2. ***No free samples or gifts to mothers or health workers.***
3. **Information and labels must advocate breastfeeding and warn against bottle feeding and contain no pictures or text that idealizes the use of breastmilk substitutes.**
4. ***The health care system must not be used to promote the use of breastmilk substitutes.***
5. **No free or low-cost supplies of breastmilk substitutes.**
6. ***Health professionals allowed to receive samples only for research purposes.***
7. ***Information to health workers must be scientific and factual***
8. **No contact between marketing personnel and mothers.**
9. ***No gifts or personal samples to health workers.***
10. **All information on artificial feeding, including labels, should explain the benefits of breastfeeding, the costs and hazards associated with artificial feeding and the correct use of breastmilk substitutes.**

Note that the italicized items (2,4,6,7, and 9) are responsibilities of the health professionals.

Adapted from: Code Essentials 3: Responsibilities of Health Workers under the International Code of Code of Marketing of Breastmilk Substitutes and subsequent World Health Assembly Resolutions. 2009. International Baby Food Action Network and the International Code Documentation Center, Penang, Malaysia 2009. Readers are urged to obtain further details about the Code provided on the IBFAN website: www.ibfan.org

E. Academy of Breastfeeding Medicine Protocol #8: Human milk storage information for home use for healthy full-term infants.

The Academy of Breastfeeding Medicine (ABM) was established in 1994 to bring together physicians from any discipline who have a common interest in supporting breastfeeding. ABM makes available (downloadable without charge) protocols regarding some of the most frequent clinical management concerns. For this Third Edition of the Self-Study Modules, Level I, the protocol which gives current guide lines on how to store of Human milk for healthy full term infants is included.

The Academy Of Breastfeeding Medicine

ABM Protocols

A central goal of **The Academy of Breastfeeding Medicine** is the development of clinical protocols for managing common medical problems that may impact breastfeeding success. These protocols serve only as guidelines for the care of breastfeeding mothers and infants and do not delineate an exclusive course of treatment or serve as standards of medical care. Variations in treatment may be appropriate according to the needs of an individual patient.

Protocol #8: Human milk storage information for home use for healthy full-term infants

STORAGE CONTAINERS

1. Hard-sided containers, such as hard plastic or glass, are the preferred containers for long-term human milk storage. These containers should have an airtight seal.[1]
2. Plastic bags specifically designed for human milk storage can be used for short-term (less than 72 hours) milk storage.[1,2] Use of plastic bags is not recommended for long-term storage as they may spill, leak, or become contaminated more easily than hard-sided containers, and some important milk components may adhere to the soft plastic and be lost.

GENERAL GUIDELINES

1. Hands must be washed prior to expressing or pumping milk.
2. Use containers and pumping equipment that have been washed in hot, soapy water and rinsed. If available, cleaning in a dishwasher is acceptable; dishwashers that additionally heat the water may improve cleanliness. If a dishwasher is not available, boiling the containers after washing is recommended. Boiling is particularly important where the water supply may not be clean.
3. Store in small portions to minimize waste. Most breastfed babies take between 2 and 4 ounces (60–120 mL) of milk when beginning with an alternative feeding method. Storing in 2-ounce (60 mL) amounts and offering additional amounts if the baby is still hungry will prevent having to throw away unfinished milk.
4. Consider storing smaller size portions [1–2 ounces (30–60 mL) each] for unexpected situations. A small amount of milk can keep a baby happy until mom comes to nurse the baby.
5. Several expressions throughout a day may be combined to get the desired volume in a container. Chill the newly expressed milk for at least 1 hour in the main body of the refrigerator or in a cooler with ice or ice packs, and then add it to previously chilled milk expressed on the same day.
6. Do not add warm breast milk to frozen milk because it will partially thaw the frozen milk.
7. Keep milk from one day separate from other days.
8. Do not fill the container; leave some room at the top because breast milk expands as it freezes.
9. Label containers clearly with waterproof labels and ink, if possible.
10. Indicate the date that the milk was expressed and the child's name (for daycare).
11. Expect that the milk will separate during storage because it is not homogenized. The cream will rise to the top of the milk and look thicker and whiter. Before feeding, gently swirling the container of milk will mix the cream back through again. Avoid vigorously shaking the milk.

12. The color of milk may vary from day to day, depending on maternal diet. It may look bluish, yellowish, or brownish. Frozen breast milk may also smell different than fresh breastmilk.[3] There is no reason not to use the milk if the baby accepts it.

Milk storage guidelines

1. Milk may be kept at room temperature (up to 77°F or 25°C) for 6 to 8 hours. Temperatures greater than 77°F (25°C) may not be safe for room temperature storage.[4] Containers should be covered and kept as cool as possible; covering the container with a cool towel may keep milk cooler.
2. Milk may be stored in an insulated cooler bag with ice packs for 24 hours.[5]
3. Milk may be safely refrigerated (39°F or 4°C) for up to 5 days.[6] Store milk in the back of the main body of the refrigerator, where the temperature is the coolest.[7]
4. The type of freezer in which the milk is kept determines timetables for frozen milk. Generally, store milk toward the back of the freezer, where the temperature is most constant.[8] Milk stored for the longer durations in the ranges listed below is safe, but there is some evidence that the lipids in the milk undergo degradation resulting in lower quality.[9]
    - Freezer compartment located inside the refrigerator (5°F or −15°C): **2 weeks**
    - Refrigerator/freezer with separate doors (0°F or −18°C): **3 to 6 months**
    - Chest or upright manual defrost deep freezer that is opened infrequently and maintains ideal temperature (−4°F or −20°C): **6 to 12 months**
5. The above guidelines apply only to healthy, term infants; guidelines are different for hospitalized, sick, or preterm infants.

Thawing or warming milk

1. The oldest milk should be used first.
2. The baby may drink the milk cool, at room temperature, or warmed.
3. Thaw milk by placing it in the refrigerator the night before use or gently rewarm it by placing the container under warm running water or in a bowl of warm water.
4. Do not let the level of water in the bowl or from the tap touch the mouth of the container.
5. Milk may be kept in the refrigerator for 24 hours after it is thawed.
6. Never use a microwave oven or stovetop to heat the milk, as these may cause scald spots and will also destroy antibodies.[10,11]
7. Swirl the container of milk to mix the cream back in, and distribute the heat evenly. Do not stir the milk.
8. Milk left in the feeding container after a feeding should be discarded and not used again.
9. As with all foods, do not re-freeze breast milk once it is thawed or partially thawed.

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Approved 3/23/2004

The Academy of Breastfeeding Medicine Protocol Committee
Caroline J. Chantry MD, FABM, Co-Chairperson
*Anne Eglash MD, FABM
Cynthia R. Howard MD, MPH, FABM, Co-Chairperson

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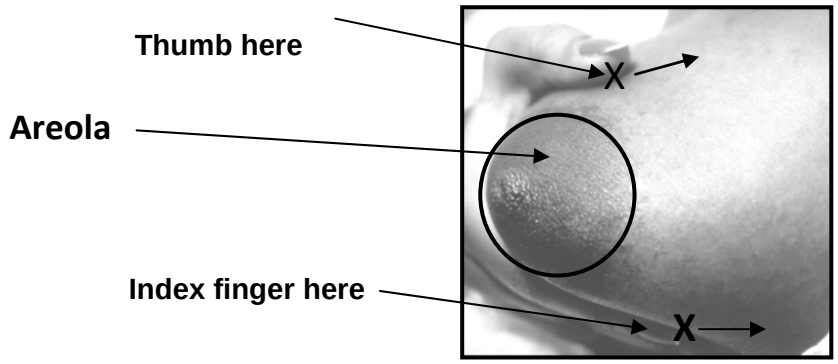
*Lead Author(s)

F. Guidelines for Hand Expression

All breastfeeding mothers should be able to hand express. Even those mothers who must or choose to use a electric pump should be prepared to hand express if the power fails or they find themselves without the hand pump to use.

F. Guidelines for Hand Expression

1. **Wash your hands with soap**
2. **Apply warm moist cloths to your breasts for 3 or 4 minutes before beginning to express.**
3. **With 4 fingers together, gently massage your breasts in a circular pattern followed by light stroking of the breasts toward the nipples. This will help the let-down reflex to stimulate milk flow.**
4. **To express place your thumb on the top of your breast about 1 to 1½ inches (3 to 4 cm) back from the edge of the areola (the more pigmented portion near nipple) and your index finger underneath your breast also about 1 to 1½ inches (3 to 4 cm) from the edge of the areola.**



Gently press thumb and Index finger back toward rib cage and gently compress together behind areola. Rotate finger and thumb around the areola to express all areas.

5. **Gently press your fingers and thumb back toward your rib cage and then gently compress your thumb and fingers together just behind the areola.**
6. **Rotate the position of your fingers and thumb around the areola to express all areas.**
7. **Alternate breasts every few minutes or when the flow slows. Repeat the massage and stroking of the breast and express cycle several times on each breast.**
8. **The appearance of the milk will change during the expression. At first the milk may appear thin and alsmost clear. After the let-down reflex begins the milk appears more creamy white. Some medications, foods and vitamins may slightly alter the color of the milk.**
9. **Note that the amount of milk obtained may vary at each expression. Don't worry this is normal. It does not indicate that your milk production is declining.**
10. **You can express directly into clean glass or plastic bottles. Remember to not use plastic bottles that contain Bisphenol A.**

G. Websites of interest in Lactation Management and Breastfeeding Promotion

The interest in lactation management and breastfeeding promotion has grown significantly since the first edition of these Self-Study Modules was published and many useful websites have appeared. Some of the more frequently used sites are listed on the following page. For the interested user of this **Level I** tool these sites will have further information about the topics included as well as additional information concerning topics that are not considered necessary to cover at **Level I**.

G. Websites of Interest in Lactation Management and Breastfeeding Promotion

Academy of Breastfeeding Medicine
www.bfmed.org

American Academy of Pediatrics
www.aap.org/healthtopics/breastfeeding.cfm

American Academy of Family Practice
www.aafp.org

American College of Obstetrics and Gynecology
www.acog.org

Baby- Friendly USA
www.babyfriendlyusa.org

U.S. Centers for Disease Control
www.cdc.gov/breastfeeding

Emergency Nutrition Network
www.ennonline.net/ife

International Baby Food Action Network
www.ibfan.org

International Lactation Consultants Association
www.ilca.org

International Society of Research in Human Milk and Lactation
www.isrhmil.org.umu.se

La Leche League International
www.llli.org

National Library of Medicine on-line service regarding drugs during lactation (LactMed)
http://toxnet.nlm.nih.gov/cgi-bin/htmlgen?LACT

UNICEF
www.unicef.org

U.S. Office of Women's Health
www.womenshealth.gov/breastfeeding

Wellstart International
www.wellstart.org

World Health Organization (WHO)
www.who.int/child_adolescent_health and www.who.int/nutrition/en

World Alliance for Breastfeeding Action (WABA)
www.waba.org.my

Alphabetic Listing of References

A total of forty-eight references have been used in this Self-Study tool and are listed at the end of the section in which they were used. To facilitate a search for a particular text, paper or report these references have also been listed alphabetically.

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*Section of the tool where the specific reference is used: (F) =Foreword, (1) =Module 1, (2) = Module 2, 3 = Module (3)

Tests

The following section contains four tests:
A pre-test without answers,
A pre-test with answers,
A post-test without answers,
A post test with answers.

Lactation Management Self-Study Modules, Level I
Pre-Test

Please circle the appropriate response:

1. Infants exclusively breastfed for about six months will have:

   a. fewer episodes of diarrhea
   b. fewer episodes of lower respiratory infection
   c. both of the above
   d. none of the above

2. Compared to formula, human milk contains higher levels of:

   a. iron
   b. lipase
   c. vitamin A
   d. vitamin D
   e. none of the above

3. The hormone responsible for milk synthesis is:

   a. estrogen
   b. oxytocin
   c. progesterone
   d. prolactin

4. The hormone responsible for milk ejection is:

   a. estrogen
   b. oxytocin
   c. progesterone
   d. prolactin

5. Identify the component of human milk that binds iron locally to inhibit bacterial growth:

   a. lactoferrin
   b. macrophages
   c. oligosaccharides
   d. secretory IgA
   e. taurine

6. Identify the component of human milk that provides specific immunity against many organisms:

   a. lactoferrin
   b. macrophages
   c. oligosaccharides
   d. secretory IgA
   e. taurine

7. Which of the following would you suggest to a woman with inverted nipples during the third trimester?

   a. cut holes in the bra to allow the nipples to protrude; wear it day and night
   b. do nothing because the natural changes in the breast during pregnancy and the infant's suckling postpartum may evert the nipples
   c. use breast shells with guidance from her health care provider
   d. use Hoffman's maneuver four times a day to permanently evert her nipples

8. The <u>most</u> important criterion for assessing the milk transfer during a feeding at the breast is:

   a. audible swallow
   b. proper alignment
   c. proper attachment
   d. visible areola compression

Answer: Position and attachment are important to achieve effectiveness, but the most Important sign that the baby is transferring milk is hearing the swallow

1. A mother with a three-day old baby presents with sore nipples. The problem began with the first feeding and has persisted with every feeding. The most likely source of the problem is:

   a. baby's suck is too strong
   b. feeding too long
   c. lack of nipple preparation during pregnancy
   d. poor attachment

10. Signs of adequate breast milk intake in the early (first 4-6) weeks include all EXCEPT:

    a. at least 3-4 stools in 24 hours
    b. at least 6 diapers wet with urine in 24 hours
    c. baby gains weight
    d. baby sleeps through the night
    e. sounds of swallowing

11. Severe engorgement is most often due to:

a. high oxytocin level
b. high prolactin level
c. infrequent feedings
d. postpartum depression

12. Nipple candidiasis can be associated with all of the following EXCEPT:

a. burning pain in the breast
b. fever and malaise
c. oral thrush in the infant
d. pink and shiny appearance of the nipples and areola

13. A breastfeeding mother with a 3-month old infant has a red tender wedge-shaped area on the outer quadrant of one breast. She has flu-like symptoms and a temperature of 39° C. Your management includes all of the following EXCEPT:

a. antibiotics for 10 to 14 days days
b. extra rest
c. interrupt breastfeeding for 48 hours
d. moist heat to the involved region

14. Which of the following is most likely to have the greatest effect on the volume of milk a woman produces?

a. maternal caloric intake
b. maternal fluid intake
c. maternal weight for height
d. supplementation of the infant with formula
e. both a and c

15. The addition of complementary foods to breastfed infants is recommended at about:

a. 2 months
b. 4 months
c. 6 months
d. 10 months
e. 12 months

16. It is especially important that an infant with a strong family history of allergy should be <u>exclusively</u> breastfed for:

a. 2 months
b. 4 months
c. 6 months
d. 8 months
e. 12 months

17. The most common cause of poor weight gain among breastfed infants during the first four weeks after birth is:

a. infant metabolic disorders
b. infrequent or ineffective feedings
c. low fat content of breast milk
d. maternal endocrine problems
e. maternal nutritional deficiencies

18. Jaundice in a normal full term breastfeeding infant is improved by:

a. breastfeeding frequently (at least 8 or more times in 24 hours)
b. giving glucose water after breastfeeding
c. giving water after breastfeeding
d. both a and c

19. Breastfeeding is contraindicated in which of the following conditions:

a. infant with galactosemia
b. mother with hepatitis B
c. mother with inverted nipples
d. mother with mastitis
e. both a and c

20. Hospital policies that promote breastfeeding include:

a. uninterrupted sleep the first night to allow mother's milk supply to build up
b. unlimited access of mother to baby
c. use of a dropper for routine water supplementation
d. use of pacifiers to prevent sore nipples

21. Studies have indicated that the Lactational Amenorrhea Method (LAM) of contraception is less reliable under which of the following circumstances:

a. is given no regular supplements
b. continues with night feedings
c. is less than 8 months old
d. feeds 8 or more times in 24 hours

22. Reasons for including breastfeeding support for mother infant pairs as an important component to include in planning for or responding to major emergencies where clean water,sanitation and power are disrupted do not include:

a. Breastmilk provides immunoglobulins that actively prevent infection.
b. It is less expensive than providing for infant formula
c. In a stressful emergency situation breastfeeding provides a secure environment for infants and young children
d. With support even mothers who have already weaned can be assisted to relactate*.*

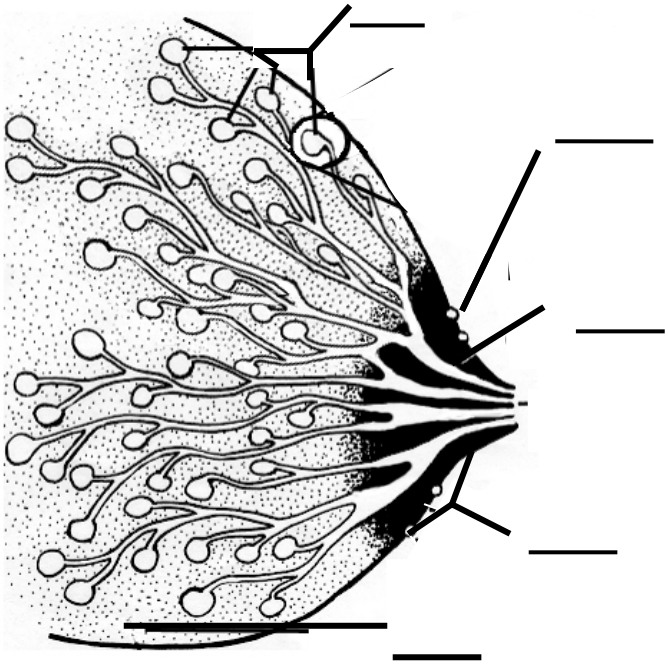
.

23. Which of the following statements is not true of The International Code of Marketing of Breastmilk Substitutes approved as a resolution in the World Health Assembly (WHA) in 1981:

a. provides guidelines for the ethical marketing of infant formula
b. is incorporated into the Baby Friendly Hospital assessment
c. was approved by all WHA member countries
d. is updated every two years by the WHA
e. includes bottles, nipples, and breastmilk substitutes

24. through 28. Label the structures of the breast by inserting next to the appropriate pointer the number of the structure listed below:

24. Alveoli
25. Areola
26. Montgomery's glands
27. Duct
28. Paranchyma



Lactation Management Self-Study Modules, Level I
Pre-Test with Answers

Please circle the appropriate response:

1. Infants exclusively breastfed for about six months will have:

   a. fewer episodes of diarrhea
   b. fewer episodes of lower respiratory infection
   c. both of the above
   d. none of the above

Answer: In the U.S., the risk of otitis media is reduced by 50% in breastfed infants. The Antibodies in human milk protect the infant from the organisms that cause diarrhea. At least 60% of the infant deaths in the U.S. from diarrheal disease are attributed to Not being breastfed.

2. Compared to formula, human milk contains higher levels of:

   a. iron
   b. **lipase**
   c. vitamin A
   d. vitamin D
   e. none of the above

Answer: Formula does not contain enzymes including lipase. Vitamins A and D Have been added to formula in an amount similar to breast milk. Formula actually contains more iron (but the iron is less bioavailable).

3. The hormone responsible for milk synthesis is:

   a. estrogen
   b. oxytocin
   c. progesterone
   d. **prolactin**

4. The hormone responsible for milk ejection is:

   a. estrogen
   b. **oxytocin**
   c. progesterone
   d. prolactin

5. Identify the component of human milk that binds iron locally to inhibit bacterial growth:

   a. **lactoferrin**
   b. macrophages
   c. oligosaccharides

d. secretory IgA
e. taurine

Answer: Lactoferrin is an iron-binding protein of external secretions, including human milk. It inhibits the growth of iron-dependent microorganisms in the gut.

6. Identify the component of human milk that provides specific immunity against many organisms:

a. lactoferrin
b. macrophages
c. oligosaccharides
d. **secretory IgA**
e. taurine

Answer: Secretory IgA is the main immunoglobulin in human milk. IgA is produced in the Mammary gland in B cells, which originate at maternal sites of high environmental pathogen exposure and therefore protects the infant against pathogens present in the immediate environment

7. Which of the following would you suggest to a woman with inverted nipples during the third trimester?

a. cut holes in the bra to allow the nipples to protrude; wear it day and night
b. **do nothing because the natural changes in the breast during pregnancy and the infant's suckling postpartum may evert the nipples**
c. use breast shells with guidance from her health care provider
d. use Hoffman's maneuver four times a day to permanently evert her nipples

Answer: Studies (MAIN Trial Collaborative Group, 1994) have demonstrated that prenatal nipple stretching exercises such as Hoffman's maneuver and the use of breast shells to encourage the nipple to protrude are equally or less helpful than no intervention at all. The mother should receive assistance postpartum.

8. The most important criterion for assessing the milk transfer during a feeding at the breast is:

a. **audible swallow**
b. proper alignment
c. proper attachment
d. visible areola compression

Answer: Position and attachment are important to achieve effectiveness, but the most Important sign that the baby is transferring milk is hearing the swallow

9. A mother with a three-day old baby presents with sore nipples. The problem began with the first feeding and has persisted with every feeding. The most likely source of the problem is:

a. baby's suck is too strong
b. feeding too long
c. lack of nipple preparation during pregnancy
d. **poor attachment**

Answer: The most common cause of sore nipples is poor attachment of the infant's mouth to the mother's nipple. Poor attachment often begins with the first feeding and if not corrected continues to contribute to increasing pain and trauma.. Nipple preparation during pregnancy is not recommended because studies have shown no effect on nipple comfort

10. Signs of adequate breast milk intake in the early (first 4-6) weeks include all EXCEPT:

a. at least 3-4 stools in 24 hours
b. at least 6 diapers wet with urine in 24 hours
c. baby gains weight
d. baby sleeps through the night
e. sounds of swallowing

Answer: Breastfeeding babies need to eat a minimum of eight times (about every three hours, day and night) in the early weeks. Sleeping long stretches at night may be seen after about six weeks of age. A baby who sleeps all night in the beginning is probably not getting enough calories.

11. Severe engorgement is most often due to:

a. high oxytocin level
b. high prolactin level
c. **infrequent feedings**
d. postpartum depression

Answer: The most common cause of engorgement is mechanical: infrequent or ineffective milk removal. The solution is milk removal by the baby, hand expression or a pump and frequent, effective breastfeeds thereafter.

12. Nipple candidiasis can be associated with all of the following EXCEPT:

a. burning pain in the breast
b. **fever and malaise**
c. oral thrush in the infant
d. pink and shiny appearance of the nipples and areola

Answer: Nipple candidiasis is a local fungal infection and usually does not cause systemic symptoms

13. A breastfeeding mother with a 3-month old infant has a red tender wedge-shaped area on the outer quadrant of one breast. She has flu-like symptoms and a temperature of 39° C. Your management includes all of the following EXCEPT:

a. antibiotics for 10 to 14 days days
b. extra rest
c. **interrupt breastfeeding for 48 hours**
d. moist heat to the involved region

Answer: An essential part of the treatment of mastitis is maintaining milk flow through the breasts by breastfeeding, hand expression or pumping. Mastitis is a cellulitis and the milk itself is not harmful to the infant. The usual antibiotics (dicloxacillin/erythromycin)used to treat mastitis are safe for the baby.

14. Which of the following is most likely to have the greatest effect on the volume of milk a woman produces?

a. maternal caloric intake
b. maternal fluid intake
c. maternal weight for height
d. **supplementation of the infant with formula**
e. both a and c

Answer: Mother's milk volume is fairly well protected. A mother"s caloric or fluid intake may effect her own energy level or urine output but is not directly related to her breastmilk volume. Giving formula results in the infant taking less breast milk; therefore, the mother's breasts are less stimulated and the supply drops.

15. The addition of complementary foods to breastfed infants is recommended at about:

a. 2 months
b. 4 months
c. **6 months**
d. 10 months
e. 12 months

Answer: Breast milk alone maintains adequate nutrition and growth up to 6 months of age in most infants. In addition feeding skills are learned in corresponding developmental sequence. By 6 months of age, the infant can transfer a bolus from the anterior tongue to the pharynx, allowing manipulation of a pureed or solid food.

16. It is especially important that an infant with a strong family history of allergy should be exclusively breastfed for:

a. 2 months
b. 4 months
c. **6 months**
d. 8 months
e. 12 months

Answer: Exposure to non-human proteins prior to 6 months increases the likelihood of allergies.

17. The most common cause of poor weight gain among breastfed infants during the first four weeks after birth is:

a. infant metabolic disorders
b. **infrequent or ineffective feedings**
c. low fat content of breast milk
d. maternal endocrine problems
e. maternal nutritional deficiencies

Answer: The lack of stimulation to the breasts causes a decrease in milk supply and the Infant does not receive enough calories and other nutrients and human milk constituents to grow.

18. Jaundice in a normal full term breastfeeding infant is improved by:

a. **breastfeeding frequently (at least 8 or more times in 24 hours)**
b. giving glucose water after breastfeeding
c. giving water after breastfeeding
d. both a and c

Answer: Water and/or glucose do nothing to relieve hyperbilirubinemia. Jaundice in normal full term breastfeeding infant is lessened by the passage of meconium, which is stimulated by the ingestion of colostrum and human milk. Adequate caloric intake is also important to reducing intestinal bilirubin absorption, an additional factor in reducing jaundice.

19. Breastfeeding is contraindicated in which of the following conditions:

a. **infant with galactosemia**
b. mother with hepatitis B
c. mother with inverted nipples
d. mother with mastitis
e. both a and c

Answer: Galactosemia in the infant is one of the rare medical problems that preclude breastfeeding/breastmilk. Mothers with Hepatitis B may begin breastfeeding their infants before receiving HBIG and the first dose of Hepatitis B vaccine series. Mothers with mastitis should continue to breastfeed and the milk is safe for the baby. Mothers with inverted nipples can be helped to breastfeed in many cases.

20. Hospital policies that promote breastfeeding include:

a. uninterrupted sleep the first night to allow mother's milk supply to build up
b. **unlimited access of mother to baby**
c. use of a dropper for routine water supplementation
d. use of pacifiers to prevent sore nipples

Answer: Rooming-in provides the mother opportunity to breastfeed frequently without a hospital-imposed schedule. Frequent breast stimulation will build the milk supply. Routine water

supplementation is not recommended by any means and pacifiers may interfere with the infants suckling at the breast.

21. Studies have indicated that the Lactational Amenorrhea Method (LAM) of contraception is less reliable under which of the following circumstances:

    a. is given no regular supplements
    b. continues with night feedings
    c. <u>is less than 8 months old</u>
    d. feeds 8 or more times in 24 hours

Answer: The neurohormones of lactation suppress ovulation. However several well designed studies indicate that the reliability decreases beyond 6 months postpartum even if all other LAM guidelines are strickly followed.

22. Reasons for including *Breastfeeding support for mother infant pairs is an important component to include in planning for or responding to major emergencies where clean water,sanitation and power are disrupted* do not include:

    a. Breastmilk provides immunoglobulins that actively prevent infection.
    b. <u>It is less expensive than providing for infant formula</u>
    c. In a stressful emergency situation breastfeeding provides a secure environment for infants and young children
    d. With support even mothers who have already weaned can be assisted to relactate.

Answer: Infants who are breastfed do considerably better in emergency situations because of the combination of nutrition, fluids, disease prevention immunoglobulins and security that nursing provides. The use of even donated (free)formula should be kept at a minimum.

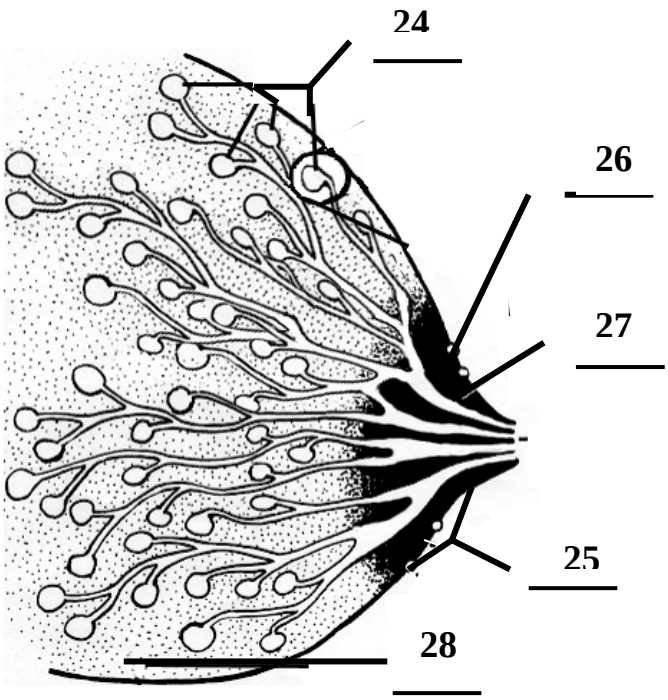
23. Which of the following statements is not true of The International Code of Marketing of Breastmilk Substitutes approved as a resolution in the World Health Assembly (WHA) in 1981:

    a. provides guidelines for the ethical marketing of infant formula
    b. is incorporated into the Baby Friendly Hospital assessment
    c. <u>was approved by all WHA member countries</u>
    d. is updated every two years by the WHA
    e. includes bottles, nipples, and breastmilk substitutes

Answer: The United States was the only member country of the WHA that did not approve the resolution in 1981.

24. through 28. Label the structures of the breast by inserting next to the appropriate pointer the number of the structure listed below:

24. Alveoli
25. Areola
26. Montgomery's glands
27. Duct
28. Paranchyma



Lactation Management Self-Study Modules, Level I
Post-Test

Please circle the appropriate response:

1. Identify the component of human milk that binds iron locally to inhibit bacterial growth:

    a. taurine
    b. secretory IgA
    c. macrophages
    d. lactoferrin
    e. oligosaccharides

2. Identify the component of human milk that provides specific immunity against many organisms:

    a. taurine
    b. secretory IgA
    c. macrophages
    d. lactoferrin
    e. oligosaccharides

3. The most important criterion for assessing the milk transfer during a feeding at the breast is:
    a. visible areola compression
    b. audible swallow
    c. proper alignment
    d. proper attachment

4. Compared to formula, human milk contains higher levels of:

    a. vitamin D
    b. iron
    c. lipase
    d. vitamin A
    e. none of the above

5. The hormone responsible for milk ejection is:

    a. progesterone
    b. prolactin
    c. estrogen
    d. oxytocin

6. A mother with a three-day old baby presents with sore nipples. The problem began with the first feeding and has persisted with every feeding. The most likely source of the problem is:

    a. feeding too long
    b. poor attachment
    c. baby's suck is too strong
    d. lack of nipple preparation during pregnancy

7. The hormone responsible for milk synthesis is:

    a. progesterone
    b. prolactin
    c. estrogen
    d. oxytocin
    .

8. Which of the following would you suggest to a woman with inverted nipples during the third trimester?

    a. Use breast shells with guidance from her health care provider
    b. Cut holes in the bra to allow the nipples to protrude; wear it day and night
    c. Use Hoffman's maneuver four times a day to permanently evert her nipples
    d. Do nothing because the natural changes in the breast during pregnancy and the infant's suckling postpartum may evert the nipples

9. Which of the following is most likely to have the greatest effect on the volume of milk a woman produces?

    a. maternal weight for height
    b. maternal fluid intake
    c. supplementation of the infant with formula
    d. maternal caloric intake
    e. both a and c

10. Infants exclusively breastfed for about six months will have:

    a. Fewer episodes of lower respiratory infection
    b. fewer episodes of diarrhea
    c. none of the above
    d. both of the above

11. The addition of complementary foods to breastfed infants is recommended at about:

    a. 2 months
    b. 4 months
    c. 6 months
    d. 10 months
    e. 12 months

12. Signs of adequate breast milk intake in the early (first 4-6) weeks include all EXCEPT:

    a. baby gains weight
    b. at least 3-4 stools in 24 hours
    c. sounds of swallowing
    d. baby sleeps through the night
    e. at least 6 diapers wet with urine in 24 hours

13. It is especially important that an infant with a strong family history of allergy should be exclusively breastfed for:

    a. 2 months
    b. 4 months
    c. 6 months
    d. 8 months
    e. 12 months

14. Severe engorgement is most often due to:

    a. high oxytocin level
    b. infrequent feedings
    c. high prolactin level
    d. postpartum depression

15. The most common cause of poor weight gain among breastfed infants during the first four weeks after birth is:

    a. maternal endocrine problems
    b. maternal nutritional deficiencies
    c. infant metabolic disorders
    d. infrequent or ineffective feedings
    e. low fat content of breast milk

16. A breastfeeding mother with a 3-month old infant has a red tender wedge-shaped area on the outer quadrant of one breast. She has flu-like symptoms and a temperature of 39° C. Your management includes all of the following EXCEPT:

    a. extra rest
    b. interrupt breastfeeding for 48 hours
    c. moist heat to the involved region
    d. antibiotics for 10 to 14 days days

17. Studies have indicated that the Lactational Amenorrhea Method (LAM) of contraception is less reliable under which of the following circumstances:

    a. feeds 8 or more times in 24 hours
    b. is given no regular supplements
    c. is less than 8 months old
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    d. was approved by all WHA member countries
    e. includes bottles, nipples, and breastmilk substitutes

19. Nipple candidiasis can be associated with all of the following EXCEPT:

    a. oral thrush in the infant
    b. burning pain in the breast
    c. fever and malaise
    d. pink and shiny appearance of the nipples and areola

20. Jaundice in a normal full term breastfeeding infant is improved by:

    a. giving glucose water after breastfeeding
    b. giving water after breastfeeding
    c. breastfeeding frequently (at least 8 or more times in 24 hours)
    d. both a and c

21. Breastfeeding is contraindicated in which of the following conditions:

    a. infant with galactosemia
    b. mother with mastitis
    c. mother with hepatitis B
    d. mother with inverted nipples
    e. both a and c

22. Reasons for including breastfeeding support for mother infant pairs is an important component to include in planning for or responding to major emergencies where clean water,sanitation and power are disrupted do not include:

    a. It is less expensive than providing for infant formula
    b. With support even mothers who have already weaned can be assisted to relactate
    c. Breastmilk provides immunoglobulins that actively prevent infection.
    d. In a stressful emergency situation breastfeeding provides a secure environment for infants and young children

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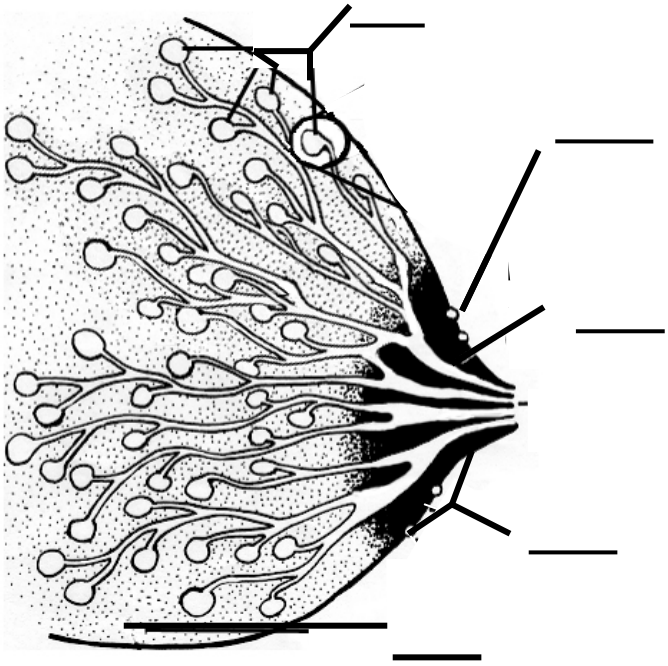

Lactation Management Self-Study Modules, Level I
Post-Test with Answers

Please circle the appropriate response:

1. Identify the component of human milk that binds iron locally to inhibit bacterial growth:

    a. taurine
    b. secretory IgA
    c. macrophages
    d. <u>lactoferrin</u>
    e. oligosaccharides

Answer: Lactoferrin is an iron-binding protein of external secretions, including human milk. It inhibits the growth of iron-dependent microorganisms in the gut.

2. Identify the component of human milk that provides specific immunity against many organisms:

    a. taurine
    b. <u>secretory IgA</u>
    c. macrophages
    d. lactoferrin
    e. oligosaccharides

Answer: Secretory IgA is the main immunoglobulin in human milk. IgA is produced in the Mammary gland in B cells, which originate at maternal sites of high environmental pathogen exposure and therefore protects the infant against pathogens present in the immediate environment

3. The <u>most</u> important criterion for assessing the milk transfer during a feeding at the breast is:
    a. visible areola compression
    b. <u>audible swallow</u>
    c. proper alignment
    d. proper attachment

Answer: Position and attachment are important to achieve effectiveness, but the most Important sign that the baby is transferring milk is hearing the swallow

4. Compared to formula, human milk contains higher levels of:

    a. vitamin D
    b. iron
    c. <u>lipase</u>
    d. vitamin A
    e. none of the above

Answer: Formula does not contain enzymes including lipase. Vitamins A and D have been added to formula in an amount similar to breast milk. Formula actually contains more iron (but the iron is less bioavailable).

5. The hormone responsible for milk ejection is:

    a. progesterone
    b. prolactin
    c. estrogen
    d. <u>oxytocin</u>

6. A mother with a three-day old baby presents with sore nipples. The problem began with the first feeding and has persisted with every feeding. The most likely source of the problem is:

    a. feeding too long
    b. **<u>poor attachment</u>**
    c. baby's suck is too strong
    d. lack of nipple preparation during pregnancy

Answer: The most common cause of sore nipples is poor attachment of the infant's mouth to the mother's nipple. Poor attachment often begins with the first feeding and if not corrected continues to contribute to increasing pain and trauma.. Nipple preparation during pregnancy is not recommended because studies have shown no effect on nipple comfort

7. The hormone responsible for milk synthesis is:

    a. progesterone
    b. **<u>prolactin</u>**
    c. estrogen
    d. oxytocin
    .

8. Which of the following would you suggest to a woman with inverted nipples during the third trimester?

    a. Use breast shells with guidance from her health care provider
    b. Cut holes in the bra to allow the nipples to protrude; wear it day and night
    c. Use Hoffman's maneuver four times a day to permanently evert her nipples
    d. <u>Do nothing because the natural changes in the breast during pregnancy and the infant's suckling postpartum may evert the nipples</u>

Answer: Studies (MAIN Trial Collaborative Group, 1994) have demonstrated that prenatal nipple stretching exercises such as Hoffman's maneuver and the use of breast shells to encourage the nipple to protrude are equally or less helpful than no intervention at all. The mother should receive assistance postpartum.

9. Which of the following is most likely to have the greatest effect on the volume of milk a woman produces?

a. maternal weight for height
b. maternal fluid intake
c. <u>supplementation of the infant with formula</u>
d. maternal caloric intake
e. both a and c

Answer: Mother's milk volume is fairly well protected. A mother"s caloric or fluid intake may effect her own energy level or urine output but is not directly related to her breastmilk volume. Giving formula results in the infant taking less breast milk; therefore, the mother's breasts are less stimulated and the supply drops

10. Infants exclusively breastfed for about six months will have:

a. Fewer episodes of lower respiratory infection
b. fewer episodes of diarrhea
c. none of the above
d. <u>both of the above</u>

Answer: In the U.S., the risk of otitis media is reduced by 50% in breastfed infants. The antibodies in human milk protect the infant from the organisms that cause diarrhea. At least 60% of the infant deaths in the U.S. from diarrheal disease are attributed to not being breastfed.

11. The addition of complementary foods to breastfed infants is recommended at about:

a. 2 months
b. 4 months
c. **<u>6 months</u>**
d. 10 months
e. 12 months

Answer: Breast milk alone maintains adequate nutrition and growth up to 6 months of age in most infants. In addition feeding skills are learned in corresponding developmental sequence. By 6 months of age, the infant can transfer a bolus from the anterior tongue to the pharynx, allowing manipulation of a pureed or solid food.

12. Signs of adequate breast milk intake in the early (first 4-6) weeks include all EXCEPT:

a. baby gains weight
b. at least 3-4 stools in 24 hours
c. sounds of swallowing
d. <u>baby sleeps through the night</u>
e. at least 6 diapers wet with urine in 24 hours

Answer: Breastfeeding babies need to eat a minimum of eight times (about every three hours, day and night) in the early weeks. Sleeping long stretches at night may be seen after about six weeks of age. A baby who sleeps all night in the beginning is probably not getting enough calories.

13. It is especially important that an infant with a strong family history of allergy should be exclusively breastfed for:

    a. 2 months
    b. 4 months
    c. **6 months**
    d. 8 months
    e. 12 months

Answer: Exposure to non-human proteins prior to 6 months increases the likelihood of allergies.

14. Severe engorgement is most often due to:

    a. high oxytocin level
    b. infrequent feedings
    c. high prolactin level
    d. postpartum depression

Answer: The most common cause of engorgement is mechanical: infrequent or ineffective milk removal. The solution is milk removal by the baby, hand expression or a pump and frequent, effective breastfeeds thereafter.

15. The most common cause of poor weight gain among breastfed infants during the first four weeks after birth is:

    a. maternal endocrine problems
    b. maternal nutritional deficiencies
    c. infant metabolic disorders
    d. infrequent or ineffective feedings
    e. low fat content of breast milk

Answer: The lack of stimulation to the breasts causes a decrease in milk supply and the Infant does not receive enough calories and other nutrients and human milk constituents to grow.

16. A breastfeeding mother with a 3-month old infant has a red tender wedge-shaped area on the outer quadrant of one breast. She has flu-like symptoms and a temperature of 39° C. Your management includes all of the following EXCEPT:

    a. extra rest
    b. interrupt breastfeeding for 48 hours
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Answer: An essential part of the treatment of mastitis is maintaining milk flow through the breasts by breastfeeding, hand expression or pumping. Mastitis is a cellulitis and the milk itself is not harmful to the infant. The usual antibiotics (dicloxacillin/erythromycin) used to treat mastitis are safe for the baby.

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    b. burning pain in the breast
    c. fever and malaise
    d. pink and shiny appearance of the nipples and areola

Answer: Nipple candidiasis is a local fungal infection and usually does not cause systemic symptoms

20. Jaundice in a normal full term breastfeeding infant is improved by:

    a. giving glucose water after breastfeeding
    b. giving water after breastfeeding
    c. breastfeeding frequently (at least 8 or more times in 24 hours)
    d. both a and c

Answer: Water and/or glucose do nothing to relieve hyperbilirubinemia. Jaundice in normal full term breastfeeding infant is lessened by the passage of meconium, which is stimulated by the ingestion of colostrum and human milk. Adequate caloric intake is also important to reducing intestinal bilirubin absorption, an additional factor in reducing jaundice.

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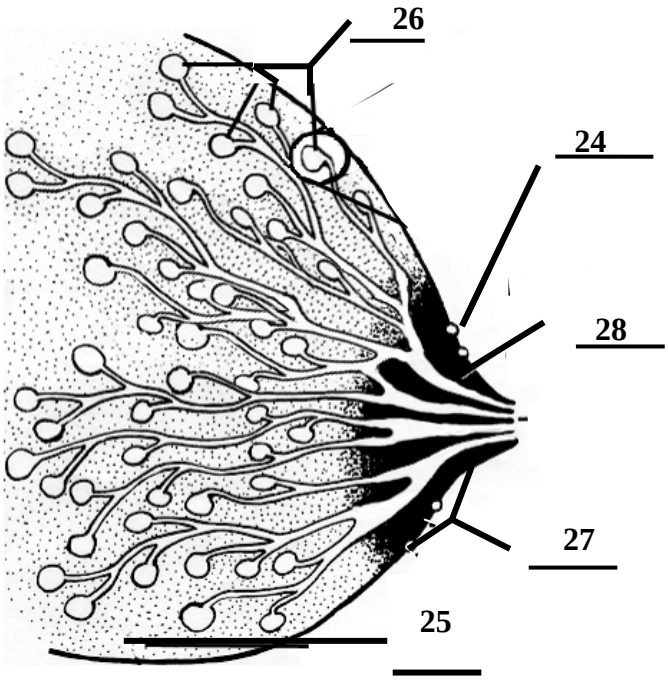
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