Promotion of Breastfeeding In Neonatal Intensive Care Unit

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Index

List of abbreviations

HM	Human milk
IgA	Immunoglobulin A
EGF	Epidermal growth factor
NEC	Necrotizing enterocolitis
DHA	Docosahexanoic acid
CVD	Cardiovascular disease
CPR	C-reactive protein
BMD	Bone mineral density
PTB	Preterm birth
NBS	New ballard score
AAP	American academy of pediatrics
UNICEF	United nations children funds
BFHI	Baby friendly hospital initiative
WHO	World health organization
NIDCAP	Newborn individualized developmental care and assessment program

List of tables

List of figures

Introduction

Breastfeeding is recognized as the best source of nutrition for all infants, and the World Health Organization (WHO) recommends exclusive breastfeeding until 6 months of age. ***(Gartner L.M, et al 2005)*** Breast milk provides protection against infection, autoimmune disease, and gastrointestinal dysfunction, and promotes cognitive development ***(Merewood . A, et al 2003)*** . The beneficial effects of breast milk can be seen even more clearly in preterm and low birth weight infants being treated in the Neonatal Intensive Care Unit (NICU), where infection and neonatal sepsis are more common. These babies will also benefit from the analgesic properties of breastfeeding during medical procedures***. (Cynthia K. 2012)***

Breast milk is high in energy, macronutrients, micronutrients, vitamins, and it contains many hormones, enzymes and some other important elements. Breastfeeding provides the total energy required during the first 6 months and one-third of the needs of the second year of life. Breastfeeding reduces the incidence and severity of infections as well as allergies and many other illnesses, including no communicable diseases. It also increases the birth space which leads to promotion of maternal and child health. Breastfeeding increases children's intelligence quotient and promotes early child development, as well as maternal and child bonding ***(Lawrence R.A. 2011).***

Breastfeeding promotion in the NICU faces a unique set of challenges. Because many of the infants are premature, oral motor skills are often poorly developed and these infants may display an inability to latch

and suck***. (Taylor C., et al 2011)*** This means that mothers must often use manual or electronic breast pumps to express milk, which is then fed to the infant by gavage or oral feeds. Another barrier to breastfeeding is the design of NICUs, which do not promote alone time or skin-to-skin contact between mothers and infants ***(Pineda RG., et al 2011).***

The importance of breastfeeding for all infants and NICU infants in particular, has been recognized around the world.

Aim of the Work

The aim of this study was to initiate interventional promotion of breastfeeding at NICU.

Chapter [1]
Human milk

Human milk (HM) feedings from the infant's own mother is the best nutrition for the preterm (<37 gestational weeks) infant ***(Jenny, 2013).***

Composition of human milk:

1. Chemical and major macronutrients.
2. Cellular components ***(Neville, 2001).***

The major macronutrients in milk are:

- Lactose and oligosaccharides
- Milk fat, including triglycerides, cholesterol, phospholipids, and steroid hormones.
- Proteins, including several caseins, alpha-lactalbumin, lactoferrin, secretory IgA, and lysozyme.
- Minerals, including sodium, potassium, chloride, calcium, magnesium, and phosphate.

The cellular components:

The cellular components of human milk vary in cell numbers and type over time ***(Neville, 2001)***. Cells include: Living leukocytes (macrophages, lymphocytes, neutrophils), and epithelial cells.

Living leukocytes are present in human milk in approximately the same order of magnitude as seen in peripheral blood, but the predominant leukocyte is the macrophage rather than the neutrophil. The number of leukocytes declines sharply after the first two to three months, and thereafter.

Human milk macrophages are capable of chemotaxis, phagocytosis, and secretion of complement, lysozyme and lactoferrin. Both B and T lymphocytes are in human milk and aid in protecting the infant's intestinal tract from invading organisms.

Epithelial cells make up a larger portion of the total cell population ***(Neville, 2001)***.

Variation in the composition of breast milk:

Colostrum:

The first fluid produced by mothers after delivery is colostrum, which is distinct in volume, appearance, and composition. Colostrum, produced in low quantities in the first few days postpartum, is rich in immunologic components such as secretory immunoglobulin (Ig)A, lactoferrin, leukocytes, and developmental factors such as epidermal growth factor (EGF*) **(Kulski et al., 1981 & Castellote et al., 2011).***

Colostrum also contains relatively low concentrations of lactose, indicating its primary functions to be immunologic and trophic rather than nutritional. Levels of sodium, chloride, and magnesium are higher and levels of potassium and calcium are lower in colostrum than in later milk **(*Pang et al., 2007)***.

Transitional milk:

Transitional milk shares some of the characteristics of colostrum but represents a period of “ramped up” milk production to support the nutritional and developmental needs of the rapidly growing infant, and typically occurs from 5 days to 2 weeks postpartum, after which milk is considered largely mature. By 4 to 6 weeks postpartum, human milk is considered fully mature ***(Ballard & Morrow, 2013)***.

Functions of the breast milk:

Breast milk has increased immunological protection, improved gastrointestinal function, visual, hearing function and enhanced cognitive development ***(Gartner et al., 2005).***

1. **Gastrointestinal function** — several components of human milk stimulate gastrointestinal growth and motility, which enhance the maturity of the gastrointestinal tract. Other factors are protective and decrease the risk of necrotizing enterocolitis and other infections ***(Steinwender et al., 2001)***. These stimulatory and protective components include:

    - Hormones (e.g, cortisol, somatomedin-C, insulin-like growth factors, insulin, and thyroid hormone) ***(Rodriguez et al., 1999).***
    - Growth factors (e.g, epidermal growth factor [EGF] and nerve growth factor) affect development of the intestinal tract and may be protective against invasive disease ***(Clark et al., 2005).***
    - Gastrointestinal mediators (e.g, neurotensin and motilin) may affect gastrointestinal motility ***(Berseth et al., 1990)***.
    - Anti-inflammatory agents (e.g, interleukin 10) may reduce the risk of NEC ***(Fituch et al., 2004).***
    - Enzymes (e.g, platelet-activating factor [PAF] acetylhydrolase) protect the GI tract. PAF-acetylhydrolase degrades PAF, a potent mediator of intestinal injury induced during necrotizing enterocolitis ***(Caplan et al., 1997).***
    - Immunoglobulins IgA and IgG may play an important role by enhancing mucosal immunity and, thus, protecting the GI tract from foreign antigens or microorganisms and contributing to the prevention of NEC.