Colostrum Swabbing as an Infection Prevention Strategy: A Retrospective Study

Sharon Sauer, RNC-NIC, BSN
Gerry Altmiller, EdD, APRN, ACNS-BC
Einstein Healthcare Network, Philadelphia, Pennsylvania

Abstract: Critically ill neonates are prone to healthcare-associated infection (HAI) due to an immature immune system and need for multiple invasive diagnostic and treatment procedures. The purpose of this retrospective study was to determine the effectiveness of oral swabbing of colostrum as an intervention to provide immunity and decrease the incidence of neonatal HAI, particularly central line–associated bloodstream infection (CLABSI). The research study was informed by specific *Caritas* Processes, which are part of Watson's Theory of Human Caring. Medical record audits were conducted for infants before, during, and after a 6-month pilot period for the clinical practice change of oral swabbing with colostrum, and data indicated the practice are safe, feasible, and effective in reducing CLABSI in critically ill neonates.

Keywords: colostrum; infection; caring science; neonate; caritas

Critically ill neonates are prone to healthcare-associated infections (HAI) because of their immature immune systems. At a Mid-Atlantic, urban, level III neonatal intensive care unit (NICU) in a medical center designated as a Watson Caring Science Affiliate, the Infectious Disease Database reported three incidences of central line–associated bloodstream infection (CLABSI) from September 2014 to February 2015 for 2,804 central venous catheter (CVC) days, translating into a rate of 1.43 CLABSI per 1,000 CVC days. In an effort to address this clinical concern, direct care nurses conducted an extensive literature review, finding support for the intervention of oral care with colostrum as safe, feasible, and effective in preventing infection in preterm infants unable to feed orally. The physiologic mechanism identified was that cytokines found in colostrum activate the lymphoid tissue system found in the mucosal lining of premature infants' mouths to trigger an immune response that protects the neonatal respiratory and gastrointestinal tracts. Based on this evidence, an infection prevention practice guideline to use colostrum for oral care in preterm infants unable to feed was developed and implemented as a quality improvement project. This practice guideline was piloted over 6 months in an effort to reduce infection rates. This retrospective study reports the impact of this newly implemented practice guideline on neonatal HAI. This article will describe the clinical concern, study, and its results.

Background

One out of every 10 infants in the United States is born prematurely (Centers for Disease Control and

http://dx doi.org/10.20467/1091-5710.HumanCaring-D-17-00058

Prevention [CDC], 2015) with approximately 30% acquiring multiorgan complications (Gephart & Weller, 2014). The premature immune system of the critically ill neonate contributes to an increased incidence of HAI in that population, which is common, costly, and harmful to the patient. HAI is identified as a late-onset infection detected after 7 days in the neonate and is a significant cause of mortality in this population (Bowen, Callander, Richards, & Lindrea, 2017).

Low birth weight (LBW) neonates (under 2,500 g), particularly those weighing less than 1,500 g, have increased vulnerability to HAI, particularly CLABSI, due to the use of invasive central lines (Ceballos, Waterman, Hulett, & Makic, 2013). The leading cause of death in neonates is low birth weight (<2.5 kg) and low gestational age (<33 weeks) (Lee, Lee, & Chen, 2017) as both extend NICU stays and require an increased number of treatments and invasive procedures that increase the risk of HAI. Eliminating CLABSI, a costly and preventable infection, is a priority of the CDC, which champions the implementation of infection prevention strategies.

Prevention strategies include instituting a central line bundle to be utilized by physicians and nurses that include strict hand hygiene, maximal barrier upon insertion, skin asepsis with chlorhexidine, optimal catheter site selection, and daily review of line necessity (The Joint Commission, 2013). Compliance with these standards is supported by the use of a checklist at the time of insertion. Additionally, the central line site dressing must be assessed hourly and redressed if necessary with minimal central line maintenance completed daily during tubing changes using aseptic technique and maximal barriers.

The effectiveness of using bundles such as described above in preventing CLABSI is well documented (Bowen et al., 2017; Ceballos et al., 2013; Patrick et al., 2014). An additional, inexpensive therapeutic intervention in protecting neonates against infection has been oropharyngeal administration of human milk because of its multisystemic immunity effect (Patrick et al., 2014). The intervention is described as placing 0.2 mLs of colostrum on the buccal mucosa to be absorbed through the mucosal lining (Rodriguez et al., 2011). When done during the first days of life, it stimulates the lymphoid tissue in the oral mucosal lining of the mouth, thus causing the release of sIgA, an antibody that plays a crucial role in immune function and lactoferrin, a protein of the immune system with antimicrobial activity, to promote immunity development (Gephart & Weller, 2014). Milk sIgA and saliva sIgA harmonize to prevent adherence of bacteria to the gastrointestinal tract and respiratory tract to promote immunity (Gephart & Weller, 2014; Thibeau & Boudreaux, 2013).

Although studies have shown that using colostrum or human milk for oral care on ventilated infants is safe and practical, a small sample size was identified in multiple studies as a key limitation in supporting evidence that colostrum decreases neonatal HAI (Jácomo, Carmona, Matsuno, Manso, & Carlotti, 2011; Rodriguez et al., 2011; Thibeau & Boudreaux, 2013). A randomized controlled study of 48 neonates born ≤28 weeks gestation found oral care with colostrum administered every 3 hours for 3 days beginning at 48 to 96 hours of life, decreased incidences of clinical sepsis significantly with no changes noted in heart rate (HR), respiratory rate (RR), oxygen saturation (SpO_2), and blood pressure (BP) during administration of oral care (Lee et al., 2015). In this double-blind placebo-controlled study, where half received oral swabbing with colostrum and half were swabbed with water, the group receiving colostrum had elevated concentration of immunoprotective agents (slgA and lactoferrin), resulting in a substantial reduction of clinical sepsis compared to the placebo group of infants (Lee et al., 2015). Another randomized controlled pilot study of 12 very low birth weight infants analyzed oral microorganisms of the neonates and found those receiving oral swabbing with colostrum over a 96-hour period, had a decrease in the abundance of Staphylococcaceae, only 17%, when compared to the control group that had 73% (Sohn, Kalanetra, Mills, & Underwood, 2016). These results support the use of colostrum as an infection prevention strategy for LBW and premature infants.

While the specific procedure of oral swabbing with colostrum, described as Colostrum-Oral Immune Therapy (COIT) is considered safe (Gephart & Weller, 2014; Rodriguez et al., 2011), recent questions being studied include whether there is a risk of aspiration during mouth care with colostrum (Nasuf et al., 2015). In an ongoing 5-year, multicenter, double-blinded, randomized controlled trial to assess safety and late-onset sepsis among neonates <1,250 g receiving COIT, all the eligible subjects (n = 66) have tolerated the doses without any adverse reactions (Rodriguez, Vento, Claud, Wang, & Caplan, 2015). Safety was evaluated by monitoring HR, RR, BP, and SpO_2.

Rodriguez et al. (2011) also identified oral swabbing of a critically ill neonate's own mother's colostrum as an intervention to improve clinical outcomes to reduce incidence of infection, but across the litera-

ture, it is unclear if the intervention of oral swabbing of colostrum consistently impacts the neonatal immune response and neonatal clinical outcomes. Furthermore, a metasynthesis by Gephart and Weller (2014) revealed that studies varied in the dosing, frequency for oral immune therapy, treatment duration, and outcomes measured, and many did not measure compliance of the intervention.

Despite conflicting evidence regarding swabbing with oral colostrum in neonates as a means to reduce HAI, most studies report no adverse effect of mouth care with oral colostrum in critically ill neonates, and other significant benefits have been described. Developmental benefits for infants, in that they began sucking on the endotracheal tube during oral swabbing of colostrum, and psychological benefits for the parents have been attributed to the administration of oral swabbing with colostrum (Rodriguez et al., 2010). Regarding practicality of implementation, Montgomery, Baer, Lambert, and Christensen (2010) hear found that in a protocol for providing oral swabbing with colostrum every 3 hours during a 7-day period, 77% of planned swabbings were delivered, indicating that it is feasible as an intervention.

The Clinical Practice Change

Using the available evidence to support *Caritas* Process (CP) #6, creative problem solving with full use of self, a nurse-led initiative to standardize practice to include oral swabbing of colostrum for neonates ≤32 weeks gestation was introduced to the Nursing Research and Evidence-based Practice Council of the medical center. The proposal was adapted from Gephart and Weller's (2014) COIT protocol. The council reviewed and approved the practice change for a pilot period of 6 months. The project leader, the direct care registered nurse (RN) who proposed the practice change, developed an education program for direct care nurses using a collaborative cocreation approach framed in CP#7, engaging in genuine teaching–learning. Seven direct care RNs (three day shift and four night shift) were recruited to become staff mentors based on their established clinical expertise. One week prior to the practice change implementation date, they were taught the COIT protocol and instructed in collaborative techniques of teaching by the project leader.

An information sheet developed by the project leader was used to teach the direct care RNs the COIT protocol. Information contained in the information sheet was also displayed as a poster in the nursing lounge. Additional methods of communicating this practice change included continuing to present the evidence for the practice change at staff meetings and in emails to stakeholders. The mentors on each shift, who oversaw staff implementation of colostrum swabbing, provided genuine teaching–learning for direct care RNs from the outset of the practice change. Once the entire RN staff was instructed on the technique, the staff mentors performed intermittent audits to ensure compliance.

Oral care was already a part of the NICU workflow, making the COIT procedure easy to adopt. Oral care supplies were in place along with small colostrum collection containers, and labeling of colostrum in the order it was collected was a well-established protocol. Prior to this practice change, colostrum was collected and stored in a freezer for up to 4 months if an infant was unable to feed or administered through a gastric tube for infants that could tolerate tube feedings. While helpful to provide nutrition with colostrum via tube feedings, it bypassed the oral mucosa, thus losing the infection prevention benefit. With the implementation of this practice change, not only did infants that were unable to tolerate feedings receive swabbings with colostrum as oral care but also infants who could tolerate feedings through a feeding tube also received the oral swabbing with colostrum. Infants of mothers who did not wish to breastfeed received oral care with sterile water.

Following the COIT procedure, mothers of premature infants who were disignated to have nothing by mouth (NPO) or receiving enteral feeds via oral or nasal gastric tube were taught to express milk into a plastic colostrum container using their hand. Teach-back method was used to ensure the mother understood how to label the colostrum in the order of how it was expressed. As had been the protocol, labels were generated at the time of admission and contained the baby's name and medical record number (MRN) as well as the mother's. At the time of milk expression, the mother labeled the containers. If the colostrum was not used immediately, it was stored up to 96 hours in a refrigerator specifically designated for breast milk. Each patient's colostrum was kept in a bin in the refrigerator specifically labeled with the mother's name and MRN to prevent errors in administration. Verification of the correct label for the mother and the baby was conducted by two nurses three times during the process—first, when the milk was expressed and labeled by the mother, second, when it was pulled from the refrigerator, and third, when it was about to be administered to the neonate.

Following the COIT procedure, 0.2 mL of colostrum was applied to the gums, tongue, and inner cheek. If less than 0.2 mL were available for the swabbing, a small amount of sterile water was added. Following CP #9, parents were invited to assist with basic human needs, participating in the actual swabbing of the colostrum for their infant under the direction of the direct care RN. Unused portions of colostrum were returned to the refrigerator for future use. This process was repeated every 3–4 hours for a period of 7 days or until the mother's colostrum was no longer available. Each administration was documented under oral care in the electronic medical record. The practice change was implemented and monitored for a 6-month pilot period during which the infection rates decreased. Shortly thereafter, COIT was adopted as a permanent protocol in the NICU.

Methods

Following adoption of the COIT protocol, institutional review board approval was obtained to conduct a medical record audit for the 6-month pilot period. The purpose of this retrospective study was to determine the safety and effectiveness of an evidence-based clinical practice change that provided for oral administration of colostrum as a preventative measure to decrease incidence of HAIs in neonates. Additional outcomes explored included incidences of apnea, bradycardia, oxygen saturations, and changes in vital signs.

The study question was "Does implementing COIT framed in Watson's Theory of Human Caring decrease neonatal infection rates?"

Theoretical Framework

Watson's Theory of Human Caring is foundational to nursing, informing, and guiding practice using the structure and core of the Theory of Human Caring based on the 10 *Caritas* Processes (2012). C*aritas* Process #9, tending to basic human needs, served as the framework for this study as the intervention of colostrum swabbing of neonates' oral cavity was designed to meet the basic need of infants for safety and to involve parents as caregivers. The direct care nurse assists the neonate and the family through the fulfillment of essential human needs and intentional caring consciousness, viewing the patient and family as a whole. COIT is done with the intention of protecting the neonate against HAIs and decreasing infection rates. The NICU nurse works to lessen the worries of the parents by assisting and involving them in the oral swabbing with colostrum. After creating a caring moment by practicing COIT, the families and the nurses talk openly about the infant's response and experience. By facilitating a spirit-filled, human-to-human connection between the infant and the family member during oral care, the direct care nurse works to meet human care necessities and promote respect, wholeness, and harmony.

Setting

The setting for this study was the NICU of a 700-bed urban Medical Center. The NICU holds 27 neonates and is staffed by 60 direct care RNs.

Sample

Potential participants included infants admitted to the NICU during the 6-month pilot period. Inclusion criteria were that the infant was born premature at ≤32 weeks gestation, was LBW, and unable to feed orally, and that the infant received oral colostrum swabbing from his/her own mother's milk. Eighteen charts for infants admitted to the NICU met the inclusion criteria.

Data Collection Process

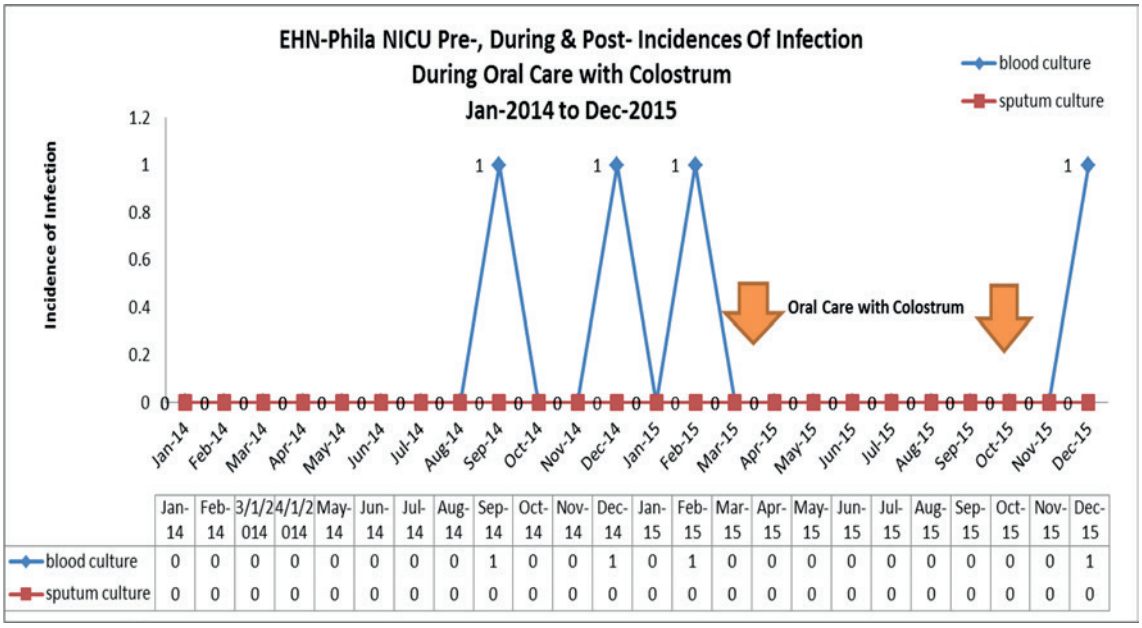
Data collection occurred retrospectively through chart reviews; data were recorded on a worksheet created by the principal investigator. Medical records were audited for the 18 charts that met inclusion criteria. Data were grouped by MRN. Data points included the following variables from the included medical records: gestational age at birth, birth weight, participation in the practice change of COIT, vital signs, oxygen saturations, incidence of apnea and bradycardia with oxygen desaturation, and results for sputum and blood cultures during the neonate's entire length of stay in the NICU.

Data Analysis

Microsoft Excel was used to organize collected data. Data were analyzed regarding infection rate and length of stay in the NICU for 18 infants who met the inclusion criteria and then compared to all infants born at ≤32 weeks gestation during the period of January 2014 to December 2015.

Results

During the 6-month pilot period, there were no instances of CLABSI detected for study participants. In addition, oral swabbing with colostrum was determined to be safe to the neonate. Specific variable data will be reported below.



	Jan-14	Feb-14	3/1/2014	4/1/2014	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15
blood culture	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1
sputum culture	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Figure 1. HAI incidence in the NICU.

Infection Rate

Infant's infection rates were determined by examining the blood and sputum cultures during their NICU stay. The hospital's Infectious Disease Control Department provided data for HAIs for neonates in the NICU for the period of January 2014 to December 2015 (Figure 1). The data indicate no infections developed during the 6-month pilot period. Three incidences of CLABSI were identified prior to the practice change, and one incidence of CLABSI occurred after the practice change in an infant who did not receive COIT. The rate of ventilator-associated pneumonia remained stable throughout the year with 0 incidences.

Safety

The vital signs, HR, RR, BP, and oxygen saturation of infants who received COIT were recorded for the entire NICU stay. In addition, although neonates are prone to episodes of apnea and bradycardia, the data revealed that there were no episodes of apnea, bradycardia, and oxygen desaturations during COIT (Table 1). These findings signify the neonate's tolerance of COIT and suggest that oral care with colostrum is safe.

Confounding Variables

Extraneous variables that may have affected outcomes during the 6-month pilot period include medications (i.e., antibiotics, caffeine to prevent apnea and bradycardia) and oxygen administration, which varies in all patients based on their individual plan of care. Standards of practice were followed for basic care of bathing and sterile suctioning.

Discussion

After an audit of 18 medical records that met the inclusion criteria, the data suggest oral swabbing of colostrum is an effective measure to safely provide immunity and lower the incidence of neonatal HAIs, particularly in this unit, the incidence of CLABSI. During the 6-month pilot period of April 1, 2015, to September 30, 2015, there was no incidence of infection in any of the premature infants ≤32 weeks that received COIT. Additionally, implementation of COIT was found to be a cost-effective infection prevention measure because colostrum is freely available from the mother and easily accessible. Since the adoption of COIT as routine practice in January 2016, the NICU Infectious Disease Database has reported no incidence of CLABSI to date.

Neonates have been known to have episodes of apnea and bradycardia with desaturations of oxygen related to prematurity. A medical record audit of the l8 charts included in the study for the 6-month pilot period indicated that there were no recorded episodes of apnea and bradycardia or desaturations of oxygen during oral care with colostrum.

Because oral care was already standard care for infants in the NICU and part of the nursing workflow, regulating the use of oral swabbing of

TABLE 1. Six-Month Data Collection Table of Results of Oral Care With Colostrum

Record	Gestational Age (Weeks)	Birth Weight (kg)	Apnea and Bradycardia with O2 Desaturation (±)	Blood Culture (±)
1	30	1.59	-	-
2	32	1.8	-	-
3	32	1.932	-	-
4	26	0.68	-	-
5	25	0.722	-	-
6	25	0.86	-	-
7	31	0.77	-	-
8	25	0.69	-	-
9	29	1.12	-	-
10	32	1.76	-	-
11	32	1.71	-	-
12	26	1.069	-	-
13	31	1.53	-	-
14	27	0.89	-	-
15	27	0.83	-	-
16	26	0.525	-	-
17	26	0.97	-	-
18	31	1.874	-	-

colostrum was not difficult to execute. The baby breastfeeding friendly culture within the unit supported the strong early emphasis of the culture of breast feeding and pumping from birth within the Women and Children's service line. Parental education provided by staff supported the availability of colostrum; mothers understood the importance of supplying their own milk to the critically ill infant. The cost of implementing the COIT protocol was minimal because the sterile oral care kits were already being utilized for standard mouth care within the NICU and the supply of the own mothers' colostrum is natural and inexpensive. There were no risks identified to the premature infants and oral swabbing with colostrum was found to be safe and effective. From the quality improvement project, the protocol was added to the breast-feeding policy and procedure, a decision now supported by this study. The practice change met the basic human needs of infants and parents, which aligned with the medical center's nursing theoretical practice model.

As a Caring Affiliate of the Watson's Caring Science Institute, the medical center's direct care RNs were able to integrate Watson's Theory of Human Caring Watson (2012), Caritas process #9, tending to basic needs, into nursing's professional practice. As the basis of the COIT implementation, nurses were able to promote the spirit-filled, human-to-human connection between the infants and families. The caring consciousness of the direct care RN being authentically present assists in performing oral care with colostrum as a basic physical need to help safely provide immunity and lower the incidence of neonatal HAIs. Transpersonal relationships were developed among the infants and their families by allowing parental participation in the infant's care. By tending to the needs of the family, caring moments were established between the infant, the family, and the nurse. Watson (2012) nurtures nursing's spiritual practice toward mind, body, and spiritual wholeness, enabling nurses to go beyond their ego within their professional practice.

Implications for practice include an increased emphasis on quality improvement projects and caring science research lead by nurses working in direct care at the bedside to advance the care of patients and support their families. Nurses seeking solutions to problems through evidence-based quality improvement projects, can impact the health of patients, improve outcomes, and allow nurses to experience the spirit-filled human to human connection that comes with promoting wholeness, respect, and harmony in meeting human care necessities. Further studies can focus on expanded sample sizes and understanding the developmental and psychological benefits of COIT.

Conclusion

This study supports inclusion of oral swabbing of colostrum as the standard of care for infants ≤32 weeks gestation in the NICU as a cost-efficient, safe,

and effective method of infection prevention for premature neonates unable to feed orally. Additionally, this project demonstrates how evidence-based practice and research informed by caring science can support the nursing profession in seeking solutions for patient care problems and enable nurses to provide the highest quality care for patients and their families. The impact of the direct care nurse is profound in improving practice and creating caring experiences in caring healing environments for patients and families.

References

Bowen, J. R., Callander, I., Richards, R., Lindrea, K. B., & Sepsis Prevention in NICUs Group. (2017). Decreasing infection in neonatal intensive care units through quality improvement. *Archives of Disease in Childhood - Fetal and Neonatal Edition*, *102*(1), F51–F57. http://dx.doi.org/10.1136/archdischild-2015-310165

Ceballos, K., Waterman, K., Hulett, T., & Makic, M. B. (2013). Nurse-driven quality improvement interventions to reduce hospital-acquired infection in the NICU. *Advances in Neonatal Care*, *13*(3), 154–163. http://dx.doi.org/10.1097/ANC.0b013e318285fe70

Centers for Disease Control and Prevention. (2015). Preterm birth. Retrieved from http://www.cdc.gov/reproductivehealth/MaternalInfantHealth/PretermBirth.htm

Gephart, S. M., & Weller, M. (2014). Colostrum as oral immune therapy to promote neonatal health. *Advances in Neonatal Care*, *14*(1), 44–51. http://dx.doi.org/10.1097/ANC.0000000000000052

Jácomo, A. D., Carmona, F., Matsuno, A. K., Manso, P. H., & Carlotti, A. P. (2011). Effect of oral hygiene with 0.12% chlorhexidine gluconate on the incidence of nosocomial pneumonia in children undergoing cardiac surgery. *Infection Control & Hospital Epidemiology*, *32*(6), 591–596. http://dx.doi.org/10.1086/660018

Lee, J., Kim, H. S., Jung, Y. H., Choi, K. Y., Shin, S. H., Kim, E. K., & Choi, J. H. (2015). Oropharyngeal colostrum administration in extremely premature infants: An RCT. *PEDIATRICS*, *135*(2), e357–e366. http://dx.doi.org/10.1542/peds.2014-2004

Lee, P. -L., Lee, W. -T., & Chen, H. -L. (2017). Ventilator-associated pneumonia in low birth weight neonates at a neonatal intensive care unit: A retrospective observational study. *Pediatrics & Neonatology*, *58*(1), 16–21. http://dx.doi.org/10.1016/j.pedneo.2015.10.014

Montgomery, D. P., Baer, V. L., Lambert, D. K., & Christensen, R. D. (2010). Oropharyngeal administration of colostrum to very low birth weight infants: Results of a feasibility trial. *Neonatal Intensive Care: The Journal of Perinatology-Neonatology*, *23*(1), 27–29.

Nasuf, A. W., Ojha, S., Dorling, J., & Cochrane Neonatal Group, Group, C. N., & Group, C. N. (2015). Oropharyngeal colostrum in preventing mortality and morbidity in preterm infants. *Cochrane Database of Systematic Reviews*, *9*(5), ART. No CD011921. http://dx.doi.org/10.1002/14651858.CD011921

Patrick, S. W., Kawai, A. T., Kleinman, K., Jin, R., Vaz, L., Gay, C., . . . Lee, G. M. (2014). Health care-associated infections among critically ill children in the US, 2007-2012. *PEDIATRICS*, *134*(4), 705–712. http://dx.doi.org/10.1542/peds.2014-0613

Rodriguez, N. A., Meier, P. P., Groer, M. W., Zeller, J. M., Engstrom, J. L., & Fogg, L. (2010). A pilot study to determine the safety and feasibility of oropharyngeal administration of own mother's colostrum to extremely low-birth-weight infants. *Advances in Neonatal Care*, *10*(4), 206–212. http://dx.doi.org/10.1097/ANC.0b013e3181e94133

Rodriguez, N. A., Vento, M., Claud, E. C., Wang, C. E., & Caplan, M. S. (2015). Oropharyngeal administration of mother's colostrum, health outcomes of premature infants: study protocol for a randomized controlled trial. *Trials*, *16*(1), 1–14. http://dx.doi.org/10.1186/s13063-015-0969-6

Rodriguez, N. A., Groer, M. W., Zeller, J. M., Engstrom, J. L., Fogg, L., Hongyan, D., & Caplan, M. (2011). A randomized controlled trial of the oropharyngeal administration of mother's colostrum to extremely low birth weight infants in the first days of life. *Neonatal Intensive Care: The Journal of Perinatology-Neonatology*, *24*(4), 31–35.

Sohn, K., Kalanetra, K. M., Mills, D. A., & Underwood, M. A. (2016). Buccal administration of human colostrum: Impact on the oral microbiota of premature infants. *Journal of Perinatology*, *36*(2), 106–111. http://dx.doi.org/10.1038/jp.2015.157

The Joint Commission. (2013). Preventing central line–associated bloodstream infections: Useful tools an international perspective. Retrieved from http://www.jointcommission.org/CLABSIToolkit

Thibeau, S., & Boudreaux, C. (2013). Exploring the use of mothers' own milk as oral care for mechanically ventilated very low-birth-weight preterm infants. *Advances in Neonatal Care*, *13*(3), 190–197. http://dx.doi.org/10.1097/ANC.0b013e318285f8e2

Watson, J. (2012). *Human caring science* (2nd ed.). Sudbury, MA: Jones & Bartlett.

Zachariah, P., Furuya, E. Y., Edwards, J., Dick, A., Liu, H., Herzig, C. T., . . . Saiman, L. (2014). Compliance with prevention practices and their association with central line-associated bloodstream infections in neonatal intensive care units. *American Journal of Infection Control*, *42*(8), 847–851. http://dx.doi.org/10.1016/j.ajic.2014.04.020

Correspondence regarding this article should be directed to Sharon Sauer, RNC-NIC, BSN, Clinical Nurse, Eistein Medical Center, 5501 Old York Road, Philadelphia, PA 19141. E-mail: SauerS@Einstein.edu