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Evaluation of a Clean Delivery Kit Intervention in Preventing Umbilical Cord Infections in Monrovia, Liberia

Wendy Post, MSN, BSN, RN¹

Odel Fayiah, NM²

Charlene D. Whitaker-Brown, DNP, MSN, FNP-C³

Sharon Davies, BS¹

Catherine Cooper, MD⁴

(1)School of Nursing, University of North Carolina Charlotte School of Nursing, CHARLOTTE, NC, USA

(2)School of Nurse Midwifery, University of Liberia School of Nurse Midwifery, Monrovia, Liberia

(3)School of Nursing, University of North Carolina at Charlotte, Charlotte, NC, USA

(4)Department of Health Services, Ministry of Health Liberia Executive Council, Monrovia, MD, USA

According to the World Health Organization's (WHO) Global Health Observatory Data; in 2016, the risk of neonatal death in Africa was 6 times greater than in European countries. UNICEF noted that more than 15% of children born in Liberia die before reaching their first birthday. Liberia's leading causes of infant mortality are malaria, neonatal tetanus infections, nutritional related deficiencies, and umbilical cord infections.

The purposes of this project were to a) initiate aseptic birth interventions using disposable clean delivery kits to pregnant women in under-resourced areas of Monrovia, Liberia, b) assess for umbilical cord infection in their infants for 28 days following birth, and c) facilitate an educational program for assessing the signs for neonatal infection of the umbilical cord site of infants. The project was conducted in partnership with the University of Liberia School of Nurse Midwifery, UNICEF, and the Liberia Ministry of Health.

Thirty pregnant women who have received a tetanus-toxoid immunization, as documented by the UNICEF vaccination coordinator of the West and Central Africa regions, along with their newborn infants were recruited from clinics and a hospital serving under-resourced areas of Monrovia, Liberia.

Given that contamination with tetanus spores can occur when the umbilical cord is cut by an unsterile instrument, the study's participating expectant mothers and their attending midwives were given an aseptic birth kit for use at the time of delivery. The items in the birth kits were consistent with the WHO's 'six cleans' model which supports a clean and sanitary mode of delivery. Each birth kit came in a pink purse and contained a pair of sterile gloves, a clean delivery surface by means of a blue chux pad, a clean cord clamp, a pair of umbilical cord scissors, a wiping cloth to clean and dry the baby after delivery, and a bar of ayurvedic soap to clean the mother's perineum. Since prior research has shown that not all of the items in clean birth kits are used in the under-resourced areas of developing countries, documentation of the utilization/non-utilization of each of the 6 contents of the birth kit was noted on participant's data collection sheets.

The infants of the participating mothers were followed and assessed for umbilical cord infection (neonatal omphalitis) for 28 days post-delivery. Specifically, the infants were assessed for swelling and redness around the umbilical cord, the presence of pus at the umbilical cord site, and temperature at 12 time-points over the first 28 days following birth.

Lastly, an educational program containing digital photo algorithms that detail the distinct stages of neonatal umbilical cord infection and neonatal omphalitis was provided to all midwives, local health workers, students and mothers at the participating and surrounding clinics, hospitals, and villages as an educational resource. As there is a fine line between umbilical cord healing and the development of infection, the algorithm helped all to recognize both early and active signs of infection and to seek early clinical intervention.

Descriptive analysis including frequencies was used to describe the use of the individual items in the clean birth kit and the occurrence of umbilical cord infection in the infants. The project was consistent with the fundamental objectives of The Ministry of Health's Committee on Child's Survival which holds to the constitutional goal of preparing a comprehensive National Child Survival Strategy and Implementation for the reduction of under-five mortality.

Title:

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Keywords:

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Abstract Summary:

The project's objective was to evaluate the effectiveness, impact, and rate of infant umbilical cord infection when community health care workers/ midwives utilized clean delivery kits in under-resourced areas of Monrovia, Liberia. A descriptive-exploratory design study was conducted to determine the rate of kit utilization, infection rate; with retrospective chart review.

Content Outline:

In Liberia, infection is the leading cause of neonatal mortality. Many of the infections responsible for neonatal deaths originate from umbilical cord stump contamination. When an infant's umbilical cord is cut with a non-sterile instrument, contamination occurs rapidly. Neonatal umbilical cord infections (omphalitis)

quickly progresses into sepsis (septicemia) once bacterium gain access to the neonatal vasculature via the umbilical vessels. Endemic areas as Africa and Ethiopia have significantly higher rates of omphalitis. Providing clean, disposable birth supplies to under-resourced populations in Liberia for aseptic birth delivery; along with administration of a maternal tetanus toxoid immunization decreases the rate of neonatal infection within developing nations dramatically. With Liberia's increased neonatal sepsis rates and high neonatal morbidity and mortality, an intervention that will assist endemic African/Ethiopian villages in conducting proper umbilical cord care is more than necessary.

The project's purposes are: 1) to initiate aseptic birth interventions via disposable clean delivery kits and assess for umbilical cord infection for 28 days following births in babies who have received a maternal tetanus-toxoid immunization, 2) to facilitate educational programs for assessing signs of neonatal infection of the umbilical cord, and 3) to describe the common practices related to delivery, umbilical cord, and newborn care practices in under-resourced areas of Liberia (hospitals, clinics, and remote villages). Thirty participants who received maternal tetanus toxoid immunizations from UNICEF were recruited to receive an aseptic birth kit for use during delivery; and their infants were assessed at 12 intervals over 28 days for signs/symptoms of umbilical cord infection. A health education program using a digital photo algorithm was presented to the delivering midwives, local health workers and students at the University of Liberia School of Nursing that details the hallmark signs of neonatal umbilical cord infection: redness, swelling, and pus. Additionally, 6-8 midwives were interviewed regarding common practices related to delivery, umbilical cord care, and newborn care practices as well as barriers to implementing aseptic technique for the delivery and care of newborns. This project was conducted in collaboration with the University of Liberia School of Nursing and is supported by the Liberia Ministry of Health.

First Primary Presenting Author

Primary Presenting Author

Wendy Post, MSN, BSN, RN

University of North Carolina Charlotte School of Nursing
School of Nursing
Research Assistant
Charlotte NC
USA

Professional Experience: 2000-Bachelor of Science, Nursing University of Southern California 2016-Master of Science, Nursing American Sentinel University 2019-Certificate in Narrative Medicine, Columbia University 2019-Doctorate in Nursing Practice, University of North Carolina Charlotte

Author Summary: Wendy Post is a veteran nurse of over 18 years with primary expertise in Healthcare Quality and Hospital Epidemiology. A current Sigma Theta Tau member of the Mu Eta Chapter; she has collaborated her research with an international School of Nurse Midwifery. Wendy's research interest serves to increase infant and neonatal survival in under resourced nations through the utilization of evidence-based, low cost interventions that may be implemented at the community level.

Second Author

Odel Fayiah, NM
University of Liberia School of Nurse Midwifery
School of Nurse Midwifery
Nurse Midwife
Monrovia N/A
Liberia

Professional Experience: Odel Fayiah is a recent graduate of the University of Liberia School of Nurse Midwifery. Her current research interests are in reduction of neonatal mortality in her home country of Liberia. In the future, Odel seeks to operate a perinatal clinic in support of under-resourced clinics and villages in need of basic obstetrical resources.

Author Summary: Odel Fayiah is a recent graduate of the University of Liberia School of Nurse Midwifery. Her current research interests are in reduction of neonatal mortality in her home country of Liberia.

Third Author

Charlene D. Whitaker-Brown, DNP, MSN, FNP-C
University of North Carolina at Charlotte
School of Nursing
Clinical Assistant Professor and DNP Program Coordinator
College of Health and Human Services
Charlotte NC
USA

Professional Experience: Dr. Whitaker-Brown is the DNP coordinator and a Clinical Assistant professor at the University of North Carolina -Charlotte. She earned her Doctor of Nursing Practice degree from Indiana State University in 2013. She is a certified Family Nurse Practitioner who has experience with heart failure patients in both the acute and outpatient setting. Her primary focus is on heart failure patients in the outpatient setting and quality of life.

Author Summary: Dr. Whitaker-Brown is the DNP coordinator and a Clinical Assistant professor at the University of North Carolina -Charlotte. She is a certified Family Nurse Practitioner who has experience with heart failure patients in both the acute and outpatient setting. Her program of scholarship is devoted to translating heart failure research into practice. Her primary focus is on heart failure patients and quality of life.

Fourth Author

Sharon Davies, BS
University of North Carolina Charlotte School of Nursing
School of Nursing
Nurse Collaborator
Charlotte NC
USA

Professional Experience: 1996-present: Child Health Advocate and Community health leader with didactic focus on social determinants of health and Maternal Child Health education Responsible for development and implementation of birth kit utilization education and 12 interval newborn assessment visits in participant homes.

Author Summary: As a native to Liberia, Sharon Davies' participation in this project has expanded her outreach and public health experience in the area of Maternal Child Health. As a child health advocate and community health leader in North Carolina, Sharon has been vital to the success and diversity this project requires.

Fifth Author

Catherine Cooper, MD
Ministry of Health Liberia Executive Council
Department of Health Services

Assistant Minister for Curative Services
Congo Town
Monrovia MD
USA

Professional Experience: B.S- Biology from Cuttington University College 1989-Medical Doctor: A.M. Dogliotti College of Medicine 2001-University of Liberia School of Medicine Ministry of Health of Liberia Executive Council Member of the National Polio Expert Committee 2008-2014-National Leprosy and TB Control Program, Ministry of Health Liberia; Master Trainer IPC, Ebola

Author Summary: Dr. Catherine Cooper is medical doctor native to Monrovia, Liberia. With over fifteen years of experience in various areas of medical practice, six years were concentrated in general practice; and five years in Pediatric Medicine. Nine years of Dr. Cooper's experience is concentrated in public health programmatic management, and Infectious Disease. Dr. Cooper has worked with several international partners and donor agencies on disease prevention and control specific to the Ebola epidemic.