



A Study to Assess the Knowledge of Staff Nurses on Infection Control Protocol in NICU Suitable for Peripheral Newborn Clinic at Selected Hospital of Jabalpur City, Madhya Pradesh

Jyoti Tiwari ^{a*} and C. C. Linson ^a

^a Sarvepalli Radhakrishnan University Bhopal (M.P.), India.

Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JPRI/2021/v33i50B33456

Editor(s):

(1) Dr. Amal Hegazi Ahmed Elrefaei, Hot Lab and Waste Management Center, Atomic Energy Authority, Egypt.

Reviewers:

(1) Nguyen Thi Trieu, Vietnam.

(2) Lesia Ostapiuk, Lviv Regional Medical Information and Analytical Center, Ukraine.

Complete Peer review History: <https://www.sdiarticle4.com/review-history/76606>

Short Communication

Received 05 September 2021

Accepted 11 November 2021

Published 20 November 2021

ABSTRACT

Newborn care is one of the vital sectors to be looked into in order to reduce neonatal mortality and morbidity. Infection is great area of concern, especially for the newborn babies, we are losing many babies, because of sepsis in resources limited setting, while it is difficult to treat neonatal sepsis, it is rather easier to prevent infections. Recommendations for prevention for infection, with special references to the rural Indian scenario. The approaches towards the prevention of neonatal sepsis are multi-disciplinary. Comprising of neonatologist, hospital administration, nursing staff, and engineers. Thus making implementation easy, if the equipment and other consumable are manufactured indigenously bulk, and in a large quantities, thus reducing the financial burden on the hospital and the health care cost of the country. The present study was to evaluate the knowledge of staff nurses on infection control protocol. Total sample size consumed of 100 staff nurses and convenience sampling was used area in Jabalpur Madhya Pradesh. Data was collected using a self – structured question are purposive sampling. Regarding demographic variables majority highest number of respondents was in the educational qualification staff nurses. Majority of the respondent (49 %) had experiences in SNCU. It was found that self-instructional module was very effective in improving the knowledge of staff nurses of regarding infection control protocol in NICU.

*Corresponding author: E-mail: muskan.tiwari.390@gmail.com;

Keywords: Effectiveness; SNCU; Knowledge, staff nurses.

1. INTRODUCTION

Neonatal care should undergo a paradigm shift as a result of India's Make in India strategy. Because the cost of consumable and non-consumable equipment is expected to come down across the board, the current system of solely conservative methods to neonatal case management must change to high-end professional and preventative measures. Once the route of a germ from the environment to the vulnerable newborn is known [1-2], effective infection management in the NICU may be created. Visitors and health-care workers bring the bacteria into the NICU, where they multiply in a vulnerable area. They are spread to the neonates via contaminated hand of the HCWs. Once the babies are colonized, the organism then enter through their umbilical cord and skin during procedure such as venous access, parental fluids, internal feeds, intubations and suctioning of endotracheal tube [3].

2. INFECTION CONTROL STEP 1 – PREVENT ENTRY OF MICROBES INTO THE NICU

2.1 Clean Immediate Environment

Organism from labor room, resuscitation room environment and maternal vaginal flora can colonized the new born skin. This can be prevented by following the 6' Cs

1. Clean perineum
2. Clean delivery surface
3. Clean cord
4. Cutting instrument
5. Clean cord care
6. Ensuring that nothing unclean is introduced into vagina.

2.2 Standardized the NICU Design

Each infant space has a minimum of 120 sq ft clear floor space excluding the hand and washing room and hallways, and the NICU has its own section with regulated access. Between two infant beds, there should be at least 4 feet [4].

2.3 Isolation Chamber for Airborne Infections

An isolation chamber for airborne infections should be accessible. A free hand washing

station for gowning and clean material storage should be provided at the room's entrance. Negative air pressure ventilation is used, with exhaust to the outside. These rooms were utilised to care for non-infectious newborns when they weren't being used for isolation. Relative humidity should be 30-60% relative humidity >60% may increase micro-organism proliferation. According to American institute of agriculture guideline, the NICU should have a minimum of 6 air changes per hour and 12 ACH for isolation room [5].

2.4 Hand Washing Station

A hands-free hand washing station should be within 20 feet of every newborn bed. The sink where you wash your hands should be large enough to prevent splashing. Hand washing instructions should be illustrated. To avoid mould formation on cellulose materials, non-absorbent wall material should be used around the sink. Soap and towel dispensers should be available [6-8].

2.5 Hand Hygiene is Really Important

Hand cleaning for 20 seconds before and after interaction with each patient is recommended by the CDC, as is hand washing for 40-60 seconds before entering the NICU. Hand washing should be done in stages [9].

2.6 Hand Massages with an Alcohol Base

If the hands are not visibly unclean or polluted, an alcohol-based hand rub can be used as a hand hygiene agent.

2.7 Policy for Visitors, as well as a Mobile Phone Limitation

Microbes usually enter the NICU through people who enter the NICU, hence entrance restrictions are necessary.

2.8 Nosocomial Infection can be Reduced by Wearing a Gown

In studies, there was no difference in infection rates between gowning and not gowning. the focus should be on appropriate hand washing by all hospital employees and visitors before touching newborns [10-11].

2.9 Policy on Jewellery and Fingernails

Artificial fingernails should not be worn by health-care employees, according to consensus.
Infection control step II

2.10 Prevent Proliferation of Microbes in the NICU

Good housekeeping routine are helpful in reducing the proliferation of microbes, thus preventing and curtailing spread of infection. Avoid wet areas inside the NICU, dry and clean NICU is unlikely to harbor microbes.

2.11 Daily and weekly Routine in NICU Daily

1. Incubators, heaters, syringe pumps, infusion pumps, phototherapy units, mattresses, pulse oximeters, phototherapy units, monitors, oxygen hoods, ventilators, CPAP machines, and telephones). Cleaning with a damp wipe after daily dry dusting.
2. CPAP with suction bottles, humidifier chamber, and water in bubbles). Change the water every day with distilled water.
3. (Ventilator filter) clean and dust off on a daily basis
4. After disassembling and washing with running water, submerge bag and mask in 2% cidex for 6 to 8 hours each day.
5. Clean the incubator/radiant warmer on a daily basis with a bacillocid solution of 2%.
6. Laryngoscope, mask, stethoscopes, measuring tapes, and thermometer spo2) clean with spirit on a regular basis
7. Walls, floor, wash basin) daily clean with polysan or phenol or lysol
8. Dustbin, bucket, waste) daily clean soap and water

2.11.1 Weekly

1. Ventilators and CPAP circuits changes with a new circuit
2. Procedure set autoclave with after every use and keep ready to the set
3. Window air conditioners weekly surface and filter with soap and water
4. Refrigerators sorted and cleaned separatebridge for milk and lab sample.

Step 3 of the infection control process:
Preventing infection from proliferation sites to

babies and from one baby to another is the most critical stage in preventing the transmission of microorganisms from proliferation sites to babies and from one baby to another.

Patient to nurse ratio: All newborn intensive and high-dependency care units should have a sufficient number of neonatal nurses. If the infant has multidrug-resistant microorganisms, the recommended ratio is 1:1; if the baby has a comparable or susceptible organism, the recommended ratio is 1:2; and if the baby is currently on enough antibiotic coverage, the recommended ratio is 1:2.

Use disposables:A large number of disposables is required to interrupt the microorganisms' trip. At each medicine and for each infant, a baby kit including a stethoscope, measuring tape, thermometer, and torch in a sterile container should be provided. For endotracheal suction, a new suction catheter should be used each time. Separate gloves, antibiotic vials, and a disposable respiratory support circuit should be used for each infant. Formites such as files, x-ray films, and pencils should not be kept on the baby cot. Stock solution should not be used to flush the catheter. There has been an outbreak of *Enterobacter cloacae* in the NICU due to the usage of multidose antibiotic vials

Laminar flow system for drugs, fluids and TPN preparation: Use of laminar flow for preparation of TPN and other IV. Fluids decrease local complication rate and sepsis.

3. INFECTION CONTROL STEP IV

3.1 Prevent Germs from Entering the Infant

If there is a breakdown in aseptic precaution, germs colonise the skin and umbilical cord and enter the circulation. As a result, maintaining good cleanliness during the operation is critical.

3.2 Care for the Cords

Infection of the cord can be avoided by promoting clean cord maintenance and limiting hazardous cord application. In underdeveloped countries, the WHO presently advises dry cord care and cleaning the chord with a soap and water solution if it is visible.

3.3 Skin Care

Applying less adhesive tape, employing tegaderm between the skin and the adhesive, taking precautions during adhesive removal, and utilising skin-friendly duropore instead of dynaplast and micropore are all ways to avoid skin harm. In hospitals, both should be avoided; instead, sponging may be used.

Taking precautions during the operation.

During all procedures, aseptic precautions should be observed, and a hand scrub should be performed prior to each procedure. Using spirit wipes, clean the skin area. Disposable gloves should be worn, the cannula should be secured with clear tape after insertion, and the cannula site should be checked regularly for signs of thrombophlebitis.

3.4 Precaution during CVC/PICC/ Umbilical Catheter / Handling of Catheter

- Health-care employees' training and education.
- Follow regular hand-washing routines.
- Always leave povidone iodine on the skin for at least 2 minutes before inserting.
- Always use sterile gloves.
- Cover the catheter site with sterile gauze or a sterile transplant, semi-permeable dressing.
- Through the intact dressing, visually or by palpation, keep an eye on the catheter sites.
- If the catheter site dressing becomes moist, unfastened, or obviously filthy, replace it immediately.
- Remove any intravascular catheters that are no longer needed as soon as possible.
- Keep the PICC in place until the IV treatment is finished, unless there is indication of a problem (phlebitis or infiltration).
- Change tube and bottles every 24 hours taking same precaution as used for inserting central line i.e surgical scrub, mask, gown, gloves, and sterile dressing set.
- Remove and do not replace umbilical artery catheter if any sign of catheter related blood stream infection, vascular insufficiency, or thrombosis are present.
- Optimally, umbilical artery catheter should not be left in place > 5 days

- Umbilical venous catheter should be removed as soon as possible when no longer needed but can be used up to 14 days if managed aseptically.

3.5 Precaution during Endotracheal Intubation and Suction

- Put on a surgical scrub, an autoclave gown, sterile gloves, and enlist the assistance of a nurse.
- The endotracheal tube should be kept in the sterile pack until it is used.
- Do not touch the tube's tracheal tip.
- When suctioning, use sterile gloves.
- After a single usage, throw away the suction.
- Infection control step v: breastmilk/ breastfeeding and proper formula milk preparation

Encourage the use of colostrum, trophic meals with expressed breast milk, and nutritive sucking by the newborn to sustain breastfeeding and promote its benefits to infants and young children.

Infection control step VI: kangaroo mother care/ early discharge: KMC was linked to a statistically significant reduction in severe infection/sepsis at least follow-up (7.2 percent versus 12.6; RR 0.57, 95 percent CI 0.40-0.80) and nosocomial infection/sepsis at discharge or at 40-41 weeks corrected gestational age in a cochrane meta-analysis of stabilised LBW infants (4.2 percent versus 10.1 percent typical rr 0.42, 95 percent CI 0.24-0.73 percent).

3.6 Step VII of the Infection Control Process

3.6.1 Lowering the baby's vulnerability to illnesses

Incidence and severity of nosocomial infection or late-onset sepsis in preterm (37 weeks gestation) newborns after early breast feeding, colostrum usage, and little internal nutrition. Trophic feeding has benefits which include improved milk tolerance, greater postnatal growth, reduce systemic sepsis and shorter hospital stay.

3.6.2 Immunomodulators

The use of IVIG and GM-CSF for nosocomial infection prevention is not supported by current

data. The use of probiotics is promising, but the correct choice, the right dose, and the right patient are still being studied.

3.6.3 Prophylaxis with antifungals

Antifungal prophylaxis is advised for all infants born with a low birth weight. The coherence meta-analysis predicts that for every nine infants treated with the intervention, one would die less, but the 95 percent confidence interval around this estimate of impact is large. Large randomised controlled trials will be required in the future.

3.6.4 Infection control step VIII

Infection control protocol: Individuals must take primary responsibility for preventing nosocomial infection. In order to limit the risk of infection among patients and employees, everyone must work together. As a result, an infection control plan should be implemented.

Hospital administration's role: Establish a multidisciplinary infection control committee that can monitor and prevent infections, provide information and training, and engage in epidemic investigations using appropriate resources and methodologies. In the NICU, the physician, microbiologist, nursing manager, resident nurse, and cleaning staff all have a role to play in infection monitoring and outbreak control.

Infection control committee: Hospital should have infection control committee in a place with the goals to review and approve promptly:

1. A yearly programme of activity for surveillance and prevention.
2. Epidemiological surveillance data and identify area of intervention.
3. Ensure appropriate staff training in infection control and safety.
4. Provide input into investigation of epidemics.
5. Antibiotics uses and microbial resistance
 - The hospital must have an antibiotics policy depending upon the local condition.
 - Antimicrobial resistance has emerged as a major public health issues all over the world, especially in developing countries like India.
 - Prophylactic antibiotics should not be started in condition like severe asphyxia, neonatal jaundice, prematurity, caesarean delivery, and exchange transfusion.

- Without exception, a blood culture should be obtained before starting an antibiotic.
- If the blood culture is sterile after 48-72 h of incubation, it is almost always safe and appropriate to stop antibiotic.
- Restrict the use of broad spectrum antibiotics, for empiric therapy narrow spectrum antibiotic should be choose, CPR should not be guide for antibiotic therapy.
- Use of cephalosporines, quinolones and carbapenems should be restricted to microbes resistant to aminoglycoside of penicillin. In a recent study cephalosporian restriction reduce the incidence of ESBL producing bacteria from 46.8 %- 19.5 %.
- Treat the infection, not colonization or contamination.

4. CONCLUSION

The morbidity and mortality of neonates can be significantly reduced by instituting strict infection control strategies, prevention of entry of microbes to NICU can be achieved by clean environment, hand hygiene and conductive infrastructure, curtailing proliferation of microbes in NICU can be successful by daily and weekly maintenance of equipment like incubators, warmers, syringe pump, ventilator filter, circuit, bag and mask. Efficient bio- medical waste disposal is very important. Cord care, skin care, and precaution during various procedure like venipuncture, endotracheal intubation and umbilical catheterization are important. early discharge play an important role in prevention of neonatal morbidity, the role of hospital management and robust infection control committee play an important role in prevention of infection related neonatal morbidity and mortality.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Harbarth S, et al. The preventable proportion of nosocomial infection, an overview of published reports, reports, Journal of Hospital Infection. 2010;54:258-266.
2. RD white, consensus committee chairmen, recommended standard for newborn ICU design. Journal of Perinatology. 2006;23:23-40.
3. Pessoa-silva CL, Hugonnet S, pfister R, touveneuve S, Dharan S, posfay – Barbe K, pittet D. Reduction of health care associated infection risk in neonates by successful hand hygiene promotion; 2007.
4. Pittet D, allegarng B, Boyce J. World health organization world alliance for patient safety first global patient safety challenge core group of expert, the world health organization guidance on head hygiene in health care and their consensus recommendation. Infect control hospital epidemoil. 2009;30(7):611-222.
5. Carey AJ, saimen L, polin R. hospital acquired infection in the NICU: epidemiology for the new millennium, Clin Perinatal. 2008;35(1):223-49.
6. Agostomni C, Axelsson I, Goulet O, Koletzko B, Michaelsenb KF, Puntis JW, Rigo J, Shamir R, Szajewska H, Truck D, Conde Ageuldo oham A, Diaz-Rossello JL. Kangaroo mother care to reduce morbidity and mortality in birthweight infant, ccchrane database of systematic review. 2014;4:22-77.
7. Harbarth, S et al, The preventable proportion of nosocomial infections: an overview of published reports, Journal of Hospital Infection , Volume 54 , Issue 4 , 258 – 266
8. RD White, Consensus Committee chairman. Recommended standards for newborn ICU design journal of perinatology, 2006; 26: s2- s18
9. Pessoa-Silva CL, Hugonnet S, pfister R, Touveneuve S, Dharan S, posfay-Barbe K, Pittet D. Reduction of health care associated infection risk in neonates by successful hand hygiene promotion. Pediatrics. 2007; 120(2):382-90.
10. Pittet D, Allegranzi B, Boyce J; World Health Organization World Alliance for patient safety First Global patient safety challenge core Group of Experts. The World Health organization Guidelines on Hand Hygiene in Healthcare and their consensus recommendations. Infect Control Hosp Epidemiol. 2009; 30(7):611-22 PubMed PMID:19508124.
11. Carey AJ, Saiman L, Polin RA. Hospital acquired infections in the NICU; epidemiology for the new millennium. Clin perinatol. 2008; 35(1):223-49.

© 2021 Tiwari and Linson; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

The peer review history for this paper can be accessed here:
<https://www.sdiarticle4.com/review-history/76606>