

Original Article

A survey of infection control practices in the delivery room and nursery to investigate and control the high rate of neonatal sepsis: An experience at a secondary care hospital

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Abstract

Objective: To survey the infection control practices in the delivery room and the nursery so that the ongoing high rate of neonatal sepsis can be controlled.

Method: A prospective study was conducted at the Department of Pathology, Paediatrics and Gynae/obst Combined Military Hospital, Gujranwala. Situation analysis was carried out, according to which a total of 56 cases of neonatal sepsis were diagnosed on the basis of clinical and lab criteria during a six month period from November 2005 to April 2006. The routine being followed in relation to neonates was observed by a team of doctors in the delivery room and the nursery. Certain observations were made regarding breach of infection control practices and specimens were collected from suspected sources of infections for cultures. Recommendations were made in the light of observations and the results of cultures of the specimens to interrupt the chain of infection and to eradicate the source/reservoir of infections in the delivery room and the nursery environment. The gynaecologist and the paediatrician in charge of the delivery room and the nursery respectively remained involved during the whole process and the paramedical staff was given necessary training in the light of recommendations.

Results: After the implementation of the control measures, the rate of neonatal sepsis was drastically reduced from 63/1000 to 14/1000 live births over the next 3 months.

Conclusion: Survey of the delivery room and nursery regarding infection control practices and training of the paramedical staff helped in reducing the nosocomial neonatal sepsis (JPMA 58:237;2008).

Introduction

Neonatal sepsis is a life threatening emergency which carries high morbidity and mortality inspite of the advances made in antibiotic therapy.¹ The incidence of neonatal sepsis is approximately 1-10/1000 live births in developed countries, but in Pakistan it is three times more common.² Nosocomial neonatal sepsis makes the major component of all the sepsis cases occurring in the hospital born neonates.³ A number of factors including the prenatal conditions, the condition of the delivery room, the flora of the delivery room and the nursery, quality and quantity of the health care personnel, infection control methods being adopted and the types of antibiotics used, are the main determinants for the nosocomial neonatal sepsis.⁴ The problem can only be tackled by implementing effective preventive strategies. These include making good delivery room and nursery designs, educating the staff regarding infection control procedures like hand washing, by continuous monitoring the infection rates and the types of pathogens, and the prudent use of antibiotics.⁵ Keeping in view the above facts, a survey of the delivery room and the nursery regarding infection control practices was carried out to investigate

the cause of the ongoing high rate of nosocomial neonatal sepsis so that effective control and preventive measures could be adopted.

Methods

Combined Military Hospital Gujranwala is a 400 bed hospital with 45 bed Gynae/Obst ward and an 8 bed nursery. About 150 deliveries are being conducted in the delivery room each month. A total of 56 cases of neonatal sepsis were diagnosed on the basis of clinical criteria (Lethargy or reluctance/intolerance to feeds or respiratory distress and/or temperature above 99°F) and the lab criteria (increase C-reactive protein levels or high white blood cell count or low platelet count and/or a positive blood culture) during a six month period from November 2005 to April 2006. The rate of nosocomial sepsis was 7-12 per month which is equivalent to 63/1000 live births. This figure was quite high keeping in view the international nosocomial neonatal sepsis rates. The organisms isolated from blood cultures of the neonatal sepsis cases during the above period were *Staphylococcus aureus* (n=22) including MRSA (n=19), *Klebsiella pneumoniae*, (n=19), *Acinetobacter* sp (n=9), *Escherichia coli* (n=3), *Enterobacter cloacae* (n=2) and *Proteus mirabilis* (n=1).

Methodology for survey and investigation/control

A plan was made to survey the delivery room and the nursery for the infection control practices so as to investigate and control the infections during the 1st week of May 2006. Following methodology was adopted for the purpose

- Routine handling of the neonates in the delivery room and the nursery was observed by a team of pathologist, gynaecologist and the infection control nurse in the delivery room and by the pathologist, paediatrician and the infection control nurse in the nursery.
- Certain specimens were collected from the environment of the delivery room and the nursery.
- Recommendations were made keeping in view the observations and the culture results of the specimens.
- To implement the instructions, the paramedical staff was provided with necessary equipment and training.
- Observations were again made after the above interventions.

Results

The observations before intervention were;

Delivery room

- General cleanliness of the delivery room was satisfactory.
- Baby towels and blankets appeared dirty and were not regularly sterilized/washed and properly stored.
- Sterile gloves were not being used while handling the neonates.
- No hand rub was available.
- Masks were not being used.
- Only three delivery sets were available and these were only being treated with hot water.
- Treatment of umbilical stump was not being done regularly after cutting.
- Proximal sucker tube was being changed only once in months.
- Terminal sucker catheter was not even being changed for each newborn.
- MRSA carrier testing/eradication of the nursing staff were not being done.

Nursery

- General cleanliness of the nursery was satisfactory.
- Disinfection of the incubators was not being carried out regularly after use by each newborn.
- Distal catheter for suction was not being changed

regularly after every use.

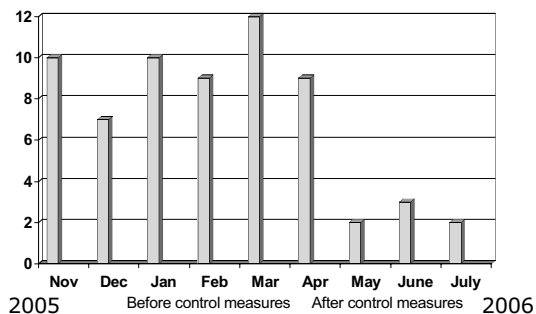
- Umbilical stump was occasionally being cleaned with spirit swab.
- Venepuncture sites were being treated with spirit swab only.
- Hand rub (Sterillium) was available in the ward but staff on duty did not know its use.
- Hand washing was not being carried out before and after each contact with the new born.
- Staff did not wear sterile gloves while handling the neonate.
- Masks were not being used.
- MRSA carrier testing/eradication were not being done.

Table 1. Report of specimens collected from the delivery room.

No.	Place of specimen	Result of culture
1.	Delivery bed No 1	Bacillus sp, Staphylococcus aureus, Streptococcus sp
2.	Delivery bed No 2	Bacillus sp
3.	Delivery set instruments x 3	Bacillus sp
4.	Baby towel x 2	Staphylococcus aureus (MRSA), Aspergillus sp
5.	Baby blanket x 2	Bacillus sp, Staphylococcus aureus
6.	Oxygen tube x 1	Staphylococcus aureus
7.	Proximal sucker tube x 1	Klebsiella pneumoniae, Bacillus sp
8.	Terminal sucker catheter x 1	Klebsiella pneumoniae, Proteus mirabilis
9.	Hand washing tap x 1	Bacillus sp
10.	Nasal swabs of nursing staff x 3	Staphylococcus aureus (MRSA), Streptococcus sp

Table 2. Report of specimens collected from the nursery.

No.	Site of specimen	Result of culture
1.	Oxygen tube Incubator No 1	No organism
2.	Oxygen tube Incubator No 2	No organism
3.	Proximal tube of sucker machine x 1	Staphylococcus sp, Aspergillus sp, Acinetobacter sp
4.	Surface swab incubator x 1	Staphylococcus aureus x2 MRSA
5.	Umbilical swab of a neonate x 1	Staphylococcus aureus MRSA, Acinetobacter sp
6.	Swab from canula site x 1	No organism
7.	Fluid from buret x1	No organism
8.	Spirit swab container x 1	No organism
9.	Oxygen tube Emergency table x 1	Staphylococcus aureusx2 MRSA
10.	Thermometer fluid x 1	Klebsiella pneumoniae
11.	Nasal swabs of nursing staff x 3	Staphylococcus aureus (MRSA)



63/1000 Live births 14/1000 Live births
 Figure. Neonatal sepsis cases before and after implementing control measures.

The results of specimens collected for culture from the delivery room and the nursery along with the organisms isolated are shown in Table 1 and 2 respectively.

Recommendations made were;

Delivery room

1. All surface disinfection should be done regularly with virkon/lysol.
2. Baby towels must be sterilized by autoclaving and blankets should be laundered and stored properly in a closed clean cupboard.
3. When not wearing sterile gloves, a hand rub such as Sterillium or 70% ethanol should be used before and after each contact with the new born.
4. When the hands are visibly soiled, these must be washed before applying hand rub.
5. Masks should be used while working in the delivery room.
6. Umbilical stump should be cleaned with 70% ethanol.
7. Delivery set used for each case should be autoclaved one and stored in separate tray. The sets double the number of average deliveries should be available. Half of these should be sent to the main operation theatre for sterilization for use the next day. The set trays should be stored in a separate cupboard having shelves matching the size and number of the sets.
8. Proximal sucker tube should be replaced at least once in 48 hours with an autoclaved one.
9. Terminal sucker tube/catheter should be a separate and sterilized/disposable for each newborn.
10. MRSA carrier detection of the nursing staff should be done on monthly basis and eradication should be carried out with mupirocin nasal cream.

Nursery

1. Disinfection of the incubators/other surfaces should be done on regular basis with virkon/Lysol.
2. Glutaraldehyde 2% should be available for the disinfection of reusable items like oxygen tubes etc.
3. Hand rub (Sterillium) is available, it should be used properly i.e. before and after each contact with the neonate if the hands are not visibly soiled. If these are soiled with secretions or excretions of the neonate then washing with soap and water should be followed by hand rub.
4. Masks preferably disposable should be used while working in the nursery.
5. Umbilical stump should be cleaned at least thrice daily with 70% ethanol till it is completely dried up.
6. MRSA carrier detection/eradication should be done on monthly basis.

Once the observations, results of the specimens collected for culture and the recommendations made were presented to and discussed in detail with the concerned specialists in the presence of the hospital administration, a plan for implementation of the same was made. The necessary items recommended were provided during the next one week and the training session was conducted for the staff of the delivery room and nursery regarding infection control practices.

The routine handling of the neonates was again observed both in the delivery room and the nursery by the same team members. The infection control precautions were being practiced by the staff according to the training provided to them.

Observation after intervention showed that

1. All the surfaces and equipment was being decontaminated according to the training.
2. Hand hygiene was being practiced.
3. Personal protective equipment including gloves and masks were being used.
4. Treatment of umbilical stump was being done.
5. Delivery sets and suction apparatus were attended as recommended.
6. MRSA carrier eradication was completed.

As a result of the above interventions, the rate of the neonatal sepsis dropped during the next three months from previous 63/1000 to 14/1000 live births (Figure).

Discussion

Life expectancy of the neonates is increasing with the help of advances in neonatology, new life support techniques and new treatment modalities. But despite all

these measures and the availability of newer antibiotics, the management of the nosocomial neonatal sepsis cases is a big problem.³ The only solution left is to control these infections by implementing preventive measures.⁶ The simplest strategy for decreasing the incidence of nosocomial neonatal sepsis is to maintain good hand hygiene but practically it is the most difficult to achieve.⁷ Its importance cannot be undermined both in the delivery room and the nursery. The rationale for hand washing /hand rub is to reduce the transient microflora.⁸ As a few of the organisms isolated from the cultures of the specimens collected from the delivery room and the nursery environment were similar (according to the biochemical characters and the antibiogram) to the organisms being isolated from the blood cultures of the neonatal sepsis cases, the organisms responsible were most probably there in the environment of the delivery room and the nursery and were being transmitted to the neonates due to breaches in the infection control precautions. Once the recommendations made were implemented and the staff given necessary training, the chain of transmission was interrupted and the rate of sepsis dropped to about one third. This clearly indicates and also has been reported in the literature that adherence to the simple basic infection control measures can help a lot in reducing the rate of hospital acquired infections.⁹ Areas which need special attention include the avoidance of over crowding in the delivery room and the nursery, availability of the trained staff in adequate number, availability of the hand washing/rub facility and its proper use before and after the contact with each neonate, and the proper care of the intravenous canulae and the central lines.¹⁰⁻¹² Better management of the process in the delivery room and early breast feeding of the neonate can also help a lot in preventing neonatal sepsis.¹³

Conclusion

Survey of the delivery room and nursery regarding infection control practices and training of the paramedical staff can be very helpful in reducing the nosocomial neonatal sepsis.

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