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# OUTBREAK OF NOSOCOMIAL MDR- KLEBSIELLA PNEUMONIAE IN NEONATAL INTENSIVE CARE UNIT (NICU) – EARLY IDENTIFICATION AND PREVENTIVE MEASURES

Microbiology

**Khandelwal Dheeraj Kumar*** Senior Medical officer, Department of Microbiology, Dr. S. N. Medical College & Associated Group of Hospitals, Jodhpur (Rajasthan) India. *Corresponding Author

**Gupta Ritu** Assistant Professor, Department of Biochemistry, Dr. S. N. Medical College & Associated Group of Hospitals, Jodhpur (Rajasthan) India.

**Parihar RS** Senior Professor & Head, Department of Microbiology, Dr. S. N. Medical College & Associated Group of Hospitals, Jodhpur (Rajasthan) India.

## ABSTRACT

**Introduction:** Early neonatal sepsis is the most common cause of mortality in first 7days of life in developing countries in early neonates. Klebsiella species are the most common associated pathogen in neonatal sepsis and ventilator associated pneumonia in NICU.

**Aim of Study:** To describe an outbreak occurred in a NICU and control measures adopted in order to interrupt the chain of transmission in Government RDBP Jaipuriya Hospial, Jaipur.

**Material & Method:** 7 blood culture and 2 endotracheal tube culture positive cases by same strain of Klebsiella Pneumoniae were observed during 5/7/19 to 20/7/19. All the isolates of Klebsiella pneumoniae isolated from the patients' clinical samples had the same antibiogram, showing resistance to ampicillin, cephalosporins, amynoglicosides and piperacillin and susceptibility to ciprofloxacin and imipenem. This was an alarming stage.

When the first five cases of infection were identified, a series of measures was implemented. 45 swab samples were collected from different sites like from ventilator, suction machine, oxygen humidifier, multidose and monodose solutions etc. The hand specimens of healthcare personnel were also taken by using the touch plate method.

**Discussion:** Outbreak investigation revealed the similar growth from 3 different sites of NICU (from ventilator tubes, ventilator screen, and 1 from oxygen humidifier. Antibiogram typing revealed that all the isolates belonged to a single strain. The main cause behind outbreak was found to be breach in infection control measures.

**Conclusion:** The prevention of nosocomial outbreaks can be done by stringent infection control measures and judicious use of antibiotics in hospital settings to prevent early neonatal deaths.

## KEYWORDS

Klebsiella, ampicillin, cephalosporins, amynoglicosides and piperacillin

## INTRODUCTION:

Nosocomial infection is a very common infection in post operative wards, ICU, NICU, trauma centre, cancer ward and CCU because patients are admitted in these wards are having weak immune system so they are more vulnerable to get infection.

The infants admitted to the NICU are prone to acquire nosocomial infections owing to their vulnerable defense mechanisms. Prematurity, low birth weight and weak immune system of neonates increases risk of infection in infants. If any infants undergo for any Invasive procedure or mechanical ventilation also increases risk of nosocomial infections. Early neonatal sepsis is the most common cause of mortality in first 7days of life in developing countries i.e. India.

Gram negative bacilli are most common causative agents of neonatal septicemia among gram positive and grams negative bacteria. Klebsiella pneumoniae are the most common associated pathogen in neonatal sepsis and ventilator associated pneumonia in NICU. Neonatal septicemia due to ESBL producing K. pneumoniae was reported to produce 25% mortality[1]. Eighty percent mortality was reported during an ESBL outbreak in NICU of JIPMER, Pondicherry. Klebsiella pneumoniae is a Gram-negative bacilli belongs to Enterobacteriacae family[2].

It is usually resistant to commonly used antibiotics in NICU. It can easily survive in hospital environment and colonize the human skin, bowels, bladder, respiratory tract and over apparatus & instrument. Transmission can occur either from the mother to child at birth, or acquired during nursery by person-to-person transmission, via the hands of the nursing staff and the contaminated equipment, food or the environment[3,4].

Early identification of causing agents can be helpful in decreasing mortality and morbidity especially in neonates. Thus this study was planned to describe the out breaks in NICU and use of control measures to interrupt the transmission chain.

## AIMS & OBJECTIVES:

To describe an outbreak occurred in a NICU and control measures adopted in order to interrupt the chain of transmission in Government RDBP Jaipuriya Hospital, Jaipur (Rajasthan).

## MATERIAL & METHODS:

### CASE DEFINITION -

A case was defined as isolation of Klebsiella pneumoniae from blood with signs and symptoms of a BSI (fever (>38 °C), chills or hypotension) according to CDC definition.

When the first five cases of infection were identified, a series of measures was implemented. Extensive culture specimens from the NICU environment and equipments as well as from newborn nursery were taken. Further, followed and checked all medical records. Total 5 air sample and 45 swab samples were collected from different sites like from ventilator, suction machine, oxygen humidifier, multidose and monodose antibiotic solutions, IV fluid, etc. To find out cross contamination the hand specimens of healthcare personnel were also taken by using the touch plate method. Microbiological samples were inoculated on blood agar and MacConkey agar plates.

Identification of the organisms was done by morphological, gram's staining and biochemical test. Antibiotic susceptibility testing and multi-drug resistant pattern were determined by done by using Kirby bauer method and E- test.

## RESULT:

- Outbreak investigation revealed the similar species of Klebsiella pneumoniae isolated from patient sample.
- Klebsiella pneumoniae were isolated from three different sites of NICU:
  a. Ventilator tubes,
  b. Ventilator screen and
  c. Oxygen humidifier

During outbreak total 43 blood culture and 2 endotracheal tube sample were receive, out of these 7 blood culture and 2 endotracheal tube culture were reported positive cases by same strain of Klebsiella Pneumoniae during 5/7/19 to 20/7/19.

- All the isolates of Klebsiella pneumoniae isolated from the patients' clinical samples and NICU had the same antibiogram.

- All were resistance to ampicillin, cephalosporins, amynoglicosides and piperacillin and susceptibility to ciprofloxacin and imipenem.
- Further, antibiogram typing also revealed that all the isolates belonged to a single strain.

**DISCUSSION:**

The onset of the outbreak was noticed when the first five consecutive cases of Klebsiella pneumonie infection were identified in 3-4 days.

- This was an alarming stage so this situation was informed to Medical officer Incharge (MoIC) of NICU and hospital infection control committee.
- After this a series of measures was implemented
- Extensive culturing of specimens from the NICU environment, newborn nursery and pharmacy was randomly performed from multidose and monodose solutions, dispensers and corks, TPN pump and keys, feeding bottles, venous lines hubs, working surfaces1
- Three neonates were died out of eight positive cases.
- After thorough investigation of medical records, it was found that all neonates were delivered as low birth weight. All neonates were on ventilator.
- All of them had a history of empiric antibiotic therapy with a combination of cephalosporin and aminoglycosides, intravenous catheterization and parenteral nutrition.

- Breech in CSSD was observed. The probable causes for this were:
- Cleaning and sterilization ventilator tubing was not properly done.
- Date of sterilization and date of expiry was not mentioned on equipments.
- Further, in was also observed that in NICU bio medical waste rules were poorly followed.

**SUMMARY & CONCLUSION:**

Klebsiella pneumoniae is a most common pathogen, potentially fatal in the NICU .The outbreak occurred when attention to hygiene measures decreased. In this study, it was identified a reduced compliance to the general control measures, and poor monitoring of HICC (Hospital Infection Control Committee) and poor sterilization in CSSD (Central Sterile Supply Department). After correcting these and closing of NICU for 5 days for fogging and cleaning after adoption of the correct control measures in order to stop the outbreak. Early identification of nosocomial infection can reduce mortality in neonates.

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