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AN OUTBREAK INVESTIGATION AND CONTROL OF MDR KLEBSIELLA PNEUMONIAE IN SURGICAL INTENSIVE CARE UNIT IN A TERTIARY CARE HOSPITAL.

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ABSTRACT

Aim and objective: To identify the source of out break caused by MDR Klebsiella pneumoniae in a Surgical intensive care unit. To define the control measures to eliminate the source and prevent further out breaks. **Materials and methods:** A study was conducted to investigate an outbreak caused by MDR Klebsiella pneumoniae in SICU-I at Krishna institute of Medical sciences, Secunderabad. In the First week of June, 3 patients in SICU-I developed Ventilator associated pneumonia with MDR Klebsiella pneumoniae. Taking it into consideration HIC department became alert and conducted a preliminary review of Patients characteristics and microbiology reports in all those whose specimen was positive for Klebsiella pneumoniae for the month May and June. A total number of 9 patients were infected with same strain of Klebsiella pneumoniae tracing back to first case which was detected on 2-5-2018. The strain was identified by AST and other phenotypic methods using VITEK 2 Compact system. In response to above finding environmental samples were collected from various sites in SICU, out of them swabs collected from few suction jars yielded growth of same strain of Klebsiella pneumoniae. SICU was evacuated and patients were shifted to other ICU, followed by thorough cleaning, deep scrubbing and disinfection of all surfaces was done. All the suction jars and their wall units were thoroughly washed, disinfected and sent for sterilization. Fogging was done according to standard protocol. Microbiological surveillance of surfaces and air was done and found to be satisfactory. A new protocol for changing suction jars was formed and implemented stating that daily suction jars should be cleaned and disinfected with bacillocid 1% solution then sent for ETO sterilization. An additional protocol was formed regarding change of Oral suction yunkar tubes 8 hourly to reduce colonization. **Results:** For next one month follow-up was done in patients admitted to SICU by microbiological analysis to detect colonization with MDR Klebsiella pneumoniae. Microbiological analysis was done for the suction units by randomly collecting swabs to detect environmental colonization. The culture were found to be negative and satisfactory. **Conclusion:** The out break ended after implementation of the new protocol for sterilization of suction jars and additional precaution with frequent changing of Oral suction Yunkars.

INTRODUCTION

Klebsiella pneumoniae has become a well recognized nosocomial pathogen in various health care settings.[1] Increasing prevalence of multi drug resistant Klebsiella pneumoniae in causation of ventilator associated pneumonia is becoming the problem of concern.[2] In recent days hospital outbreaks due to multi drug resistant Klebsiella pneumoniae strains have been described through out the world.[3] These out breaks are mainly associated with various environmental sources in hospital. The common sources associated with this organism are bed rails, suction jars, sinks, ultrasonography gels, ECG leads, intravenous dextrose solutions, food blenders, milk, bath soaps and bed side lockers. Patient to patient transmission via hands of hospital staff was considered the main route of transmission.[4]

AIM

The present study was undertaken to investigate a nosocomial out break caused by Multi drug resistant Klebsiella pneumoniae in a Surgical intensive care unit at Krishna institute of medical sciences, secundrabad.

OBJECTIVES

To identify the source of out break caused by multi drug resistant Klebsiellapneumoniae strain in SICU I**.** To define the control measures to eliminate the source and prevent further out breaks.

MATERIALS AND METHODS

Hospital setting

The study was performed in 800 beded tertiary care hospital at secundrabad. The hospital is having a 48 beded surgical intensive care wing which is having four independent surgical intensive care units SICU-I,SICU-II,SICU-III,SICU-IV respectively.SICU-I is a neurosurgical intensive care unit where majority of post neurosurgery cases are admitted. The average length of patient stay in this ICU is 7 days for ventilated patients and 3 days for non ventilated patients.

Identification of out break

In the first week of June three patients in SICU-I developed Ventilator associated pneumonia caused by same strain of multi drug resistant Klebsiella pneumoniae expressing sensitivity to aminoglycosides, tigycycline and colistin (Bionumber : 6607734653165010).

The hospital infection control department became alert and preliminary review was done.All the culture and sensitivity reports of ICU patients were analysed and specimens which are positive for same strain of multi drug resistant Klebsiella pneumoniae (6607734653165010) were identified from April to J une 2018.

Retrospective analysis of patient characteristics was done for these patients and recoded chronologically and systematically.Infection with the same strain was identified in 9 patients only from SICU-I. The strains were identified based on phenotypic methods using VITEK 2 Compact system and antibiotic susceptibility pattern.

Source identification

In response to the above findings to identify the source environmental specimen for culture and sensitivity were taken with pre moistened sterile swabs from various high touch surfaces. Such as bed rails, suction jars, suction ports, door handles, sinks, telephones, side lockers, oxygen flow meters and send to laboratory for further processing. The swabs were inoculated on blood and Mac Conkey agar, incubated at 37C over night. The growth was identified and AST was performed on Vitek 2 compact system. The strain was identified with the help of Bionumber**.**

The same strain of multi drug resistant Klebsiella pneumoniae (6607734653165010) was found in suction ports and suction jars of Bed number 6 and 7. The retrospective analysis of the 9 patients showed that they were kept in either of the above mentioned beds at one point of time during their hospital stay making them as source of infection.

Course of out break and root cause

The first case of outbreak was traced back to a 55year old male patient came with history of RTA and head injury was intubated at peripheral hospital and came to undergo decompressive craniotomy for epidural hemorrhage.He underwent the surgery on the same day of admission shifted to neurosurgical ICU and kept on ventilator support. The patient specimens were sent to lab for culture and sensitivity. MDR Klebsiella pneumoniae was isolated in endotracheal secretions. The very next day Patient was succumbed to death due to multiple complications related to trauma.

From this patient the strain might have spread to the wall units and suction jars either due to inadequate cleaning and disinfection or due to resistance of the organism to disinfectants. A total number of 8 cases were infected with the same strain. Out of them a 60 years old male admitted on 25-5-2018 with massive subdural hemorrhage has developed septicemia and MODS resulted in death. Remaining patients were recovered and discharged in good condition. During the time of outbreak 3 cases were found to be harboring the same strain, these patients were isolated and appropriate antibiotic therapy was instituted.

Control Measures

Immediately after the outbreak SICU-I was evacuated, through surface cleaning was done by high dusting and deep scrubbing with Bacillocid solution.Fogging was done with Desinet solution according to standard protocol. Post fumigation swabs were sent to microbiological analysis which was found to be satisfactory. Repeat swab analysis from same site was done and found to be satisfactory. The suction jars and their wall units were removed, disassembled, washed thoroughly and disinfected with 1% Bacillocid solution. These suction units were sent to ETO sterilization.

Interventions to prevent outbreaks

To prevent further infection with these types of strains few modification and additions were done in the protocol. An additional protocol added to perform sterilization of suction jars by ETO after through cleaning and disinfection with bacillocid to ensure the removal of all drug resistant organism. A new protocol was added in oral suction yankers which should be replaced 8th hourly with a new one to reduce the bio-burden and to prevent the infection.A new protocol was formed to identify the patients with MDR infections by placing a pink board to prevent any breach in contact and barrier precautions.

RESULTS

With the above control measures and interventions one month follow up was done in all patients got admitted to SICU-I with mechanical ventilation for colonization with same strain of (6607734653165010)MDR Klebsiella pneumoniae. Random swab analysis was done to ensure proper sterilization of suction units. The cultures were negative and found to be satisfactory.

DISCUSSION

Klebsiella pneumoniae is a well-known causative agent of hospital acquired infections and can be the source of an epidemic outbreak in ICUs. Recently, there have been several reports of Klebsiella pneumoniae outbreaks in ICUs[5,6] due to poor immune response, use of invasive devices and frequent contact with health care workers. Outbreaks of Klebsiella pneumoniae have been reported to spread very rapidly with significant morbidity and mortality.[7,8,9]

In our study, environmental cultures from suction jar, suction ports were positive for Klebsiella pneumoniae, suggesting that there was a breach in infection control practices. The bionumber and antimicrobial resistance patterns of these isolates matched those recovered from cases and therefore, were thought to have a common origin.This kind of outbreaks were also recorded previously in few studies condected by Poonam Gupta et al, ShivaniSathia et al.[10] Compliance with strict infection control practices is the most important means to control an outbreak in such high risk areas.

Reinforcement for following proper infection control measures was done by strengthening the disinfection and sterilization protocols. Emphasis was laid upon simple measures such as five moments of hand hygiene, barrier precautions, educating the staff regarding infection control practices. With these interventions the outbreak caused by multi drug resistant Klebsiella pneumoniae has been controlled.

CONCLUSION

In conclusion one must understand the importance of active surveillance. It is suggested that every hospital must have a system for active surveillance which would help to detect the outbreak at an early stage so that investigations could be carried out and proper control measures could be initiated in time. Disinfection of suction jars may not be adequate to remove the resistant pathogens. Sterilization of these articles may be required to remove the all the microbial flora. It is also suggested that training of health care workers regarding hospital infection control practice is very important especially in high risk areas.

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