

Change in trend of bacterial isolates amongst patients of post-operative surgical site infections of G and O ward of a tertiary care hospital and medical college at Kishanganj, Bihar

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Abstract

Context: A two year study done on post-operative surgical site infections among G and O patients of this hospital to observe bacterial isolate pattern and drug resistancy in this area of Bihar and adjoining West Bengal. **Aims:** to identify bacterial isolates and to compare type of isolates with drug resistancy pattern of last two years. **Methods and Materials:** The present study include swab and Pus samples taken from post operative surgical site infections of G and O ward and aerobic culture and sensitivity examination done in our tertiary care teaching hospital. All results were rechecked in VITEK-2 automated system from a NABL accredited laboratory. **Results:** A gradual increase in number of post operative surgical site infections and the alarming obvious changes in bacterial isolates noticed when compared between 2013-14 and 2014-15 year departmental records. **Conclusion:** Emerging bacterial isolates are noticeably multidrug resistant. This study clearly indicates the importance of periodic review of hospital infection policy and subsequent change in hospital antibiotic policy.

Key Words: Emerging bacterial isolate, drug resistancy, hospital infection control policy and antibiotic policy.

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Received Date: 21/01/2017 Revised Date: 15/02/2017 Accepted Date: 10/03/2017

DOI: <https://doi.org/10.26611/1008131>

Access this article online	
Quick Response Code:	Website: www.medpulse.in
	Accessed Date: 14 March 2017

INTRODUCTION

Surgical site infection among operated patients is a very common problem in 3rd World country like India. But when there is a noticeable increase in number of infection and marked change in isolated species with spreading multidrug resistancy trend, in spite of hospital infection control program, it is definitely alarming¹. The conditions become worst where hospital infection control program is

not in use or not properly functioning. Aperiodic review is necessary to search emerging new organisms. Hospital environment harbors susceptible and drug resistant species altogether in its own environment. Due to existing hospital antibiotic policy susceptible organisms are gradually replaced by more resistant newer and emerging multidrug resistant strains due to selection. Hence a periodic review and a revised antibiotic policy should be necessary for the newer situation. Although we have a heavy patient flow in our OPD as well as in hospital Ward, it is a challenging task to control the spread^{2,3}. The crowded wards are often remaining the source of infection spread. The overall effect is delay in patient discharge and a huge financial burden which imposed on patient party and hospital authority and results in a heavy economic loss^{4,5}. The recent changes in isolated organisms were noticed in our microbiology department when compared with previous years isolated species. Among the gram positive organisms Staphylococcus aureus, Enterococcus spp are predominant in 2013-14 and

2014-15. MRSA, VRSA and VRE strains are emerging. Among gramnegative organism E. coli is followed by Pseudomonas spp in 2013-14. A few MDR Strain of Pseudomonas spp. were detected in 2013-14 but the trend is rising in 2014-15. Very recently we have noticed a rise of Citrobacter and enterobacter spp infections in our G and O ward. About 95% species of Citrobacter and enterobacter are multi drug resistance. Hence in this study we emphasized review of all the isolated spectrum from samples of surgical site infection like pus or swab where multiple antibiotics were tried for longer periods without much benefit to the patients.

MATERIAL AND METHODS

This study was conducted in Microbiology departmental laboratory of MGM Medical College and LSK Hospital, Kisanangani, Bihar. Pus, wound swab were collected aseptically from surgical site infection from admitted patient in G and O ward from September 2013 to October 2015 and were studied. The pathogens were identified using standard phenotypic method, as per guideline of Mackie and Mc Cartney practical textbook, 14th edition. Citrobacter and enterobacter spp. were reconfirmed by sending specimens to a NABL accredited laboratory and by VITEK- 2 automated identification system. AST performed at MGM Medical College by conventional method of Kirby-Bauer disc diffusion technique and compared with VITEK-2 automated system following CLSI guideline 2016. Both these methods show mostly identical results. 390 (three hundred and ninety) Pus and Wound swab samples were collected during this two year period. 184 (one hundred and eighty-four) samples were collected in 2013-14 and 206 (two hundred and sixteen) in 2014-15. Aerobic culture at 37 degree C. was done.

RESULTS

Table A: In 2013-14, frequency of pathogens isolated from surgical site infection in MGM Medical College and LSK Hospital (arranged below in order as per incidence rate). Speciation of the identified organisms are not done.

Table 1

Sr. No.	Organisms	Incidence rate
1	Staphylococcus aureus	75
2	E.coli	30
3	Enterococcus	28
4	Klebsiella	22
5	Pseudomonas	14
**6.	Citrobacter and Enterobacter	15(5+10)
Total	184	

Table B: In 2014-15, frequency of pathogens isolated from surgical sites infection in MGM Medical College and LSK Hospital arranged in order as per incidence rate.

Table 2

Sr. No.	Organisms	Incidence rate
1	Staphylococcus aureus	70
2	Enterococcus	41
3	Pseudomonas	28
4	Klebsiella	23
**5	Citrobacter and Enterobacter spp	22 (8 + 14)
6.	E coli	17
7	Acinetobacter	05
Total	206	

From this study, it is clearly evident that the incidence of Citrobacter and enterobacter infection has increased substantially in 2014-15 when compared to 2013-14. Although Enterococcus and Pseudomonas infections rate are showing rising trend but their existence in the hospital environment since earlier days (as per departmental records) are already established. However multi drug resistancy is the only common phenomenon amongst all these strains. In 2013-14, citrobacter infection detected in five cases out of 184 culture positive patient. The incidence rate was 2.71% only but the rate has increased to eight patient out of 206 culture positive cases in 2014-15. The incidence rate has increased to 3.88% in 2014-15. Similarly, the incidence of enterobacter infection was 5.45% in 2013-14 but has increased to 6.99% in 2015-16. Both the emerging organisms are kept in a single column to give them importance during subsequent studies. Table C: Comparative study of incidence of drug resistancy among the following drugs when compared between 2013-14 and 2014-2015.

Table 3: Drug resistancy 2013-14 against 2014-15

Gram negative	2013-14 2014-15	Amp.	Cef+s	Cef+cl	P+T	ceftri	cefe	lmi	gen	cipro	colis
E.coli	30/17	26/15	4/12	3/11	11/1	15/25	1/13	5/14	3/14	5/14	-
Klebsiella	22/23	20/22	14/20	14/18	8/16	19/22	10/15	14/20	10/14	14/17	-
Pseudomona	14/28	20/20	12/24	-	10/20	-	12/24	13/20	13/20	12/24	4/14
Citrobacter, enterobacter	5/22	4/22	4/22	4/22	2/10	5/22	5/22	4/22	3/20	4/22	2/8
Acentonetobacter	0/5	-/5	-/5	-/5	-/5	-/5	-/5	-/3	-/3	-/5	-/2

Table 4:

Gram positive	2013-14 2014-15	cef	Am+cl	Cf+cl	cip	cefe	Az	Clinda	Van	Gen	HIgen
Staphylococcus	85/70	68/67	68/67	68/67	68/67	69/69	60/58	70/68	40/49	30/35	-
Enterococcus	28/41	-	-	-	-	-	-	-	12/15	-	10/16

Amp= Ampicillin, Cef+S= Ceftazidime and Salbactam, Cef+Cl=Ceftazidime+clavulanic acid, P+T= Piperacillin and Tazobactam, Cetri=Ceftriaxone, Cefe= Cefepime, Imi=Imipenem, Gen= Gentamycin, Cipro= Ciprofloxacin, Colis= Colistin, cef= Ceftazidime, Am+Cl= Amoxicillin+Clavulanic acid, Az=Azithromycin, C=Clindamycin, Van= Vancomycin, HI Gen= High Level Gentamycin.

DISCUSSION

With the increasing number of surgical site infections in our tertiary care hospital, it is observed that there is a definite change in trend of isolated microorganism pattern⁶. Citrobacter and enterobacter infection has remarkably increased from 15 in the year 2013-14 to 22 in 2014-15. The overall incidence of citrobacter and enterobacter infection rate amongst ssi patient has jumped from 8.1% in 2013-14 to 10.6% in 2014-15. So far as drug resistancy is concerned, both citrobacter and enterobacter are multi drug resistant^{10,11} and it is clearly evident from this study that the citrobacter and enterobacter wound infections are emerging¹⁰ in this hospital. When each organism's resistancy pattern is compared with previous year's, the result seen is really alarming. Almost all category of drug resistancy starting from ESBLs, carbapenemase⁷ to MRSA, VRSA and high level Amp C are noticed. Amongst them, citrobacter and enterobacter species are mostly sensitive to piperacillin and tazobactam combination and Colistin sulfate. Hence, for post surgical site infection patients only these two drugs are left to deal with. Further development of resistancy against these two drugs is a mere sequence of time. However, this is the first study here at MGM Medical college and LSK Hospital, Kisangani, Bihar, where multi drug resistance Citrobacter and enterobacter wound infections were found to be emerging and causing wound gaping in and even secondary suture failure in G and O ward. Although we have also found MDR Pseudomonas and MDR Acinetobacter in few cases but the infections were already established as a known cause of wound infection⁸. The citrobacter and enterobacter spp. were sent to a NABL accredited laboratory in Kolkata where further examinations were done in VITEK-2 system. The AST done in VITEK-2 was in confirmation with our sensitivity test pattern as per Kirby-bauer disc diffusion technique CLSI- 15(9). The MIC of sensitive antibiotics are given below: **Table D:** Comparative MIC value of isolated sensitive Citrobacter and enterobacter species against MIC value of Enterobacteriaceae (CLSI 2016) MIC of Citrobacter and Enterobacter CLSI 2016 (enterobacteriaceae)

CONCLUSION

The report clearly shows a rising trend of MDR citrobacter and enterobacter. As these pathogens are environmental in origin, i.e., present in soil, food, milk, water, etc and usually colonize in human GI tract and can cause wound infection through contact or from infected hospital dressings. A proper infection control policy is immediately required and a revised hospital antibiotic policy must be established. Since the hospital caters a low resource setting, proper educational surveillance, organizational change of quality improvement can reduce nosocomial infections. There is a need to improve attitude changes to effectively implement infection control measures.

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Source of Support: None Declared
Conflict of Interest: None Declared

