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A Study of incidence of Hospital acquired infection in oral and maxillofacial surgery ward

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Abstract:
AIMS: *The aim of this study is to determine the incidence, various risk factors, various methods of diagnosing infection, disinfection and sterilization methods, efficacy, degree of microbial contamination, severity of wound infection by clinical grading of post operative wound infection in the department of oral and maxillofacial surgery at Acharya Vinoba Bhave rural hospital attached to Jawaharlal Nehru medical college and Sharad Pawar dental college, sawangi (Meghe) Wardha in collaboration with department of Microbiology of the same institute.*
MATERIALS AND METHODS: *The present study is an Prospective. A total of 414 patients were subjected to various surgical procedures. Out of 361 cases either it was day-care surgeries or patient discharged on or before first pre-owned operative day. Remaining 261 patients were included in the study and cases were classified by degree of surgical site contamination based on the criteria laid down by National Research Council of USA. Patient with remote infection were not included. All surgeries were performed in the operation theatre site was prepared with 2 % savlon followed by tincture of iodine and spirit. Infected were kept dressed in dressing room whereas clean cases were kept dressed at bedside. Wounds were examined on regular basis on 2^{nd}, 4^{th}, 6^{th}, 10^{th} post-operative day to check for wound infection evidence. Wounds infection was clinically graded as grade-I (serous/serosanginous), grade-II (Frankly purulent discharge) and grade-III (purulent discharge). 261 cases were studied to determine the post-operative wound infection with other parameters like fever, urinary tract, blood stream and lower respiratory tract infection. Blood sample was taken for culture and sensitivity from all the patients with pyrexia. Patient with oro-facial space infection were also admitted. Antibiotic sensitivity test was done employing modified stroke method using standard NCTC strains as controls. Ward environment and operation theatre environment was studied by sending swabs for culture from different sites of the ward and theatre e.g. Roof wall, dressing trolley, sister's and surgeon's hand.*
RESULTS: *261 patients were included in the study out of 441 patients. Overall incidence of post-operative wound infection was 23.3 %.*
CONCLUSION: *The wound sepsis still remains the most dreaded complication of a surgical operation. [1]Significant determinants were type of operation, distribution of clinical grades, urgency of operation, use of drain, age of patient, sex of the patient, surgery with various predisposing factors, duration of pre-operative hospital stay, total duration of operation, use of electrocautery, antimicrobial prophylaxis, wound infection and post-operative hospital stay, pyrexia and post-operative infection, mortality rate due to post-operative wound infection.[2,3] The future advances will help to change the antibiotics strains of bacteria and increased the efficacy of antibiotics.*

Keywords*: Noso-comial infection, SSI (Surgical site infection)*

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I. Introduction

Nosocomial infection occurs in patients under medical care. These infections occur worldwide both in developed and developing countries. It accounts for 7% in developed and 10% in developing countries. They developed during hospital stay and cause disability, prolonged stay and financial constraints. Common infections are central line associated, catheter associated urinary tract infections, bloodstream infections, surgical infections and ventilator associated pneumonia[3,4].

Study Design: Prospective observational study
Study Location: Department of oral and maxillofacial surgery at Acharya Vinoba Bhave rural hospital attached to Jawaharlal Nehru medical college and Sharad Pawar dental college, sawangi (Meghe) Wardha in collaboration with department of Microbiology of the same institute.

Study Duration: The period of study was from January 2004 to December 2005.

Sample size and Sample size calculation: A total of 661 patients were out of which 415 undergoing various surgical procedures from which 261 cases were included in this study (excluding criteria is not included). Cases were categorized into 4 groups i.e. clean, clean contaminated, contaminated and dirty.

Inclusion criteria:
1. Age group mainly 1-60 years.
2. Medium: - Pre-operative and postoperative from first dressing.
3. The main consideration whether patient is immune-compromised or not.

II. Material and Methods

1. Selection of patient: During the period

WARDS	TOTAL NO. OF PATIENTS	NO. OF PATIENTS INCLUDED IN THE STUDY	TOTAL NO. OF CASES OPERATED
Oral & Maxillofacial ward	661	261	45

2:-Records of patients

Following incidence of post-operative wound infections in relation to various surgeries

SURGERIES PERFORMED	TOTAL NO. OF CASES	PERCENT OFWOUND INFECTION
Cancer	90	16 (17.7)
Reconstruction	65	10 (15.3)
Trauma	123	25 (20.3)
Ankylosis	10	(0.0)
Benign Tumours	29	6 (20.6)
Cleft palate/lip	40	5 (5.0)
Infection	43	……..
Burn	5	2 (40)
Orthognathic	1	…. (0.0)
Tracheotomy	9	…. (0.0)
Total	45	61

- Excluding Criteria

X2 = 354.90, highly significant, P < 0.001.

2. Incidence of wound infection

WOUND CLASS	TOTAL NO. OF CASES	INFECTED CASES	CLINICAL GRADES OF WOUND INFECTION		
			Grade-I	Grade-II	Grade-II
			No. (%)	No (%)	No. (%)
I.	24	3 (12.5)	1 (50)	1(50)	1(50)
II.	148	31 (20.9)	20 (62.5)	10 (31.2)	1 (3.1)
III.	62	12 (19.3)	7 (58.8)	4 (33.3)	1 (8.3)
IV.	27	15 (55.5)	8 (53.3)	4 (26.6)	3 (20)
Total	261	61 (23.3)	36 (59.2)	19 (31.1)	6 (9.8)

I: Clean; II: Clean contaminated; III: Contaminated; IV: Dirty. X2 = 14.808, X2-tab = 12.59, P < 0.05, significant

SENIC risk factors.

Table showing distribution of patients and incidence of postoperative wound infection by "SENIC" risk factors

"SENIC" RISK FACTORS	NO. OF PATEINTS IN "SENIC"	"SENIC" % OF ALL PATIENTS	NO. OF INFECTED PATIENTS	"SENIC" % OF PATIENTS WITH INFECTION (n = 186)
0	112	33.3	26	13.7
1	……..	……	……	…….
2	148	44. 0	60	32.2
3	36	10.7	70	37.6
	40	11.9	30	16.1

As the SENIC-I is not considered in the study. X2 = 76.60, X2-tab = 16.92, significant, P < 0.05.

Table showing post-operative incidence wound infection in relation to the urgency of operation and degree of wound contamination

WOUND CLASS	EMERGENCY OPERATIONS		ELECTIVE OPERATIONS	
	TOTAL NO OF CASES	CASES WITH WOUND INFECTION	TOTAL NO. OF CASES	CASES WITH WOUND INFECTION
		No. (%)		No. (%)
Clean Clean	1	…….	16	3 (18.7)
Contaminated	3	1 (33.3)	148	31(20.9)
Contaminated	2	1 (50)	62	10 (6.1)
Dirty	2	1 (50)	27	14 (51.8)
Total	8	3 (37.5)	253	58 (22.9)

X2 = 18.48, significant, P < 0.05

Urgency of operation:

Table showing incidence of post-operative wound infection in relation to the urgency of operation and degree of wound contamination

WOUND CLASS	EMERGENCY OPERATIONS		ELECTIVE OPERATIONS	
	TOTAL NO. OF CASES	CASES WITH WOUND INFECTION	TOTAL NO. OF CASES	CASES WITH WOUND INFECTION
		NO. (%)		NO. (%)
Clean Clean	1	……	16	3(18.7)
Contaminated	3	1 (33.3)	148	31 (20.9)
Contaminated	2	1 (50)	62	10 (16.1)
Dirty	2	1 (50)	27	14 (51.8)
TOTAL	8	3 (37.5)	253	58 (22.9)

X2 = 18.48, significant, P < 0.05.

Use of Drain:

It was observed that open type of drain infection increased.

WOUND CLASS	DRAIN USED	
	Total no. of cases	Cases with wound infection
		No. (%)
Clean	24	1 (4.1)

Clean Contaminated	148	31 (20.9)
Contaminated Dirty	62	14 (22.5)
	27	15 (55.5)
Total	261	61 (23.3)

X2 = 153.6, significant, P < 0.05

Month of operation

Table showing monthly incidence of post-operative wound infection

Month of operation	Clean surgeries		Clean contaminated surgeries		Overall surgeries	
	Total no. of cases	Infected cases	Total no. of cases	Infected cases	Total no. of cases	Infected cases
		No. (%)		No. (%)		No. (%)
January	4	0	16	1 (6.2)	24	2 (8.3)
February	1	0	14	2 (14.2)	26	3 (11.5)
March	2	0	12	1 (8.2)	17	2 (11.7)
April	2	0	18	2 (11.1)	21	2 (9.5)
May	1	0	10	3 (30)	12	6 (50)
June	2	0	8	2 (25)	24	3 (12.5)
July	4	2 (50)	18	7 (38.8)	26	17 (60)
August	2	1 (50)	19	7 (36.8)		15 (62.5)
September	2	0	6	2 (33.3)	18	4 (15.3)
October	1	0	8	1 (12.5)	19	3 (16.6)
November	2	0	8	1 (12.5)	22	2 (10.5)
December	1	0	11	2 (18.1)	22	2 (9)
Total	24	3 (12.5)	148	31 (20.9)	261	61 (23.3)

Age of the patient:

AGE GROUP (YEARS)	CLEAN SURGERIES		CLEAN SURGERIES CONTAMINATED	
	Total No. of cases	Cases developing wound infection	Total no. of case	Cases of developing wound infection
0-9	9	1 (11.1)	2	1 (50)
10-19	2	…….	6	1 (16.6)
20-39	6	……..	42	5 (11.9)
40-59	5	1 (20)	72	12 (16.6)
>_ 60	2	1 (50)	26	12 (46.6)
Total	24	3 (12.6)	148	31 (20.9)

X2 = 7.27, less significant
X2 = 110.91, Non-significant

Sex of the patient

Overall post- operative wound infection rate was almost equal in both males and females

Table showing monthly incidence of post-operative wound infection in clean, clean contaminated surgeries in relation to the sex of the patients

WOUND CLASS	TOTAL NO. OF CASES		CASES OF DEVELOPING WOUND INFECTION	
	Male	Female	Male no. (%)	Female no. (%)
Clean (n = 24)	14	10	2 (20)	1 (10)
Clean contaminated (n = 98)	98	50	19 (19.3)	12 (24)
Total- 172	112	60	21 (18.7)	13 (21.6)

X2 = 5.61, significant, P < 0.05

Surgery with various pre-disposing factors:
Table showing monthly incidence of post-operative wound infection in clean, clean contaminated surgeries in relation to the various pre-disposing factors:

PRESDISPOSING FACTORS	CLEAN SUGERIES		CLEAN CONTAMINATED SURGERIES	
	Total no. of cases	Cases developing post-operative wound infection	Total no. of cases	Cases developing post- operative wound infection
		No. (%)		No. (%)
Malignancy	……	……	90	19 (21.1)
Diabetes mellitus	3	3 (100)	18	10 (55.5)
Tuberculosis	….	……..	4	…..
Total	3	3 (100)	112	29 (25.8)
Cases with no. predisposing factor	22	……	36	2 (5.5)
Overall cases	24	3 (12.5)	148	31 (20.9)

X2 = 787.92, significant, P < 0.05.

Pre-operative haemoglobin levels:
Table showing post-operative incidence wound infection in clean and clean contaminated surgeries in relation to the pre-operative haemoglobin levels [5]

PRE-OPERATIVE HEMOGLOBIN LEVELS (GRAM %)	CLEAN SURGERIES		CLEAN CONTAMINATED SURGERIES	
	Total no. of cases	Cases developing post- operative wound infection	Total no. of cases	Cases developing post- operative wound infection
		No. (%)		No. (%)
0-8	9	2 (22.2)	80	20 (25)
9-10	7	1 (14.2)	18	7 (38.8)
11-12	4	……..	14	2 (14.2)
>= 13	4	……..	36	2 (5.5)
Total	24	3 (12.5)	148	31 (20.9)

X2 = 6.76, less significant

Body mass index:
Table showing post-operative incidence wound infection in clean and clean contaminated surgeries in relation to body mass index

BODY MASS INDEX	CLEAN SURGERIES		CLEAN CONTAMINATED SURGERIES	
	Total no. of cases	Cases developing post-operative wound infection	Total no. of cases	Cases developing post- operative wound infection
		No. (%)		No. (%)
<= 18	7	1 (14.2)	19	2 (10.5)
19-23	4	1 (25)	53	9 (17)
24-28	9	1 (11.1)	65	14 (21.5)
>= 29	4	……	11	6 (54.5)
Total	24	3 (12.5)	148	31 (20.9)

X2 = 8.16, significant, P < 0 .05.

Duration of post-operative hospital stay [5]

DURATION OF PRE-OPERATIVE HOSPITAL STAY	CLEAN SURGERIES		CLEAN CONTAMINATED SURGERIES	
	Total no. of cases	Cases developing post- operative wound infection	Total no. of cases	Cases developing post- operative wound infection
		No. (%)		No. (%)
Up to 1 day	2	……	22	2 (9)
1 day to 1 week	14	1 (7.1)	55	8 (14.5)
More than 1 week	8	2 (25)	71	21 (29.5)
Total	24	3 (12.5)	148	31 (20.9)

X2 = 3.90, less significant

Total duration of operation:

Table showing post-operative incidence wound infection in clean and clean contaminated surgeries in relation to body mass index

TOTAL DURATION OF OPERATION	CLEAN SURGERIES		CLEAN CONTMINATED SURGERIES	
	Total no. of cases	Cases developing post-operative wound infection	Total no. of cases	Cases developing post- operative wound infection
		No. (%)		No. (%)
<=30 minutes	4	……..	8	1 (12.5)
31-60 minutes	3	……	32	3 (9.3)
61-12 minutes	9	1 (11.1)	48	11 (22.9)
> = 2 hours	8	2 (25)	60	16 (26.6)
Total	24	3 (12.5)	148	31 (20.9)

X2 = 5.04, Non-significant, P > 0.05

Use of electrocautery:

Table showing post-operative incidence wound infection in clean and clean contaminated surgeries in relation to total duration of operation

ELECTROCAUTERY	CLEAN SURGERIES		CLEAN CONTAMINATED SURGERIES	
	Total no. of cases	Cases developing post-operative wound infection	Total no. of cases	Cases developing post- operative wound infection
Used	8	No. (%)		No. (%)
Not used	16	2 (25)	112	23 (20.5)
Total	24	1 (6.2)	36	8 (22.2)

X2 = 17.57, significant, P <= 0.01 (Fisher Exact Test)

Antimicrobial prophylaxis [5,7,6]

Table showing post-operative incidence wound infection in clean and clean contaminated surgeries in relation to total duration of operation

ANTIMICROBIAL PROPHYLAXIS	CLEAN SURGERIES		CLEAN CONTAMINATED SURGERIES	
	Total no. of cases	Cases developing post- operative wound infection	Total no. of cases	Cases developing post- operative wound infection
		No. (%)		No. (%)
Used	24	3 (12.5)	148	31 (20.9)

Rank of operator:

Table showing post-operative incidence wound infection in clean and clean contaminated surgeries in relation to the rank of operator

RANK OF OPERATOR	CLEAN SURGERIES		CLEAN CONTAMINATED SURGERIES	
	Total no. of cases	Cases developing post- operative wound infection	Total no. of cases	Cases developing post- operative wound infection
		No. (%)		No. (%)
Senior	24	1 (5.0)	112	16 (14.2)
Junior Surgeon	4	2 (50.0)	36	18 (50)
Total	24	3 (12.5)	148	31 (20.9)

X2 = 0.68, Non-significant, P < 0.05.

Onset of wound infection after an operation:
Table showing post-operative incidence wound infection in clean and clean contaminated surgeries in relation to the onset of wound infection after an operation

DAYS AFTER AN OPERATION (IN DAYS)	CLEAN SURGERIES		CLEAN CONTAMINATED SURGERIES	
	Total no. of cases	Cases developing post- operative wound infection	Total no. of cases	Cases developing post- operative wound infection
		No. (%)		No. (%)
0-2	…….	……..	4	(12.9)
2-4	1	(33.3)	2	(6.4)
4-6	42	(66.6)	21	(67.7)
>6	…….	………..	4	(12.9)
Total	3		31	

X2 = 3.07, Non-significant, P > 0.5

Wound infection and post-operative hospital stay:
Table showing post-operative incidence wound infection in clean and clean contaminated surgeries in relation to the wound infection and post-operative hospital stay.

DURATION OF POST-OPERATIVE HOSPITAL STAY (IN DAYS)	EXTRA POST-OPERATIVE HOSPITAL STAY (IN DAYS)	CLEAN SURGERIES TOTAL INFECTED CASES		CLEAN CONTAMINATED SURGERIES TOTAL INFECTED CASES	
		No.	(%)	No.	%
<=7	0	……..	……	……	…….
8-10	1-3	……	…….	1	(3.2)
11-15	4-8	1	(33.3)	14	(45.6)
>=16	>=10 days	2	(66.6)	16	(51.6)
Total		3	(12.5)	31	(20.9)

X2 = 0.03, non-significant, P > 0.05.

Pyrexia and post-operative infections:
Table showing correlation of pyrexia (48 hours after an operation) with post operative infections observed in various 261 operated cases, by their degree of contamination.

WOUND CLASS	PATIENT WITH PYREXIA	POST-OPERATIVE INFECTIONS							
		S.S.I	U.T.I	B.S.I	L.R.T.I	S.S.I + U.T.I	S.S.I + U.T.I + B.S.I	S.S.I +B.S.I	U.T.I +B.S.I
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
I). Clean (24 cases)	2 (8.3)	2 (12.5)	……	…….	…….	……	…….		
II). Clean contamination (148 cases)	11 (7.4)								
III). Contamination (62 cases)	5 (8)								
IV. Dirty (27 cases)	7 (25.9)								
Total (261 cases)	25 (9.5)	14 (56)	4 (16)	3 (12)	…..	3 (12|)	….	1 (4)	….

Relationship of Urinary tract infection (UTI) with catheter

URETHRAL CATHETER	PATIENTS WITH UTI	
	No.	(%)
Used (112)	12	(10.7)
Not used (149)	3	(2)
Total (261)	15	(5.7)

X2 = 5.4, significant, P <0.05

Mortality rate due to post-operative wound infection:

TOTA L NO. OF INFECTED CASES	MORTALITY RATE (OUT OF INFECTED CASES)
61	1 (1.6 %)
Total no. of patients 261	1(0.38 %)

Bacteriology of infected post-operative wounds:

Observation regarding organisms isolated

1.	Coag Positive staphylococci	4.21 %	(11/261)
2.	Coag negative staphylococci	3.44 %	(9/261)
3.	Streptococcus pyogenes	3.44 %	(9/261)
4.	Pseudomonas aeruginosa	5.36 %	(14/261)
5.	Klebsiella species	2.68 %	(7/261)
6.	Proteus species	0.38 %	(1/261)
7.	Other streptococci	0.76 %	(2/2610
8.	Escherichia coli	3.44 %	(9/261)
9.	Citrobacter species	0.38 %	(1/261)

III. Discussion

The wound sepsis still remains the most dreaded complication of a surgical operation. Surgeons all over the world have recognized the magnitude of the problem and are working hard to study and devise various methods to reduce this complication. [8,9,10]

The infrastructure for any study on the wound infection is its rate of occurrence and is a guide to evaluate the efficacy of various modifications and improved techniques. With this aim the present study was carried out to find the incidence of post- operative wound infection, its problem and various risk factors in a hospital, situated in a rural area, dealing in mostly to the rural population. [11,12, 13]

They also increase the cost of treatment for particular a surgical operation, as infection in a post-operative wound increases the post- operative hospital stay. [5] Further it adds to the treatment cost through cost and duration of antibiotic therapy. Most of the surgical patients treated at our hospital were socio-economically poor or average and these were under-nourished and hence more susceptible for infections. [13,14,15,16,17]

IV. Summary And Conclusion

The present study titled "**A Study of incidence of Hospital acquired infection in oral and maxillofacial surgery ward**" was carried out in Acharya Vinoba Bhave rural hospital attached to Jawahar Lal Nehru College and Sharad Pawar dental college, Sawangi (meghe) Wardha, Maharashtra in collaboration with department of microbiology. The period of study is from January 2004 to December 2005.

A total of 661 patients out of which 415 patients undergoing various surgical procedures from which 261 cases were included in this present study (in which excluding criteria is not included). Cases were included into 4 groups i.e. clean, contaminated, contaminated, and dirty. The post-operative wounds were examined on 2^{nd}, 4^{th}, 6^{th}, 10^{th} post-operative day to look for evidence of infection and were clinically graded into three grades. Surgical wound sepsis if present, swabs were obtained for culture and sensitivity, 261 cases were obtained for culture and sensitivity to find out association of post –operative wound infection with other parameters like pyrexia, urinary tract infection, blood stream infection and lower urinary tract infection. Arch was made out to Search strategy: Search was made to find out cause of pyrexia (developing 48 hours after an operation) with special reference to surgical site infection, urinary tract infection, blood stream infection and lower urinary tract infection. Around (123 out of 70 cases of maxillofacial fracture are infected open wounds.

Following conclusions were drawn from this present study:

1. Overall incidence of post-operative wound infection was 23.3 %. 7,8. Clean surgeries minimum infection rate of 12 % and maximum rate of sepsis was 61 % noted in dirty surgeries. The rate of sepsis was 29 % and 24 % in clean contaminated and contaminated surgeries respectively.

2. Out of total 38 cases with grade-I (62.2 %) wound infection, maximum number of cases i.e. 2.63 % were following clean surgeries; 52.6 % were following clean contaminated surgeries; 23.6 % and 21 % were following contaminated and dirty surgeries respectively.

Out of total 18 cases infected with grade-2 wound infections, maximum number of cases (16.6 %) were following dirty surgeries followed by 5.5 %, 55.5 % and 22.2 % of cases following clean, clean contaminated and contaminated surgeries respectively. [18, 19,20]

Maximum number of cases (60 %) with grade-3 wound infection were following dirty surgeries. 20 % and 20 % of the infected cases with grade-3 wound infection were following clean contaminated and contaminated surgeries respectively and not a single case developed grade-3 wound infection following clean surgeries. [18, 19,20]

3. The incidence of wound sepsis was significantly related to each of SENIC risk factors which include: Operation on the abdomen, operation lasting for more than 2 hours, contaminated or dirty operations by traditional wound classification system and presence of at least three medical diagnosis. [18, 19,20]
4. Risk of developing wound infection was related more on degree of microbial wound contamination than on the urgency of operation.
5. Use of drain was found to increase the incidence of post-operative wound sepsis in all types of wound class.
6. Rate of post-operative sepsis in open wounds had highest rate. The rate of wound sepsis was higher in the month of July and August (i.e., summer and rainy seasons) minimum in the month of July and August (i.e. summer and rainy season) and minimum in the month of January-February.
7. Incidence of post-operative sepsis was significantly high in the patient of elderly agree group.
8. Patients with pre-existing malignancy and anaemia were associated with high rate of wound sepsis.
9. It was found that incidence of post-operative sepsis was higher in obese with BMI 29 or more on taking body mass index (BMI) i.e. (weight in kg/height in m 2) as index of obesity.
10. Increased duration of pre-operative hospitalization and operations were significantly associated with high rates of wound sepsis.
11. Use of electric cautery for cutting and homeostasis during operations was significantly associated with high rates of wound sepsis.
12. Use of prophylactics contaminated surgeries was associated with high rates of wound sepsis.
13. Maximum number of wound infection were first time observed on 4-6 days after an operation.
14. The mean length of stay in the hospital following clean surgeries for patients who had post-operative infection was longer (12 days) as compared to those who had no infection (7 days) and thus these patients with wound infection had extra post- operative hospital stay of average 4 days. Similarly mean length of post-operative hospital stay following wound infection in clean contaminated surgeries was longer (14 days) as compared to (8 days) for those who had no infection. These patients were kept in the hospital for extra average 7 days.
15. Pyrexia (48 hours after an operation) was observed most often (40%) following dirty surgeries and was last common (6 %) following clean surgeries. The most common cause of pyrexia was surgical site infection (41%) followed by urinary tract infection (23 %), blood stream infection (8%) and lower respiratory infection (5%).
16. The commonest organisms isolated from post-operative wounds infection was coagulase positive Stapylocoagulase (14%) followed by Escherichia coli (20%), Pseudomonas aeruginosa (30%), Klebsiella Penumonieae (9%), Proteus vulgaris (7%) and Acinetobacter anitratus (6%).
17. Gram negative sepsis was two times more predominant as compared to gram positive sepsis.
18. Gram positive organisms were most sensitive to Cipofloxacin and Gentamycin followed by Cloxacillin and Erythromycin. Gram negative organisms isolated from wound sepsis were most sensitive to Amikacin and Cefotaxime followed by Carbenicilllin and Gentamycin.
19. The most common organisms isolated from community acquired surgical wounds were Pseudomonas followed by E. coli and Klebsiella species and Klebsiella pneumonieae. [1, 2, 3,4]
20. The gram positive isolated from community acquired surgical infections were more sensitive to Penicillin, Ampicillin, Gentamycin, Ciprofloxacin and Cephalexin s compared to isolated from hospital acquired clean wound infections. In contrast hospital acquired microorganisms isolated were more sensitive to Cloxacillin as compared to hospital acquired isolated. [1,2, 3,4,5,6]
21. The gram negative isolates from hospital acquired clean wounds infections were more resistant to Chloramphenicol, Ampicillin, Gentamycin and Ciprofloxacin as compared to community acquired isolates.[14, 15, 16]

It is to conclude that there is no gentleness in handling the tissues, preservation of vascularity, ideal hemostasis and removal of devascularized tissue and foreign particles and anatomical closure without tension or dead space, also is important that blind use of antibiotics in the hospital and in the community should be avoided to prevent the emergence of antibiotic resistant strains.

The future advances will help to change the antibiotics strains of bacteria and increased the efficacy of antibiotics. The recombinant DNA breakthrough has provided us with a new and powerful approach to the questions that have intrigued and plagued man for centuries.

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