The Role of Prophylactic Antibiotics in Surgical Site Infection (SSI)

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Abstract:

Background: Prophylactic antibiotics have been shown to be effective in reducing the incidence of febrile morbidity associated with surgical operations. Surgical site infections (SSI's) account for approximately (15%) of nosocomial infections and are associated with prolonged hospital stays and increased costs.
***Aim of the study*:** To evaluate the efficacy of prophylactic antibiotics in reducing the incidence of postsurgical wound infection.
Objective: (1) - To improve the outcome and reduce the time stay at the hospital.
(2) - To determine the independent risk factors for postsurgical infection.
(3) - To decrease the incidence of postsurgical wound infection.
***Study Design*:** A prospective comparative study.
Place and Duration: Department of surgery-Azadi Teaching Hospital/ Kirkuk, from June 2007-December 2012.
Patiens and Methods: 600 patients undergoing surgical operations were enrolled in this study and classified into two groups: male 327, (54.5%) and female 273, (45.5%).
GROUP 1:- 300 patients received parental prophylactic antibiotics. M; 181, (30.2%), F; 119, (19.8%)
GROUP 2:- 300 patients not are receiving prophylactic antibiotics. M; 146, (24.3%), F; 154, (25.7%).
Both groups were followed for any sign of infection up to 2-3 weeks.
Results: The rate of infection in the emergency surgeries was (13%) significantly higher than that in the planned and elective (4%) surgeries. The infection rate was seen to be the maximum, with prolonged stay at the hospital, (11.7%) more than three days in group1, and (21%) days in group 2 when more than three days duration of the post-operative hospitalization. There was a significant increase in the rate of infection as the duration of the surgeries increased (13.8%) if lasting for more than two hours. Patients with co-morbid disease have higher IR (51%) in comparism with non co morbid patients.
Conclusion: the use of prophylactic antibiotics therapy is satisfactory in our surgical environment; this practice would be efficient, cost effective and prevent the emergence of nosocomial infection in developing countries.
***Key words*:** Surgical Site Infections (SSI's), Prophylactic antibiotic, Infected rates (IR).

Introduction:

Infection may be defined as 'invasion and multiplication of microorganisms in body tissues, which may be clinically in apparent or result in local cellular injury because of competitive metabolism, toxins, intracellular replication, or antigen-antibody response' [1]. Claudius Galen (130-200 AD), another Roman physician had such an influence on the management of wounds that he is still thought of by many today as the 'father of surgery'. He and some of his followers instigated the 'laudable pus' theory, which incorrectly considered the development of pus in a wound as a positive part of the healing process [2]. The 19th century witnessed the acceptance of the germ theory and introduction of antisepsis through Semmelweiss (1818-1865), Pasteur

(1822-1895) and Lister (1827-1912). Mary Ayton [3], a Nursing officer, defined terminologies like wound contamination, wound colonization and wound infection, which are in current use. Vincent Falanga, in 1994 [4] identified the concept of 'critical colonisation' with fresh insights into chronic wound healing and non-healing wounds. Prior to the middle of the 19th century, when Ignaz Semmelweis and Joseph Lister became the pioneers of infection control by introducing antiseptic surgery, most wounds became infected [5]. In cases of deep or extensive infection, this resulted in a mortality rate of (70-80%) [6]. The traditional classification was as follows: clean (2%), clean contaminated (5%-15%), contaminated (15%-30%), and dirty or infected (30%) [7].

Patient factors that influence development of surgical site infection include the following:

(1). those undergoing abdominal operations.

(2). those whose operations last longer than 2hours.

(3). those undergoing contaminated or dirty- infected operations by traditional definition.

(4). those having three or more different diagnoses.

Other systemic predisposing factors include weight loss greater than (10%) of baseline, physiologic impairment of two or more organ systems [8], obesity [9], concurrent infection at a remote site, and immunocompromise [10, 11,12].

The term *surgical site* was used to replace *surgical wound* to clarify the specific anatomic location of deep infections after operations. The *Centres for Disease Control* (CDC) definition states that only infections occurring within 30 days of surgery.

Patients and Methods:

A comparative study was conducted in the Department of General Surgery, at Azadi-Teaching Hospital from June 2007 to December 2012. Six hundred patients where included; male 327, (54.5%) and female 273, (45.5%). The age of the patients sample are between infancy to the elderly group as the following; 74, (12.3%) are below fifteen years, 58 (9.7%) are elderly while the others about (78%) are the young age group i.e. between (16-60 years). They have undergone different surgical operations (elective or emergency), including patients with comorbid illnesses, they are classified into two groups:

Group 1: "G1" Including 300 patients who have received parental prophylactic antibiotics.

Group 2: "G2" Including 300 patients who have not received prophylactic antibiotics.

Within 24-72 hours before surgery, a baseline assessment was performed for each patient included measurement of vital signs (pulse rate, respiration rate, blood pressure, and body temperature), general physical, systemic and gynecological examination. Blood and urine samples were also sent for hematology, as well as blood chemistry, and urine analysis.

Follow up: Routine postoperative observation was done during the hospital stay and after till stitch removal. Surgical sites examined for any signs of infection.

Signs of wound infection according to Killian et al (2001) are:

*Redness or excessive swelling in the wound.

*Throbbing pain or tenderness in the wound area.

*Generalized chills or fever.

*Pus or watery discharge collected beneath the skin or draining from the wound.
*Foul odor from the wound.
*Red streaks in the skin around the wound, or progressing away from the wound.
*Erythema, induration, cellulitis or purulent drainage.
We follow the patients for any signs of wound infection and sample of pus were obtained for culture /sensitivity to prove the type of infection. The swabs were collected from the infected wounds and were processed without delay by using standard microbiological methods.
The Centres for Disease Control and Prevention (CDC) term for infections associated with surgical procedures was changed from surgical wound infection to surgical site infection.
The CDC criteria for defining the type of the surgical wounds are as follows:
Class I: Operative wound, clean. Non -traumatic wound.
Class II: Operative wound, clean contaminated.
Class III: Operative wound, contaminated.
Class IV: Operative wound. Dirty.
The details of the surgeries including the preoperative hospitalization, the duration of surgery, whether it was emergency or elective, history of co morbid illnesses and the prophylactic antibiotic therapy which was received, were recorded.

Results:

In all, 600 surgical site infections (SSI) were studied, the infected rate (IR= number of infection/ 100 cases).
Twelve (12) patients (4.0%) from group 1 developed wound infection, and 39 patients, (13.0%) from group 2 developed wound infection. The surgical infection rate in the wounds following clean surgery (class I) was 1, (0.9%), that in clean contaminated surgeries (class II) was 6, (4.3%). In contaminated surgeries (class III) was 19, (7.6%), and in dirty (class IV) surgeries was 25, (25%).
Table (1 and 2) shows the age and sex of the patients. The age varied from five years up to 82 years. The majority of the patients were from the age group 16-60. As it show in the table, male patients in both groups are (327=54.5%), and female (273=45.5%).
Most of infection rate is found as following:
*G2 cases is 39(13%), the female 21 (7.0 %), and male, 18 (6.0%).
*G1 cases is 12(4.0%) the female 6 (2.0%), and male; 6 (2.0%). In our study, we found that SSIs are more common in patients above 60 years of age 21 (3.5%) ,while less infection rate is found among the younger age group below than 30 years (9 patients=1.5%).
Table (3) shows that the infection rate (IR) in both groups is 51 out of 600 (8.50%). It occurs less in G1 group; 12 patients (4.0%) in those who received the antibiotics prophylactically in the form of parentral administration than in those of G2 group who did not receive them i.e. 39patients (13.0%).
Table (4) show most wound types are (clean-contaminated and contaminated 432 (72%), clean type are 108 (18%) while dirty type are 60(10%).
Table (5) shows infection rate in relation to the type of wounds. In G1 group it has no occurance in clean surgery (0=0.0%), while in dirty wounds the infection rate is 6 (12%). In G2 it occurs less in clean surgery 1 (0.9%), while in dirty wounds the infected rate is 25 (25%).
Table (6) shows that Only in two patients (3.9%) stayed for one day, but

22 (28%) of the patients in G2 needed to stay more than three days where as in G1 only 60 (10%) need to stay for more than three days.

Table (7) shows that in G2 the infection rate in the surgeries lasting for more than 2 hours duration is 20 patients (20.6%) than in the surgeries of 1 hour duration 4 patients (4.8%) in comparison to the G1 were it is (1=1.6% and 8=7.6). the total IR is 5 patients (4%) in those with less than one hour operative time. While when the duration is longer than two hours it is 28 patients (13.9%).

Table (8) shows that most of surgical infection rate occur in the emergency type of surgical operations i.e. 43 patients (10.2%).it is clear that cases in G2 is more in comparison to G1cases.they are 31 patients; (15.5%) in G2 and 8 patients (4.5%) in G1. The infection rate is less frequent if antibiotic prophylaxis is used as shown in both elective and emergency surgeries.

Table (9) shows that the infection rate is more common in cases with co-morbid diseases 42, (51.9%) in comparison to the non-co-morbid patients 9, (1.7%). The (IR) also is more observed in G2 in which occurs in 33 (11%) in those with co-morbid diseases in comparison to only three patients (1.0%) in the co-morbid disease patients.

Table (10) shows that the causative microorganism isolated from the infected tissue (pus) from the surgical site is mostly by single organism growth of one microorganism which is mostly staphylocous aureus followed by E coli, Pseudomonas and Klebsiella, are the commonest isolate which caused the surgical wound infections 22, (43.1%), while mixed infection (polymicrobial) occur in 19, (37.3%). And in 10 cases, (19.6%) there is no growth isolation from the wound swab. The table also shows that the causative microorganism isolated from the infected tissue (pus) of the surgical site is mostly by single organism growth of one microorganism mostly staphylocous aureus followed by E coli. Pseudomonas and Klebsiella, are the commonest isolate which caused the surgical wound infections 22, (43.1%), while mixed infection (polymicrobial) occurs in 19, (37.3%) but in 10 cases, (19.6%) there is no growth isolation from the wound swab.

Table (1): Distribution of patients according to the age and sex. (No =600).

Age /year	G 1						G 2						Total	
	M	%	F	%	T	%	M	%	F	%	T	%	N	%
Less15	21	(3.5)	13	(2.16)	34	(5.7)	24	(4.0)	12	(2.0)	36	(6.0)	70	(11.7)
16-30	41	(6.8)	23	(3.83)	64	(10.7)	31	(5.1)	34	(5.7)	65	(10.8)	129	(21.5)
31-45	60	(10)	44	(7.33)	104	(17.3)	43	(7.1)	45	(7.5)	88	(14.7)	192	(32.0)
46-60	49	(8.2)	21	(3.50)	70	(11.7)	37	(6.1)	42	(7.0)	79	(13.1)	149	(24.8)
More60	10	(1.7)	18	(3.00)	28	(4.7)	11	(1.8)	21	(3.5)	32	(5.3)	60	(10.0)
Total	181	(30.2)	119	(19.8)	300	(50.0)	146	(24.3)	154	(25.7)	300	(50.0)	600	(100.0)

Table (2): IR (infection rate) according to the age and sex. (No =600).

Age /year	G 1				(IR)		G 2				(IR)		Total	(IR)
	M	%	F	%	T	%	M	%	F	%	T	%	N	%
Less 15	1	(0.3)	0	(0.0)	1	(0.3)	1	(0.3)	1	(0.3)	2	(0.7)	3	(0.5)
16-30	1	(0.3)	0	(0.0)	1	(0.3)	2	(0.7)	3	(1.0)	5	(1.7)	6	(1.0)
31-45	1	(0.3)	1	(0.3)	2	(0.7)	3	(1.0)	4	(1.4)	7	(2.3)	9	(1.5)
46-60	1	(0.3)	2	(0.7)	3	(1.0)	5	(1.7)	4	(1.4)	9	(3.0)	12	(2.0)
More 60	2	(0.7)	3	(1.0)	5	(1.7)	7	(2.3)	9	(3.0)	16	(5.3)	21	(3.5)
Total	6	(2.0)	6	(2.0)	12	(4.0)	18	(6.0)	21	(7.0)	39	(13.0)	51	(8.5)

Table (3): Prophylactic antibiotic therapy and infection rate (IR).

Prophylactic administration of antibiotic	No. patient	IR	%
G 1=Antibiotic administered	300	12	4.0
G 2=Antibiotic not administered	300	39	13.0
Total	600	51	8.50

Table (4): Distribution of surgical wound infection on both groups.

No. of patients	Clean		Clean-Contaminated		Contaminated		Dirty		Total	
	No	%	No	%	No	%	No	%	No	%
G1=300	48	(16)	123	(41)	93	(31)	36	(12)	300	(50)
G2=300	60	(20)	144	(48)	72	(24)	24	(8.0)	300	(50)
Total	108	(18)	267	(44.5)	165	(27.5)	60	(10)	600	(100)

Table (5): IR (infection rate) in both group in relation to surgical wound type.

Type of surgical wounds	G 1		IR		G2		IR		Total		IR	
	No	%	No	%	No	%	No	%	No	%	No	%
Clean	50	(16.7)	0	(0.0)	60	(20.0)	1	(1.7)	110	(18.3)	1	(0.9)
Clean contaminated	100	(33.3)	2	(2.0)	40	(13.3)	4	(1.0)	140	(23.3)	6	(4.3)
Contaminated	100	(33.3)	4	(4.0)	150	(50.0)	15	(10.0)	250	(41.7)	19	(7.6)
Dirty	50	(16.7)	6	(12.0)	50	(16.7)	19	(38.0)	100	(16.7)	25	(25)
Total	300	(100)	12	(4.0)	300	(100)	39	(13.0)	600	(100)	51	(8.50)

Table (6): Correlation between Postoperative hospital stay and (IR) infection rate (no=600).

Postoperative hospital stay	Total		G 1				G 2				Total	
	No	%	No	%	IR	%	No	%	IR	%	IR	%
Up to 1 day	105	17.5	54	9.0	1	1.9	51	8.5	2	3.9	3	2.9
1-2 day	357	59.5	183	0.5	4	2.2	174	29.0	15	8.6	19	5.3
More than 3 days	138	23.0	60	10.0	7	11.7	78	13.0	22	28.2	29	21.0

Table (7): Operative period in relation to infection rate in both groups.

Duration of surgery in hours	Total		G 1				G 2				Total	
	No	%	No	%	IR	%	No	%	IR	%	IR	%
0-1	122	20.3	63	21.0	1	1.6	59	19.6	4	6.8	5	4.0
1-2	276	46.0	132	44.0	3	2.3	144	48.0	15	10.4	18	6.5
2 hour and more	202	33.7	105	35.0	8	7.6	97	32.3	20	20.6	28	13.9

Table (8): Type of surgery in relation to rate of infection in both groups.

No. of patient	Emergency				Elective				Total	
	No	%	IR	%	No	%	IR	%	IR	%
G 1 (300)	216	(36.0)	11	(5.0)	84	(14.0)	1	(1.2)	12	(4.0)
G 2 (300)	207	(34.5)	32	(15.5)	93	(15.5)	7	(7.5)	39	(13.0)
Total (600)	423	(70.5)	43	(10.2)	177	(29.5)	8	(4.5)	51	(17.0)

Table (9): Infection rate in G1 & G2 in relation to co- morbid diseases.

	Co-morbid + ve				Co-morbid - ve				Total	
	No	%	IR	%	No	%	IR	%	IR	%
G 1 (300)	33	(11.0)	9	(27.2)	267	(89.0)	3	(1.1)	12	(4.0)
G 2 (300)	48	(16.0)	33	(68.8)	252	(84.0)	6	(2.4)	39	(13.0)
Total (600)	81	(13.5)	42	(51.9)	519	(86.5)	9	(1.7)	51	(8.5)

Table (10): Micro-organism growth from culture positive isolated from the infected wound.

No. of organism	No.	%
No growth	10	(19.6)
Single growth	22	(43.1)
Poly microbial growth	19	(37.3)
Total	51	(100.0)

Discussion:

600 patients with different types of surgical wound where divided into two groups regarding the administration of antibiotic prophylaxis. The rate of infection is higher in those who did not administer prophylactic antibiotics, this included 549 non infected surgeries and 51 infected surgical wound infections. The overall infection rate in the present study is (51/ 600= 8.50%). This is in agreement with the overall infection rate which ranged from (2.8% to 20.19%) in other studies [13.14.15]. The use of antibiotic prophylaxis before surgery has evolved greatly in the last 20 years [16]. The choice of parenteral prophylactic antibiotic agents and the timing and route of administration have become standardized on the basis of well-planned prospective clinical studies [17].

Wound infection remains an important postoperative complication. Its occurrence is associated with readmission, repeat surgery or intervention, prolonged hospitalization and significant clinical and economic consequence (Sadique et al., 2009) [18]. It can be due to multiple factors like a low healing rate, malnutrition, mal-absorption, increased catabolic processes and a low immunity [19]. Other studies [20, 21] also report advanced age as a risk factor for the development of SSI.SSI rate is not significantly different with both gender. These findings are comparable to studies done by Culver and Gaynes [22]. Infections occur even though surgeons take meticulous aseptic precautions during surgery and the patients are strictly managed before and after surgery. The overall infection rate in the current study is (8.50%) which is lower than rates reported in an Indian study, (8.95%) [23].

These findings are in agreement with many studies (Nisa et al 2005& Oliver et al 2009 and Walaa et al 2011) [24, 25, 26]. This study concludes that the administration of prophylactic antibiotics has an effect on the decrease in the surgical wound infection rate, as the infection rate in patients who were given the prophylactic antibiotics is (4%). The findings of this study correlate with the findings of those of P.L. Nandi et al (1999) [27]. National Nosocomial Infections Surveillance (NNIS) program, run by the CDC, has indicated that the three factors: surgical risk; as measured by the ASA, duration of surgery, and level of bacterial contamination of the wound, provide a satisfactory risk-adjusted infection rate across a wide range of surgical procedures [28]. The most important factor in pathogenesis of wound sepsis is the presence of bacteria at the time of wound closure, thus too early or too late administration of antibiotic therapy cannot produce adequate tissue drug level while surgery is going on and this is in agreement with many researchers who suggested that the responsibility for prophylactic antibiotic should be assigned to the anesthiologist at the induction of anesthesia (Costantine et al 2008 & Sadique et al 2009 and Vernessa et al 2011) [29, 30, 31]. The rate of infection in G2 for clean surgeries (class I) is (1.8%). For the clean contaminated (class II) surgeries, it is (1.0%). For the contaminated (class III) surgeries, it is (10%) and for the dirty (class IV) surgeries, it is (38%). These results were similar to those of Anvikar et al and Olsen Marry et al [32, 33, 34, 35].

The SSI rates in clean and clean contaminated surgeries are (0.9%) and (4.3%), favourably comparable with rates of (1%–5%, 5%–10%) respectively [36]. In another study Sangrasi *et al*. from Hyderabad, Pakistan, observed SSI rate of (5.3%) and (12.4%) in clean and clean contaminated cases respectively [37]. Surgical site infection rate is much higher for class IV or dirty wounds as compared to other classes (25%). The underlying reason may be the presence of devitalized tissue and preexisting clinical infection or perforated viscera which are generally encountered in class IV wounds. These findings are in agreement with other authors [38, 39]. Around (1%) of the patients undergoing clean surgery (e.g., breast, hernia) and (11%) of patients undergoing clean-contaminated surgery (e.g., colorectal) surgery experience surgical site infections [40]. SaeTia L *et al* (2006) showed that antibiotics were effective only if given within 4-hrs of inoculating bacteria into a wound [41]. Porras-Hernandez et al. and Fletcher et al. showed that antibiotic prophylaxis, although marginally significant, served as a protective factor against SSI [42, 43]. Uludag et al. pointed out that despite the use of antibiotic prophylaxis; the rate of wound infection for dirty-infected operations was still (30%) [44]. The low overall rate of SSI and the rate of SSI in clean operations are obviously related to the facts that 423, (70.5%) of the patients in the present series underwent an elective operation and that (91.3%) of the operations were clean or clean-contaminated [45, 46]. In our study, SSI is most frequent for dirty-infected operations (25%), which is consistent with literature data according to which the rate of SSI for dirty-infected operations is (10–40.7%) [47, 48]. The total IR occur in 3 patients (2.9%) in those who stayed less than one day, while occurs in 29 patients (21%). The surgical site infection increases the length of hospital stay. [49]. The additional length of stay is dependent on the type of surgery [50, 51]. Prophylaxis has the potential to shorten hospital stay. The rate of infection is more in patients having longer perioperative stay in the hospital wards. Long perioperative hospital stay leads to colonization with antimicrobial resistant microorganisms and affects patients' susceptibility to infection by lowering host immunity or by providing increased opportunities for bacterial colonization [52]. In the presence of SSI, the hospital stay of patients increases significantly, in our study by 12.6 days, which is 2.5 days longer than the hospital stay in a study by Platon [53]. Although most studies report longer hospital stay in the case of SSI, the cause of such lengthening is not specified [54, 55]. According to many studies, the duration of operation increases the rate of SSI [48, 49, 50]. Direct association between the duration of operation and higher rate of SSI was pointed out by Platon et al., who showed that infection rate increases almost two times by every hour of operation [53]. Similar findings were reported by Anviker et al [32]. The timing of administration of antibiotics prophylaxis is also a critical factor in the development of SSI. The administration of antibiotics 2 hours or more before surgery or post-operatively was definitely associated with a higher SSI rate. The antibiotics should be administered ideally within 30 minutes and certainly within two hours of the time of incision [51]. The duration of operation more than 60 min was in 17 cases in group 1 and 34 cases in group 2 and the incidence of wound infection was higher between these cases, and this is in agreement with Oliver et al (2009) [25], who demonstrated that the risk of postoperative wound infection was Considerably reduced when the operation time was short. In the course of prolonged operation, there was a significant tissue devitalization resulting from tissue handling reduced tissue perfusion. Incidence of surgical site infections is higher in emergency procedures (13.1%) as compared to elective procedures (2.9%) [52]. In many ways, the value of surgical antibiotic prophylaxis in terms of the incidence of SSI after elective surgery is related to the severity of the consequences of SSI. For example, in the presence of an anastomosis of the colon, prophylaxis reduces postoperative mortality [53]. In total hip replacement surgery prophylaxis reduces long term postoperative morbidity [54]. In the present study, the maximum number of emergency surgeries was (70.5%) and the infection rate was found to be (10.2%) in the emergency surgeries, which was more than those in the elective surgeries. This is similar to the findings from the studies of Anvikar

A.R. 1999 in which it is (4.66%) [32]. The high rates of infection in emergency surgeries may be due to sufferings of insufficient pre-operative preparations, the underlying conditions which predisposed to the emergency surgery, and the more frequency of contaminated or dirty wounds in emergency surgeries [51] Emergency surgeries were usually performed by junior doctors, more often with complication and had dirtier cases [55]. Diabetes is also a well established risk factor for all kinds of infections and SSIs are no exception to this. Patel Sachin et al [55]. Also found the same findings. Anemia is also an important risk factor in development of SSI. Similar results were observed by Awan MS [56]. The more the number of persons in the operation theatre more are the chances of SSI. The same findings are also observed by Pryor F et al 1998 [57]. Many risk factors have been reported, such as age, nutritional status, diabetes mellitus, smoking, and obesity [36], as well as coexistent infections at a remote body site, colonization with microorganisms, altered immune response, length of preoperative stay, transfusion, preoperative hair removal, antimicrobial prophylaxis, operating room, surgical attire and drapes, and surgical techniques. Those at the extremes of age or those with diabetes mellitus, chronic renal failure, obesity, malnutrition, and use of immunosuppressive medications have been identified as being at increased risk of wound infection [13, 14]. The extent of nonviable exogenous contamination, although the incidence of wound infection in our study, the microbial load, and combined level of virulence is markedly greater than Manian FA [58, 59], it has been demonstrated that approximately is (50%) of twenty-one patients, 195 patients developed an infection traumatic injuries of varied etiology, have a polymicrobial (3.5%), however considering age and sex. Staphylococcus aureus was predominant causative organism in this study. Muhammad Shoaib Khan et al and Wassef MA et al [60] also found same organism. About (10-30%) of healthy people carry this organism in their nares. Infections by these organisms can also be caused by patients themselves. Bed sheets, instruments and dressing have also been found to act as reservoirs of S. aureus [61] Rajvir Singh et a [l3] recorded gram negative infections as major threat and isolated gram negative organisms in (75.6%) cases. All the isolates were resistant to the commonly used antibiotics. In individual patients, the type of operation performed and length of preoperative stay will be the strongest predictors of the species of organism isolated from a subsequent surgical site infection. In clean operations (no gastrointestinal, genitourinary, or respiratory tract violation), Staphylococcus species is the usual culprit; in contrast, a polymicrobial aerobic-anaerobic flora infection usually occurs in clean-contaminated cases, for example, elective colon resection [10, 35]. The longer the preoperative stay the greater the likelihood of infection from a more antibiotic-resistant organism. These points form the basis for the practice of prophylactic antibiotic administration to the surgical patient, and suggest the advantage of the current practice of day case surgery.

Conclusion:

1- This study aimed to objectify the true rate of SSI in a Department of General Surgery, avoiding the exclusive underestimation of intrahospital evaluation.

2- The study conclud that routine preoperative antibiotic prophylaxis significantly reduces the incidence of postoperative wound infection.

3- Surgical wound infections are common and they consume a considerable pattern of the health care finances.

4- SSIs are common and costly complications that increase morbidity and mortality in hospitalized patients.

5- Recent improvements in antibiotic prophylaxis, including the timing of initial administration, appropriate choice of antibiotic agents, and shortening the duration of administration, have established the value of this technique in many clinical surgical settings.

Recommendations:

1- Administer surgical antimicrobial prophylaxis as indicated, such as in some operations classified preoperatively as clean surgical wounds and clean-contaminated surgical wounds. Operations classified as contaminated or dirty surgical wounds are frequently receiving therapeutic antimicrobial agents preoperatively to treat related infections. They are not regarded as surgical antimicrobial prophylaxis.

2- Select antimicrobial agents according to antimicrobial efficacy against the common pathogens most likely encountered in the specific surgical sites.

3- Antimicrobial dosage modification may be necessary for the elderly, the very obese individuals, those with renal failure and / or liver failure.

4- Avoid using newer broad-spectrum antibiotics whenever possible.

5- The duration of antimicrobial prophylaxis should not routinely exceed 24 hours.

6- For many prophylactic antimicrobial agents, the administration of an initial dose should be given within 30 minutes before surgical incision (coinciding with the induction of anaesthesia) to achieve an adequate tissue concentration at the time of initial incision.

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