Evaluation of rational use of antibiotics as surgical prophylaxis in a tertiary care teaching hospital

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Abstract

Background: Rational antibiotic prophylaxis reduces the incidence of surgical wound infection.

Aim: To evaluate the rational use of antibiotics as surgical prophylaxis in a tertiary care teaching hospital.

Methods: This was a prospective and observational study conducted at the S.N. Medical College and HSK Hospital, Bagalkot. All the in-patients subjected for surgical procedure of any age of either sex at HSK hospital, Bagalkot were included in the study. The study was begun with the approval by the H S K Hospital's Institutional Ethics Committee, S.N.M.C and H.S.K Hospital and research Centre, Bagalkot. The study was conducted in accordance with the ethical principles of the ethics committee guidelines.

Results: In the present prospective study total 106 cases data were collected from surgery department during study period, out of which 43 were male and 63 were female patients found. During the study period 15 surgical site infections (SSI) were found and as per the ASHP guidelines out of 106 cases, 26 cases were received antibiotics at right time and right dose, while right selection of antibiotics was noted in 25 cases. Out of 106 cases of surgeries, 80 cases were not received any prophylactic antibiotics as per the ASPH guidelines.

Conclusion: The prophylactic antibiotics significantly reduce the incidence of post-operative wound infection.

Key words: Prophylactics, surgical site infection, rational use, right time, right dose

Introduction

The use of prophylactic antibiotic is one of the important factors in surgery and has been regularly used to eradicate endogenous microorganisms and to prevent postoperative infectious complications [1,2] manipulated during the procedure. The majority of SSI becomes apparent within 30 days of an operative procedure and most often between the 5th and 10th postoperative days. However, where a prosthetic implant is used, SSI affecting the deeper tissues may occur several months after the operation. Although the outcome measure for SSI used by many studies is based on standard definitions such as those described by the centers for disease control and prevention (CDC) or the surgical site infection surveillance service[3,4]. It remains a major cause of postoperative morbidity and mortality, prolong hospitalization and cost increase of medical care in the surgical unit. Appropriate prophylactic antibiotics administration before surgery can reduce the incidence of SSI. However, inappropriateness of antibiotic prophylaxis administration is still commonly found in various surgical procedures[5-8].

Approximately 30–50% of antibiotic use in hospital practice is now for surgical prophylaxis. However, between 30% and 90% of this prophylaxis is inappropriate. Most commonly, the antibiotic is either given at the wrong time or continued for too long[9]. Controversy remains as to duration of prophylaxis and also as to which specific surgical procedures should receive prophylaxis[10].

Various international guidelines and national

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guideline are available for the use of antibiotic prophylaxis in surgery[11-12]. However, adherence to the guidelines in choosing the type and timing of antibiotic prophylaxis administration is not always followed. This situation has led to high incidence of antibiotic resistance worldwide, which has a significant impact on public health issues, especially on treatment outcomes. Development of guidelines for the use of prophylactic antibiotics based on local microbial resistance patterns can improve the effectiveness of the use of prophylactic antibiotics[13]. Surgeons often use a broad-spectrum antibiotic prophylaxis prior to surgery or that does not comply with the guidelines that have been recommended[14].

In India, research on the rational use of prophylactic antibiotics in surgery, is still rare, therefore the aim of this study was to evaluate the rational use of antibiotics as surgical prophylaxis in a S.N. Medical College and HSK Hospital, Bagalkot.

Methods

Study Design

This was a prospective and observational study of inpatients under going for surgery.

Study Location

This study was conducted at the SN Medical College and HSK Hospital, Bagalkot. It is a multispecialty tertiary care teaching hospital with different specialties and super specialties. HSK Hospital provides primary and specialized health care facilities to people in and around Bagalkot district.

Study Criteria

Inclusion criteria: All the in patients subjected for surgical procedure of any age of either sex at HSK hospital, Bagalkot were included in the study

Exclusion criteria: The patient undergoing surgery of minor importance without (significant indication) and the patient with pre-existing infections.

Study procedure

The study was begun with the approval by the H S K Hospital's Institutional Ethics Committee [Ref: SNMC/PG/2012-13/3982, Date: 02-02-2013], S.N.M.C and H.S.K Hospital and research Centre, Bagalkot. The study was conducted in accordance with the ethical principles of the ethics committee guidelines. Data from the medical records of patients treated in the surgery unit, including patient demographics, type of surgical procedure, drug history, choice of antibiotic regimens, dose, time of administration, and dosage were collected retrospectively. The rational use of antibiotics was assessed by the guidelines of American Society of Health System Pharmacists (ASHP).

Results

Demographic details of the patients

In the present perspective study the total 106 cases data were collected from surgery department during study period, out of which 43 were male and 63 were female patients were found [Figure1]. From total surgery cases the 27 cases of abdominal and 12 cases of vaginal hysterectomy were the most of the chief complaints with abdominal pain, bleeding from vagina, mass per vagina etc. Appendectomy, 7 cases with abdominal pain and 8 cases of anal fissure were collected. Total 2 cases of Cholecystitis with complaints of abdominal pain and Hydrocele with chief complaints of swelling in the hemi scrotal area of total 7 cases were collected. Hernia of 17 cases was collected and 7 cases of excision were reported. Similarly a few cases with Orthopedic (diabetic foot), debridement, esophageal surgery, and gynacomestia, Thyroidectomy, Ileostomy, left gluteal abscess, Phimosis circumcision, splenectomy and thyrodectomy were collected.

Surgical antibiotics and hospital stay in tertiary care hospital

The hospital stay for the patients with abdominal hysterectomy was 7 to 10 days, vaginal hysterectomy 7 to 10 days, appendectomy 3 to 9 days, hemorrhoid was 5 to 6 days, cholecystitis 1 to 18 days, excision was 3 to 5 days, hydrocele was 3 to 5 days, hernia was 5 to 9 days and with thyrodectomy, goiter, phimosis, splenomegaly, left gluteal abscess, gynacomestia, diabetic foot, debridement and esophageal surgery was between 5 to 10 days. The most commonly used antibiotics for the above mentioned surgeries were cefotaxim, ceftriaxone, amoxicillin and clavulanic acid, metronidazole, cefoperazone, and ornidazole. Figure. 2 demonstrates the antibiotics given to them.

Surgical site infections found during study

During the hospital stay of the 106 surgical cases we found the quite good number of surgical site

infections and results were summarized in figure 3. During the study period 15 SSI were found out of which abdominal hysterectomy was 5, appendectomy 2, Anal fissure 2, Cholelithiasis 1, Hydrocele repair 1, Hernioplasty 1, and vaginal hysterectomy 3. Most of the other cases of surgeries SSI were not found.

Use of appropriate prophylactic antibiotics as per the ASHP guidelines

The selection of the prophylactic antibiotics is most important to reduce the SSI. In our study out of 106 cases only few cases were received antimicrobial agents as per the ASHP guidelines. In briefly, as per the ASHP guidelines out of 106 cases, 26 cases were received antibiotics at right time and right dose, while right selection of antibiotics was noted in 25 cases. [Results were summarized in Figure 4].

Prophylactic antibiotic used in various surgical procedures

ASHP provided the revised clinical practice guidelines for antimicrobial prophylaxis in surgery to reduce the surgical site infection and optimum post-operative patient care. In present study out of 106 cases of surgeries, 80 cases were not received any prophylactic antibiotics as per the ASPH guidelines. The details of the each type of surgeries and prophylactic antibiotics selection were given in the Figure. 5. In briefly, prophylactic antibiotics were not used in surgeries like abdominal hysterectomy 23 cases (82.14%), vaginal hysterectomy 7 cases (58.3%), appendectomy 6 cases (85.7 %), anal fistula 5 cases (62.5%), choleystectomy 1 case (50%). Similarly, surgical excision 7 cases (100%), gynacomestia 1 case (100%), hydrocele repair 6(85.7%), Hernioplasty 14 cases (82.3 %), Hemorrhoidectomy 6 cases (100%), left gluteal abscess 1 case (100%) and splenectomy 1 case (100%).

Discussion

With the advent of antibiotics and their widespread use, the incidence of wound infection has come down remarkably. Pre-operative administration of antibiotics to prevent post-operative infection represents a cornerstone in modern medicine, controlled clinical trial have shown that antimicrobial prophylaxis can lower the incidence of infection after certain operations thus reducing morbidity, hospital stay, antibiotic usage and mortality due to sepsis. An effective prophylactic regimen should be directed against the most likely infecting organisms. Infections can be prevented when

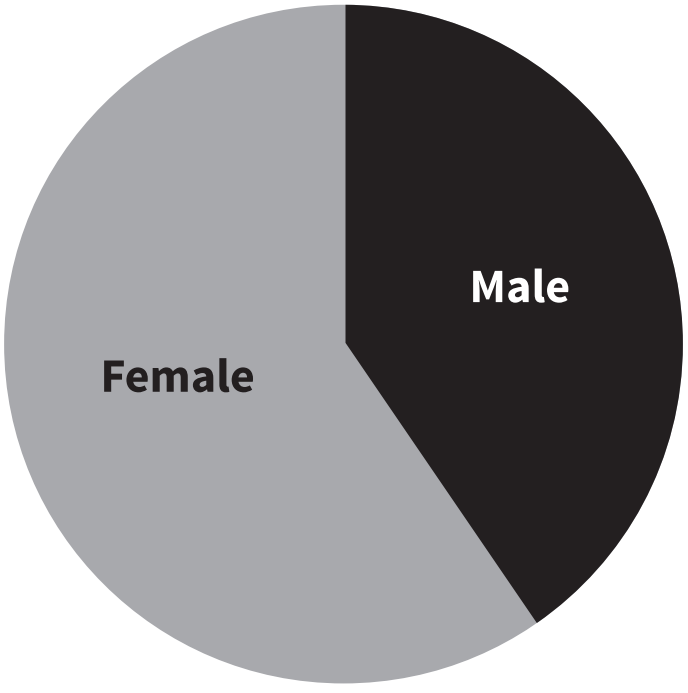


Figure.1 Demographic details of the patients in tertiary care hospital

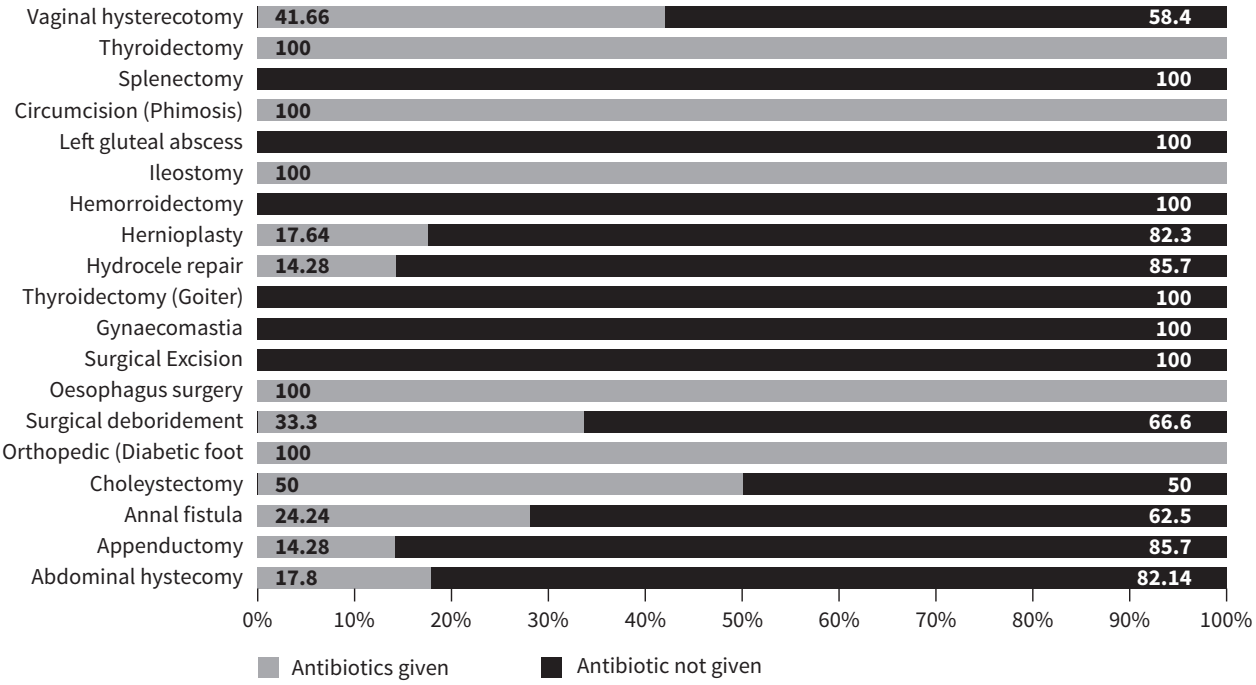
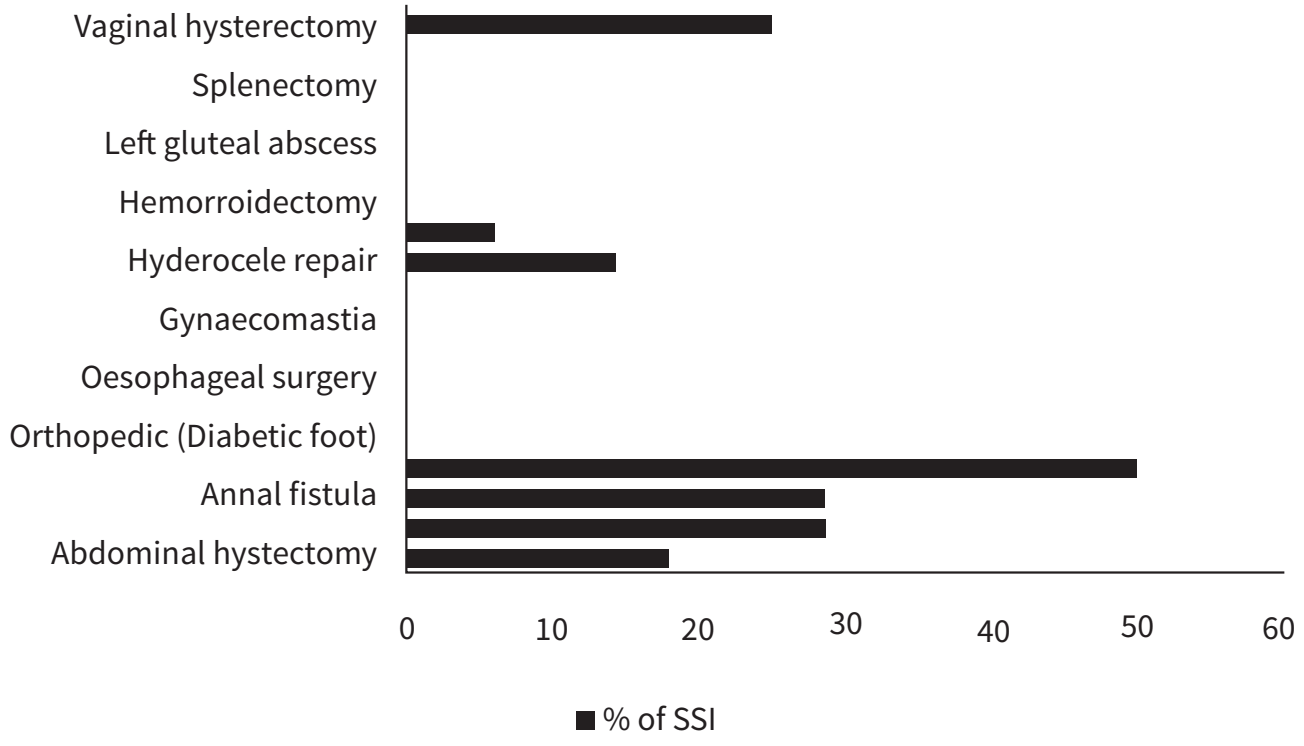
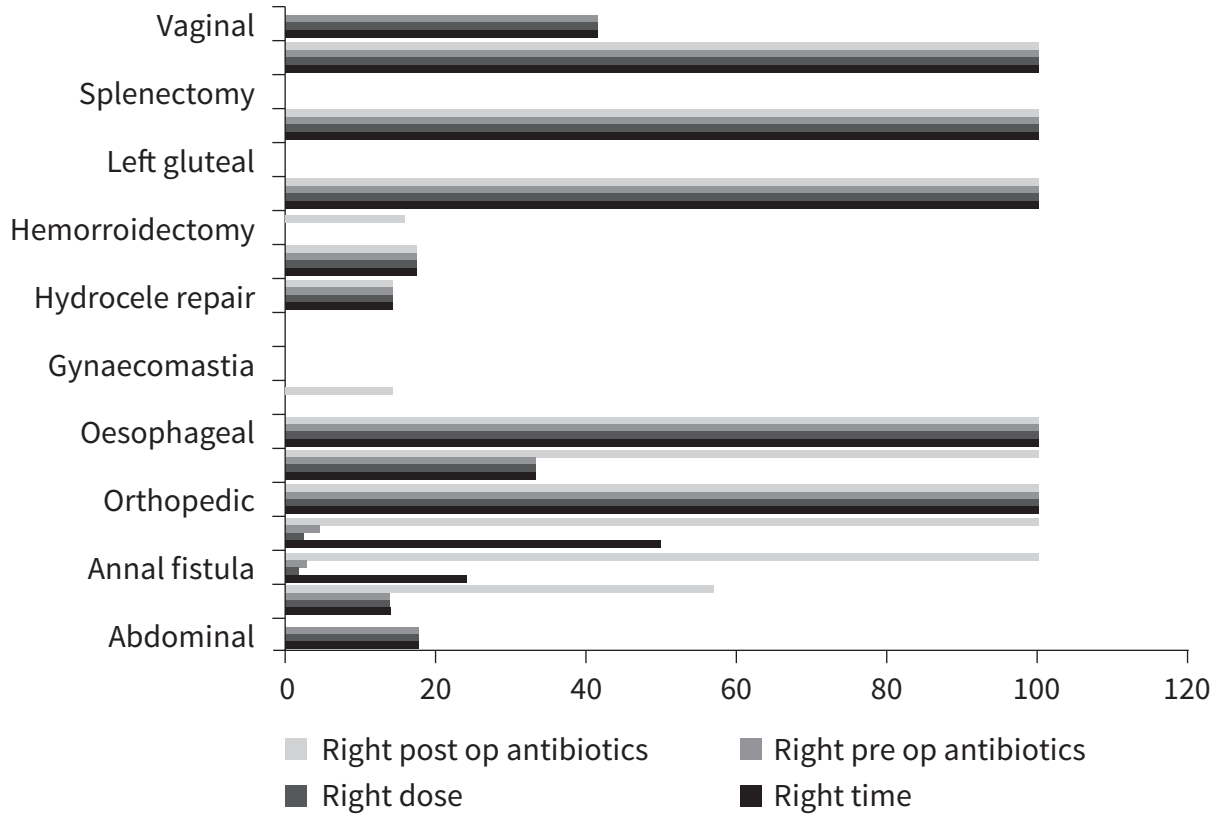
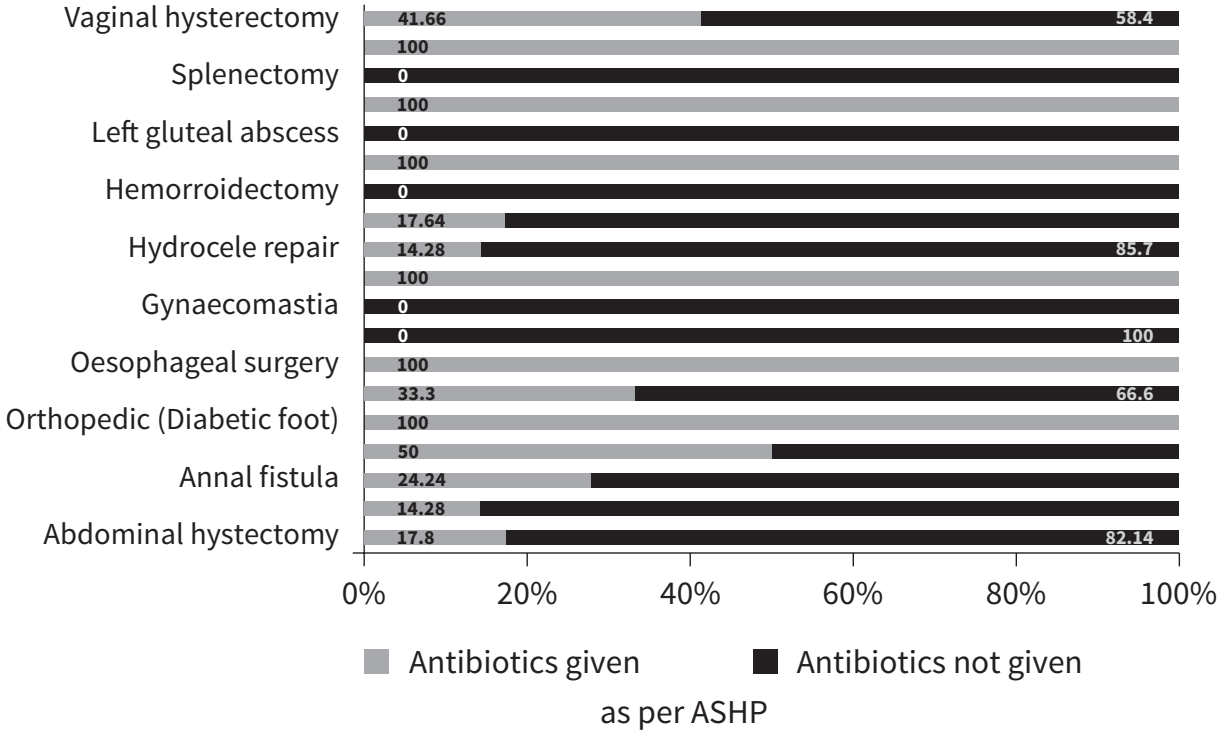


Figure. 2 Surgical antibiotics given for patients in tertiary care hospital




Vaginal
Splenectomy
Left gluteal
Hemorroidectomy
Hydrocele repair
Gynaecomastia
Oesophageal
Orthopedic
Annal fistula
Abdominal
0
20
40
60
80
100
120
Right post op antibiotics
Right pre op antibiotics
Right dose
Right time


Vaginal hysterectomy
41.66
58.4
Splenectomy
100
0
Left gluteal abscess
100
0
Hemorroidectomy
100
0
Hydrocele repair
17.64
14.28
85.7
Gynaecomastia
100
0
Oesophageal surgery
0
100
Orthopedic (Diabetic foot)
100
33.3
66.6
Annal fistula
100
50
Abdominal hystectomy
24.24
14.28
17.8
82.14
0%
20%
40%
60%
80%
100%
Antibiotics given
Antibiotics not given
as per ASHP

effective concentrations of the drugs are present in the blood and the tissue during and shortly after the procedure. Therefore antibiotic prophylaxis should begin just before the operation (60 mins). Beginning earlier was found to be unnecessary and potentially dangerous, while beginning later was found to be less effective[15]. A single dose of prophylaxis before the surgery was found to be sufficient. If surgery is delayed or prolonged, often a second dose is advisable if an antimicrobial agent with short life is used. Post-operative administration is unnecessary and harmful.

For our study, we have adopted American society of health-system pharmacist (ASHP) guidelines as reference. These guidelines are intended to provide practitioners with a standardized approach to the rational, safe, and effective use of antimicrobial agents for the prevention of surgical-site infections (SSIs) based on currently available clinical evidence and emerging issues[16].

In our study, out of 106 patients, 43 were male and 63 were female. Post-operative wound infection was found to be more common within the age group of 40 to 50 years old in our study. Hence, age also plays an important role in developing infection. The post-operative wound infection reflects the hospital stay, in our study the average hospital stay was between 7 to 10 days. There are several factors which affect the frequency of post-operative wound infection[17]. Our study shows wound infection was developed in 15 patients out of 106 patients without prophylactic antibiotic and no cases of wound infection was reported with prophylactic antibiotics.

As we have adopted American Society of Health-system Pharmacist (ASHP) guidelines as reference for our study. Out of 106 cases of surgery, 26 cases were in concordance with the ASHP guidelines for the manner of giving prophylactic antibiotics, and no post-operative wound infection was developed.

Conclusion

We conclude that, the prophylactic antibiotics significantly reduce the incidence of post-operative wound infection. Results of our study suggest that use of prophylactic antibiotics as per our adopted guidelines (ASHP) has proven to be effective in reducing the SSI which reflects rational use of antibiotics.

References

1. *Matti PR, Querol RC, Velmonte MA, Vera RL, Alejandria M. Prescribing practices of surgeons and factors that limit adherence to the Philippine College of Surgeons Clinical Practice Guidelines on antimicrobial prophylaxis for elective surgical procedures at the UP-PGH surgical wards. Philippine J Microbiol Infect Dis 2002; 31(3):107-24.*
2. *Garey KW, Dao T, Chen H, Amrutkar P, Kumar N, Reiter M, et al. Timing of vancomycin prophylaxis for cardiac surgery patients and the risk of surgical site infections. J Antimicrob Chemother 2006; 58(3): 645-50.*
3. *Horan TC, gaynes RP, martone WJ, Jarvis WR, Emori TG. Cdc definitions of nosocomial surgical site infections, a modification of cdc definitions of surgical wound infections. Infection Control and Hospital Epidemiology 1992;13:606–8.*
4. *Ridgeway S, wilson J, charlet A, Kafatos G, Pearson A, Coello R. Infection of the surgical site after arthroplasty of the hip. J Bone Joint Surg 2005;87:844–50.*
5. *Astagneau P, Rioux C, Golliot F, Brucker G; INCISO Network Study Group. Morbidity and mortality associated with surgical site infections: results from the 1997-1999 INCISO surveillance. J Hosp Infect 2001; 48: 267-74.*
6. *Perencevich EN, Sands KE, Cosgrove SE, Guadagnoli E, Meara E, Platt R. Health and economic impact of surgical site infections diagnosed after hospital discharge. Emerg Infect Dis 2003; 9:196-203.*
7. *Rana DA, Malhotra SD, Patel VJ. Inappropriate surgical chemoprophylaxis and surgical site infection rate at a tertiary care teaching hospital. Braz J Infect Dis 2013; 17(1): 48-53.*
8. *Vessal G, Namazi S, Davarpanah MS, Foroughinia F. Evaluation of prophylactic antibiotic administration at the surgical ward of a major referral hospital, Islamic Republic of Iran. East Mediterr Health J 2011; 17(8): 663-8.*
9. *Dettenkofer M, Forster DH, Ebner W, gastmeier P, ruden H, Daschner FD. The practice of perioperative antibiotic prophylaxis in eight german hospitals. Infection 2002; 30:164- 7.*
10. *Patchen Dellinger E, Gross PA, Barrett TL, Krause PJ, Martone WJ, McGowan JE Jr, et al. Quality standard for antimicrobial prophylaxis in surgical procedures. Clin Infect Dis 1994;18:422-7.*
11. *Scottish Intercollegiate Guidelines Network (SIGN). Guidelines 104. Antibiotic prophylaxis in surgery. A national clinical guideline. Edinburgh, UK: SIGN; 2008. [Online] Available from: http://www.sign.ac.uk/pdf/sign104.pdf [Accessed on 26th April 2013].*
12. *American Society of Health System Pharmacists. Therapeutic guidelines on antimicrobial prophylaxis in surgery. Am J Health Syst Pharm 1999; 56(18): 1839-88.*
13. *Allerberger F, Lechner A, Wechsler-Fördös A, Gareis R. Optimization of antibiotic use in hospitals-antimicrobial stewardship and the EU Project ABS International. Chemotherapy 2008; 54: 260-7.*
14. *Fonseca SN, Kunzle SR, Junqueira MJ, Nascimenta RT, de Andrade JL, Levin AS. Implementing 1-dose antibiotic prophylaxis for prevention of surgical site infection. Arch Surg 2006; 141(11): 1109-14.*
15. *Geroulanos SMK, Kriaraj J, Kadas B. Cephalosporins in surgical prophylaxis. J Chemother 2001;1(1):23-6.*
16. *Delinger EP. Surgical infection and choice of antibiotics. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL. Editors, Sabiston textbook of surgery. 18th edition. 2001:171-6.*
17. *Damani NN, Mughis UA. Prevention of surgical wound infection. Ann Abbasi Shaheed Hosp Karachi Med Dent Coll 1999;4:131-2.*

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