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ORIGINAL ARTICLE

Evaluation of surgical antibiotic prophylaxis

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Abstract

Surgical prophylaxis is one of the areas where antibiotics are used commonly. In this study it is aimed surgical prophylaxis appropriateness and determination of cost analysis in our hospital. The study was performed November 30-15, 2018. 108 patients who underwent surgery in general surgery, orthopedics and neurosurgery clinics have been included in this prospective study. Patient selection was based on the classification of clean and clean-contaminated. Demographics, features of the surgery, applied prophylactic antibiotics and surgical prophylaxis appropriateness were recorded in the forms. All patient information forms were evaluated by infectious disease specialists using the surgical prophylaxis guide. The costs of unnecessary antibiotics were determined. Mean age of 108 patients who underwent a surgical procedure was 52.4 years and 39.8% of the patients were male and 60.2% were female. Of the surgery procedures 75.9% (n:82) were clean and 24.1% (n:26) clean-contaminated. Preoperative 58.3% (63) unnecessary antibiotic prophylaxis was detected. Continuing prophylaxis at a prolonged time were used in 99 (91.7%) patients in the postoperative period. Cefazolin is the most commonly used agent for surgical prophylaxis. The cost of unnecessary and long-term antibiotic use was determined as ₺6983,69. In this study, the time of antibiotic prophylaxis were to be a big problem. Prophylaxis often starts very early and continues for days. The wrong practices in surgical prophylaxis lead to unnecessary antibiotics treatment to the patients and also burden to the budget of the country.

Keywords: Prophylactic antibiotics, surgical prophylaxis, cefazolin

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Introduction

Surgical antibiotic prophylaxis (SAP) is the administration of short-term antibiotics to patients without pre-operative infection in order to prevent bacterial contamination that may occur during the operation. Surgical prophylaxis is an important practice for the possible infections are prevented, morbidity, mortality, and antibiotic use are reduced, and the length of stay of patients is shortened [1]. Surgical interventions, according to the risk of infection and degree of contamination; it is classified into four groups as clean, clean contaminated, contaminated and dirty wounds. While prophylactic antibiotic use is recommended for clean and clean-contaminated wounds, treatment is recommended for contaminated and dirty wounds [2].

There is SAP guidelines created by many hospitals in our country [3]. Although there are surgical antibiotic prophylaxis guidelines in hospitals, wrong practices are frequently encountered in practice. For this reason, the effectiveness of the practices should be monitored and improvement studies should be made [4]. The aim of this study is to evaluate the SAP applications in our hospital and to prevent unnecessary costs by determining the cost analysis.

Materials and Methods

Approval for the study was obtained from the Clinical Research Ethics Committee of Afyonkarahisar Health Sciences University, Türkiye (2019/12). This study was performed November 30-15, 2018. This prospective descriptive study included 108 patients operated in general surgery, orthopedics, and neurosurgery clinics with clean and clean-contaminated wound classification. A form was prepared in which the data of the patients age, gender, surgery operations, foreign bodies, prophylactic antibiotics, and time of administration, dose, and duration of use were evaluated. The forms were filled out prospectively using the surgical forms used in the operating room, patient-nurse follow-up forms, and the electronic file system. The forms of all patients were evaluated by the infectious diseases specialist using the surgical prophylaxis guide.

The patients were evaluated in three preoperative, intraoperative and postoperative periods. They were evaluated in terms of infectious causes with clinical and laboratory findings and if possible, by taking the clinical opinion of the surgeon about the patient. Preoperative unnecessary antibiotic prophylaxis, intraoperative wrong choice of antibiotic and no prophylaxis were defined as inappropriate SAP. Preoperatively unnecessarily started antibiotics and given for a long time postoperatively were determined and their costs were calculated. The data were saved to the SPSS 20 package program Windows analysis program. Percentage distribution was used for statistical evaluation.

Results

In this study, 108 patients were included and, 39.8% (n:43) were male and 60.2% (n:65) were female. The mean age of the patients followed was 52.14 ± 17.25. The surgical operations of 75.9% (n:82) were clean and 24.1% (n:26) were clean-contaminated operations. The distribution of the patients according to the clinics where they were operated is shown in Table 1.

Table 1. The patients according to the clinics where they were operated

Clinics	Number of patients (n)	Percentage (%)
General surgery	48	44.4
Neurosurgery	22	20.4
Orthopedics	38	35.2

Table 2. Unnecessary used antibiotics preoperatively

Antibiotics	Number of antibiotics (n)	Percentage (%)
Cefazolin	32	29.6
Ceftriaxone	7	6.5
SAM	22	20.4
Ciprofloxacin	2	1.9

Unnecessary antibiotic prophylaxis was started in 63 (58.3%) patients in the preoperative period. This situation was found inappropriate according to our surgical prophylaxis guideline. Cefazolin (46.3%) and ampicillin-sulbactam (20.4%) were the most commonly unnecessary used antibiotics preoperatively (Table 2).

In the intraoperative period was determined that 66.7% (n:72) of the antibiotics given were appropriate and 33.3% (n:36) were inappropriate. It was determined that cefazolin 20.4% (n:50) was used the most for intraoperative surgical antibiotic prophylaxis in accordance with the guideline (Table 3).

Long-term antibiotics were used in 99 (91.7%) patients in the postoperative period, and this was defined as prolonged prophylaxis. The most commonly used antibiotics for prolonged postoperative prophylaxis were cefazolin (35.2%), ampicillin-sulbactam (35.2%) and ceftriaxone (17.6%). (Table 4).

The duration of postoperative prophylaxis 24 hours in 33 (30.6%) patients, 48 hours in 21 (19.4%) patients, 72 hours in 20 (18.5%) patients, 96 hours in 8 (7.4%) patients, 5 days in 8 (7.4%) patients, 6 days in 6 (1.9%) patients, 7 days in 4 (2.8%) patients, and 14 days in 3 (2.7%) patients was determined.

The total amount of antibiotics given wrong according to the guideline between the dates of the study was determined as ₺6983.69 (Table 5).

Discussion

Inappropriate antibiotics use is an important problem in Türkiye as well as all over the world. In studies performed in Türkiye, SAP applications are reported as the most common cause of inappropriate antibiotic use, and it is reported that problems such as increasing antibiotic resistance, side effects and cost [5-8]. In surgical prophylaxis, antibiotics that are sufficient for the surgical site, the narrowest-spectrum, have no side effects, have the lowest cost and resistance and should be selected. The use of broad-spectrum antibiotics in prophylaxis causes the development of resistance in microorganisms [9]. Cefazolin is suitable antibiotic for surgical prophylaxis and does not cause the development of resistance [10]. In this study, cefazolin was used, and it is possible to say that there is no problem in choosing antibiotics. The timing of surgical prophylaxis is more important. It should be 30-60 minutes before

Table 3. Intraoperative used antibiotics

Antibiotics	Number of antibiotics (n)	Percentage (%)
Cefazolin	50	46.3
Ceftriaxone	4	3.2
SAM	4	2.8
Ciprofloxacin	3	3.7

Table 4. Postoperative used antibiotics

Antibiotics	Number of antibiotics (n)	Percentage (%)
Cefazolin	38	35.2
Ceftriaxone	19	17.6
SAM	38	35.2
Ciprofloxacin	4	3.7

Table 5. Cost analysis and inappropriate used antibiotics

Antibiotics	Number of antibiotics (n)	Cost analysis (₺)
Cefazolin	267	1981.14
Ceftriaxone	81	1095.93
SAM	656	3562.08
Ciprofloxacin	23	344.54
Total	1027	6983.69

surgery or during the induction of anesthesia for the effective concentrations in serum and tissues [10]. Surgical antibiotic prophylaxis in 3 hours or more before the operation has been shown to be ineffective in preventing surgical site infections [11,12]. In current study, it was found that surgical prophylaxis was started in the early preoperative period in 63 (58.3%) patients. Long-term prophylaxis is a common wrong practices. Although a single dose of antibiotic is usually sufficient in surgical prophylaxis, the dose can be repeated in cases where the operation lasts longer than 4 hours and there is excessive blood loss. It is recommended that surgical prophylaxis should not exceed 24 hours in the presence of surgical drains and catheters [10]. Continuation of antibiotics after surgery does not cause a significant reduction in surgical site infections [12-14]. In many studies in Türkiye, it has been shown that prophylaxis is prolonged unnecessarily [7,8,15,16]. A recent multicenter study reported prolonged prophylaxis in half of the surgical procedures [17]. In this study, it was determined that long-term antibiotics were used in 99 (91.7%) patients, and prolonged prophylaxis was found to be an important problem in our hospital. Inappropriate antibiotic use in surgical prophylaxis cause unnecessary antibiotic administration to the patient and increase the cost of treatment. In the literature, there are studies in which cost calculations are made in SAP applications [6,8,18]. In our study, the total additional cost of inappropriate use of antibiotics was found to be ₺6983.69. Surgical prophylaxis is generally responsibility of the surgical team in our country [19]. Most of the studies have reported the physicians to use unnecessary antibiotics in surgical clinics. The main reasons of inappropriate surgical prophylaxis are inadequate knowledge, concern, and lack of local surgical prophylaxis guidelines in hospitals [17,20,21].

Conclusion

In conclusion, it is found that the prophylaxis duration continues to be a problem more than the decision of choice of antibiotic and was not consistent with the guideline. Prophylaxis was often started very early or late and continued for days in this study. In addition, although there is a guide on surgical antibiotic prophylaxis in our hospital, it has been observed that in practice, surgeons make different applications about SAP. For this reason, interactive educations should be provided by the infection control committee for surgical departments in order to eliminate errors in SAP applications. Surveillance programs for surgical prophylaxis should be performed, and a multidisciplinary SAP team should be established with the surgeons.

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Conflict of Interest

The author states no conflict of interest.

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