



Prophylactic antibiotics prescription in ear, nose, throat and ophthalmologic procedures; an Iranian university hospital situational analysis

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ABSTRACT

Introduction: Different prophylactic methods are introduced to prevent surgical site Infection. This study was conducted to evaluate situation of prophylactic antibiotics (PA) usage in an Iranian university hospital.

Aims: A cross sectional study.

Methods: This study obtained data from 1010 patients' medical files in 2015. These patients were admitted to a university otolaryngology (ENT) and ophthalmology hospital in north of Iran. Data from ordered prophylactic antibiotics considering induction time, type of antibiotic, duration of use, dosage amount and intervals was obtained to compare with international and national guidelines. Data analysis was performed by using Chi-square test at significance level of 95%.

Results: 402 (39.8%) patients were male and 608 (60.2%) ones were female. Mean age and standard deviation was 41.8 ± 22.3 years old, and most participants were in 20-39 years of age. Ophthalmic and ENT related procedure was respectively conducted for 41.7% and 58.3% of patients. Septorhinoplasty and phacoemulsification were the commonest procedures. Totally 999 (98.9%) people received prophylactic antibiotics. Intravenous Cefazolin (for ENT procedures) and topical eye drop of Chloramphenicol 0.5% were prescribed mostly. We found poor accommodation between antibiotic use and guidelines for prophylaxis, mostly in case of duration of apply.

Conclusion: Ordered prophylactic antibiotics is not as need as prescribed. Also, accommodation between prescription of antibiotics and available scientific guidelines was improper in this study.

Keywords: prophylactic antibiotic, ENT, ophthalmology

INTRODUCTION

Different prophylactic methods have been described to prevent postoperative Surgical Site Infection (SSI) (1-5), all aimed to reinforce host agents against enormous endogenous and exogenous bacterial colonization and following infection at sites of surgery (2,5). Although SSI prophylaxis has been accepted and very commonly considered since 20 years ago, but it is a fact that prevalence of SSI is even high. For example, in terms of extra-abdominal procedures, SSI reaches to 5% and more while it is over than 20% in intra-abdominal surgeries, additionally, reports showed the prevalence even up to 38% (1-3). This may increase risk of needing intensive care by 60%, recurrent admissions and mortality rate of five and two-fold, respectively (6). Conclusively, study reports showed that the lower the incidence of SSI, the lower the medical cost imposed, both for patients and country health system (2,3,6,7). Prescription of prophylactic antibiotics (PA) is one of common preventive methods for SSI (1,2,8-12). Although based on American Society of Health Protection (ASHP) instructions, protocols of using antibiotics have been recommended for SSI prophylaxis in different procedures, but there is no comprehensive consensus on how and which antibiotics should be whether use or not that prevent SSI incidence in borderline clean-contaminated procedures (8). This issue may be more controversial when some studies reported that the lower adequacy of using prophylactic antibiotics whether in type selection or first dose

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injection, could generate resistant species (1-3) and also increase risk of SSI by 2-fold in specific age groups (7) beside of making patients to stay more time in hospital, suffer from drug adverse effects and give more money (2,3). It is while based on ASHP guidelines prescription of therapeutic antibiotics in combination with prophylactic dosage is absolutely indicated for contaminated and dirty wounds (8). Therefore, applying PA based on personal or cultural knowledge is highly rejected (2) however it is a worldwide accepted method to prescribe antibiotics as SSI prophylaxis (1-3,7,8). As the lack of sufficient data in field of using PA in clean-contaminated ear, nose, throat (ENT) and ophthalmologic procedures has induced to not to have comprehensive instruction for the use of PA in these fields, this study aimed to show how ENT specialists and ophthalmologists apply antibiotics in their procedures in a university hospital in north of Gilan province, Iran.

METHOD AND MATERIALS

This descriptive sectional study was carried out during the year 2015, after approval by University Research Committee for Ethics Committee of our medical university (Code: IR.GUMS.REC.1394.442), All patients admitted to ENT and ophthalmologic wards and underwent any surgical procedures were eligible to enter study except for whom had documented active infectious diseases, immune insufficiency, and using antibiotics for other reasons. Eventually files of 1010 patients were evaluated for whom underwent ENT and ophthalmologic procedures including septorhinoplasty, phacoemulsification, adeno tonsillectomy, intra-vitreous injection, vitrectomy, ventilation tube insertion, lacrimal duct and corneal rupture repair and etc. Demographic data, type and duration of procedures with laboratory results of cultures and pathology of tissue samples were adopted from file of participants. In terms of PA prescription, we tried to answer "What kind of antibiotic was selected for patient?", "When the first dose was administered relative to the procedure?", "How was the route of administration, oral or intravenous?", "What was the dose of consumption?", "How was the interval between dosage?" and "How long antibiotic was continued post-operatively?" for every participants based on drug data registered in patients' medical file. Lastly adopted data was evaluated for groups of study –receiver and non-receiver for PA- in comparison with approved international ASHP guideline for each relative procedure –if available-and also national instruction for using PA ordered by Health Ministry of Iran. In terms of laboratory and pathologic reports, we considered culture positive if at least 10 (4) or more colonies for tissue samples or 10 (5) or more for discharge fluids were counted by pathologist. Tissue findings reports contained existence of adequate neutrophils for diagnosis of acute infection also considered positive.

DATA ANALYSIS

Descriptive data were reported. The Chi-square and Mann-Whitney U tests showed the difference between means of variables with level of significance considered as 95% ($P < 0.05$). Data analysis was performed using the software SPSS 21 (IBM SPSS Statistics software, version 21).

RESULTS

Data from 1010 patients' medical files during three months of the year 2015 was adopted. Of all 1010 patients, 402 (39.8%) were males and 608 (60.2%) were females, and 589 (58.3%) were in ENT ward and 421 (41.7%) in ophthalmology wards. Patients' age range was from one to 98 years old, with the highest numbers of participants in the age group of 20-39 years old (306 persons, 30.3%) followed by who were 60 or more (264 persons, 26.1%). Mean age of all participants was 41.8 with standard deviation of 22.3 years old, and there was a significant relation between age of patients and prescribing PA ($p < 0.001$). **Table 1** shows antibiotic usage related to demographic findings. Antibiotics with purpose of prophylaxis prescribed totally for 999 (98.9%) patients with distribution of 573 (97.2%) for ENT and 418 (99.3%) for ophthalmologic procedures, and just 8 (0.8%) cases received antibiotics for therapeutic purposes that all of these 8 cases underwent ENT procedures. We found no significant difference between the two wards in terms of prophylactic antibiotic prescription ($p = 0.257$). The most common antibiotic prescribed for ENT procedures was intravenous (IV) Cefazolin, while topical eye drop of Chloramphenicol 0.5% was used mostly in ophthalmologic. **Table 2** shows PA applied for patients, first dose dosage characteristics and the root of apply. Except from 11 (1.1%) patients whether took therapeutic (8 persons, 0.8%) regimen or didn't receive any dose of antibiotics (3 persons, 0.3%) whom experienced procedures related to glaucoma, fine needle biopsy under anesthesia, epidermoid cyst resection, bronchoscopy, ophthalmic sling, otic microsurgery and foreign body removal from nose, throat and ear, the rest entire underwent PA protocols ($p < 0.001$). Septorhinoplasty for 340 (57.7%) patients in ENT ward and phacoemulsification with 186 (44.2%) operations in eye

Table 1: Antibiotic Consumption in ENT and Ophthalmology Wards Related to Demographic Data in All Participants (n=1010)

		Prophylactic Antibiotic Consumption		p-value
		Yes- N (%)	No- N (%)	
History of chronic disease*	Yes	242 (100)	0 (0.0)	0.07
	No	757 (98.6)	11 (1.4)	
Prior drug use**	Yes	237 (100)	0 (0.0)	0.07
	No	762 (98.6)	11 (1.4)	

*including of diabetes mellitus, blood hypertension and lipid profile disorders

**including of any other medications except for antibiotics or cytotoxic agents

Table 2: Characteristics of Prophylactic Antibiotics Used in ENT and Ophthalmology Wards, Amirmomenin University Hospital, Guilan Province, North of Iran (N=999)

Antibiotic	First dosage characteristics			Total dosage characteristics			Administration		
	Time (relative to operation)	Amount (mg/Kg) or (mg/mL)*	Time-Drug Usage (%)		Dosage Intervals (hour)	Amount (mg)		Root	Field
			48-72 hours	>3-7 days		Min-Max	Mean±SD		
Cefazolin	Prior&Post.	20	99.4	0.6	1-12	200-1000	988.9±86.3	IV	E&O"
Cephalexin	Prior & Post.	25	0.0	100	6	500-500	500±0.0	PO	E&O
Ceftriaxone	Prior & Post.	20	75	25	12	400-1500	931.2±262.6	IV	E&O
Ceftazidime	Prior & Post.	50	75.1	24.9	6-12	900-1000	991.7±28.9	IV	E&O
Ampicillin	Prior	50	100	0.0	6-12	150-1500	708.9±300.4	IV&PO	E
Amoxicillin	Prior & Post.	25	0.0	100	8	150-500	288.3±83.0	PO	E&O
Metronidazole	Prior	15	100	0.0	8	500-500	500±0.0	IV&PO	E
Ciprofloxacin	Prior & Post.	10	2.8	97.2	12	500-1000	502.7±37.2	IV&PO	E&O
Vancomycin	Prior & Post.	15	100	0.0	12	1000-1000	1000±0.0	IV	E&O
Clindamycin	Prior & Post.	20	100	0.0	8	600-1000	666.7±163.3	IV&PO	E&O
Gentamicin	Prior	1.5	100	0.0	8	800-800	800±0.0	IV	E
Chloramphenicol	Post	30*(2drops)	1.4	98.6	4-8	60-120	91.8±13.5	Topical	O
Ceftazidime	Post	50*(2drops)	0.0	100	3-4	100-100	100±0.0	Topical	O
Ciprofloxacin	Prior & Post.	30*(2drops)	0.0	100	4	60-60	60±0.0	Topical	E&O
Vancomycin	Post	50*(2drops)	66.7	33.3	1-6	100-100	100±0.0	Topical	O

Table 3: Template Matching of Ordered Prophylactic Antibiotic in ENT and Ophthalmology Wards With ASHP and Iranian National Guidelines

Guidelines	Induction time			Type of antibiotic			Dosage amount			Dosage intervals			Duration of usage		
	ENT	Eye	Total	ENT	Eye	Total	ENT	Eye	Total	ENT	Eye	Total	ENT	Eye	Total
	Degree of accordance (%)														
ASHP	32.5	38.7	35.6	51.3	63.2	57.2	18.5	18.7	18.6	28.1	40.8	34.4	21.7	12.6	17.1
National	24.2	43.3	33.7	42.4	56.1	44.2	24.2	18.6	21.4	17.5	28.8	23.1	13.3	17.3	15.3
p-value	<0.05			<0.05			<0.05			<0.05			<0.05		

procedures were the commonest procedures that took antibiotics. As data showed pre-operative antibiotic use with prevalence of 98.8% in ENT procedures and postoperative injection with prevalence of 94% in eye ward were the most routine manners. **Table 2** summarized total dosage and intervals of antibiotics consumption data. Based on our findings, among commonest ordered antibiotics, intravenous (IV) cefazolin infusion maximally continued for 48-72 hours while topical ophthalmic Chloramphenicol 0.5% dropped up to 7 days, postoperatively. As data showed, ENT specialists prescribed IV antibiotics (53.4%) and oral antibiotics (PO) (46.2%), and majority of patients received post-operative oral antibiotics (mostly cephalexin 500 mg capsules 4 times a day) for 5 days (+2 days). On the other hand, ophthalmologists preferred topical agents (61.8%) extremely ($p < 0.05$). Of all patients experienced ENT related procedure in association with receiving antibiotics, 579 (99.6%) laboratory reports for culture of tissue or discharge samples were negative for bacterial colonization. We found same result for entire 418 (100%) patients in ophthalmic group ($p = 0.312$). Pathologic findings also showed no difference between two groups considering antibiotics usage ($p = 0.281$). As from 555 (95.5%) ENT related pathologic reports and 417 (99.8%) ophthalmic ones no signs of inflammatory changes due to acute infection were observed. Lastly, our findings revealed poor correlation between antibiotic usage in practice in comparison with ASHP guideline and those recommended as Iranian national instruction **Table 3**. Data manifested that poor accordance existed between practice usage of PA and written ASHP or national guidelines. Our findings showed complete matching in orders was as less as 7.2% and 6.4% in ENT and eye related procedures, respectively.

DISCUSSION

Current descriptive sectional study was conducted in 2015 to find status of using antibiotic in practice as prophylaxis and to compare with recommended national and international guidelines. Despite advices for applying PA pre-operatively to prevent SSI, the concern of generation of drug-resistant bacterial organisms due to inappropriate antibiotic use is great (1-9). In case of having optimal use of antibiotics hence studies conducted to achieve scientific acceptable guidelines. Unfortunately, this has not obtained in many fields by now. Apart from lack of data, to keep in mind and execute PA based on available guidelines by physicians is very important factor to control drug resistance, indeed. This study evaluated role of PA in 1010 procedures in field of ENT and ophthalmology. Of all participants, over 60% were females and no difference was declared between gender and PA applying. This is compatible with other similar studies (13-15). We found no reports that mentioned interaction between gender and decide to use PA. Most of study patients were younger than 40 years old and analysis showed significant apply of PA in this age group. This is not in lined with others' findings (2,7,16,17) that resembled more antibiotic use in elderly. The conflict may due to demographics difference of samples of studies. Although apply of PA was also highly prevalent in old group in current study but because of more number of youngsters, difference rate was shifted toward the latter. History of documented chronic disease and being under medication did not affect PA prescription, while we expected contrary. This stood in opposition with the other reports (18) and in lined with some else (2). Controversy in founded data may due to details that didn't investigate including of stage of disease, type of medication used, patient general health condition before operation and personal experience effect of physician to face with such cases. Totally over 98% and 99% of procedures underwent PA execution in ENT and ophthalmic wards, respectively. While in other studies reported prevalence of PA use was lesser than 82-90% (16-20). Ignoring field of surgery, PA findings in different countries varied widely. Considering results of other authors show that studies performed in Australia, Brazil, Netherland and United states before the year of 2005 had relatively acceptable accommodation with ASHP guideline, though there was no complete matching and achieving this goal is not easy (2,3,9,12). Data later to 2006 shows disappointing results with proportion rate of lower than 50% of truly use of PA (2-5). In national similar surveys PA prescription, apart from case of operation was compatible with guidelines from 25% to 76% (3,6). We found poor data about PA and ophthalmic procedures, as ASHP guideline also mentioned this issue (8) that there is lack of acceptable instruction. Anyhow, study showed poor accommodation between PA use in practice and available ASHP and national guideline in case of eye procedures. Matching quantity in induction time, type selection, dosage amount and intervals and also duration of usage of PA was significantly disappointing. Similar results were found in ENT procedures. Other descriptive reports mentioned that PA accommodation in the latter was only 33%, as it was as high as 75% in entire PA usage (3). The most common mistake in PA prescription in the world is to give antibiotic longer than needed (2-7). Our results implied on this fact again. As total compatibility with ASHP and national guideline were lower than 17% and 15% in ENT and ophthalmic procedures respectively. In term of selected antibiotic, however, finding was not acceptable, but for common procedures including of septorhinoplasty and phacoemulsification which were commonest in this study logical PA was selected by surgeons in comparison with documented references (8,21). Indeed, there is no indication to use PA for certain procedures. As evidences showed applying topical antisepticalone is efficient for prophylaxis and it is declared that preventing SSI is more in relation with patient factor and performing procedure than the effect of PA timing (7). Conclusively, misuse of PA not only helps patients but also leaves side effects, cost and threat of drug-resistant organisms for public health (1-7,22-24). Eventually, having consecutive overlook in practice to control ordered antibiotics is highly suggestive. The main limitation of this study is that was conducted in a limited period of time and also other type of procedures except from ENT and ophthalmic, were not included.

CONCLUSION

Based on findings ordered PA is not as need as prescribed, and generation of drug-resistant organisms is highly probable if current method of PA execution continues in practice.

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