

ASSESSMENT OF PROPHYLACTIC USE OF ANTIBIOTICS IN UROLOGICAL SURGERIES IN A TERTIARY HOSPITAL

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ABSTRACT

Aim: The present study is focused mainly to assess the existing drug therapies and procedures with appropriate amount and administrating time use of antibiotic prophylaxis to prevent urinary tract infection and bacteremia (sepsis) following endoscopic urologic procedures. **Objective:** Evidence in the literature revealed that urological instrumentation is associated with increased incidence of urinary tract infection and bacteremia. The objective of this research is to evaluate the effectiveness of antibiotic prophylaxis in reducing the risk of urinary tract infection in patients who had undergone urological surgeries. For common urological disorders, open surgery has largely been replaced by cystoscopy with access through the urinary tract and laparoscopic surgery. **Methodology:** A systematic protocol is conducted to compare the different drug therapies and timing of administration of antibiotic prophylaxis in patients undergoing urological surgery. We had use predefined inclusion and exclusion criteria, and also develop a specific quality scale to assess the quality of the research. **Result:** Antibiotic therapy should be used for patients who are going to undergo urological surgery due to a 60% risk of presenting with infectious complications such as bacteraemia and a 10% risk of sepsis. Some clinical trials have shown that antibiotic prophylaxis in patients decreases the risk of bacteraemia and sepsis in the postoperative period, but there is no general agreement on the treatment type or when to start antibiotic therapy. 28 of 49 (57.14%) patients undergoing laparoscopic radical prostatectomy received prophylaxis preoperative, 11 of 49 (22.44%) patients received prophylaxis postoperatively, and one received none for the same procedure. Studies should start prophylaxis between 1 to 7 days before the procedure, with determining the differences in the results for each intervention. Evidence in the literature revealed that urological instrumentation is associated with increased incidence of urinary tract infection and bacteremia. Potential sources of bacteria leading to infection include the prostatic adenoma, urethral flora, bladder colonization, or perioperative contamination.

KEYWORDS: Urological surgery, urological instrumentation, drug therapies, Antibiotic therapy, antibiotic prophylaxis.

INTRODUCTION

Antibiotic may be a substance, such as penicillin or streptomycin, delivered by or determined from certain organisms, microbes, and other living beings or manufactured atoms that can crush or repress the development of other microorganisms.^[1]

Prophylactic anti-microbial is organization of an anti-microbial earlier to/or within the nonappearance of defilement of already sterile tissues or liquids. The utilize of antimicrobials for dirty and sullied methods isn't considered prophylaxis. Hypothetical anti-microbial therapy is organization of an anti-microbial when there's a solid plausibility, however problematic disease.

Anti-microbial treatment is the organization of an anti-microbial when a set up contamination has been

recognized. A wound is characterized by the Centers for Illness Control as an interference or break within the progression of the outside surface of the body or the surface of an inner organ caused by surgical or other shapes of harm or injury.^[2]

A Surgical Location Contamination is clinically characterized as the nearness of torment at a surgically made wound, which is went with by erythema, induration and nearby delicacy or nearness of purulent release at the wound location.

Antibiotic prophylaxis is utilized to decrease the frequency of postoperative contaminations. Patients experiencing strategies related with tall contamination rates, those including implantation of prosthetic fabric, and those in which the results of disease are genuine

ought to get perioperative anti-microbials. Treatment, instead of prophylaxis, is shown for strategies related with self-evident preexisting contamination (i.e. canker, discharge, or necrotic tissue). Cephalosporins (such as cefazolin) are suitable to begin with line operators for most surgical strategies, focusing on the foremost likely living beings whereas dodging broad-spectrum antimicrobial treatment which will lead to the advancement of antimicrobial resistance. The length of prophylaxis ought to not surpass 24hours.^[3]

Aim

To evaluate prophylactic antibiotics practices in urological surgical patients at Prime Hospital, Hyderabad.

Specific Objectives

1. To determine demographic profile of patients undergoing elective surgery at Prime Hospital.
2. To document the proportion of patients undergoing urological surgery receiving prophylactic antibiotics.
3. To determine the commonly used prophylactic antibiotics for specific type of urological surgery at Prime Hospital.
4. To document the timing of prophylactic antibiotics in surgical patients at Prime Hospital.
5. To determine duration of prophylactic antibiotics post operatively among surgical patients at Prime Hospital.

METHODOLOGY

Department of General Surgery, Prime Hospital from November 2017 to June 2018. Department of general surgery is composed of urology unit, paediatric surgery unit, plastic surgery and burn unit and cardiovascular surgery unit. Prime Hospital is a private teaching hospital and a state referral centre for Hyderabad with a bed capacity of 1,500 out of which 120 beds are dedicated to adult general surgery services and it is positioned to serve patients from different parts of the country and is, in effect, the apex of the private health service hierarchy in Hyderabad. Hyderabad is a is the capital of the southern Indian state of Telangana and de jure capital of Andhra Pradesh. with approximately 6.7 million and a metropolitan population of about 7.75 million, making it the fourth most populous city and sixth most populous urban agglomeration in India.

Study design

This was a prospective cross section hospital based study conducted for 8 months from November 2017 to June 2018.

Study population

The study included all patients in urological surgical ward who underwent elective surgical procedures in the operating theatre during the study period.

Sample size

Sample size was convenient sampling in which all patients who had elective operation and met inclusions criteria was included. A total elective operation done were 150 were included in the study.

Inclusions and Exclusions criteria

Inclusion criteria

All elective surgeries done in operating theatre Exclusion criteria.

Emergency surgeries

Patients who did not undergo surgical procedure in operating theatre.

Sampling Technique

Convenient enrolment technique was employed in which all patients in surgical department who underwent elective operation in Prime Hospital from November 2017 to June 2018 were enrolled.

Study procedure

Prior to data collection the hospital administration visited to explain the purpose of the study. The principal investigator made a pre-test of the questionnaire and were responsible for data collection. Audit of elective surgeries was done by collecting information on timing of administering first dose of prophylactic antibiotic, length of operation, types of surgery, choice of antibiotic used, timing of stopping prophylactic antibiotics from case notes and observation. A Structured questionnaire was used to collect information.

Monitoring

Research information was gathered everyday and followed, and the resources, quality/quantity of activities reviewed frequently. This helped to identify gaps and problems which could be solved early and avoid affecting the research.

Data processing and analysis

Data recorded on the data collecting tool was processed and checked for completeness and consistency using SPSS version 16 program followed by data cleaning and coding then data analysis using frequency tables and cross tabulation with respective statistical tests. After analysis of the data followed by interpretation, report was written and presented.

Limitation of the study

The study was done at single institution. The study does not involve other surgical departments such as ENT, obstetrics and gynaecology and others.

During the study period 150 elective operation were done and all these operations were audited on practices of prophylactic antibiotics use.

RESULTS

150 surgeries conducted during a six-month period were evaluated by reviewing medical, anaesthetic and nursing records, and medication charts for each patient. The antibiotic choice, duration of prophylaxis, dose and timing of the first dose was recorded on special schemes. The majority of the patients were males (85 %) and the mean length of hospital stay was 8.16 [1: 21] days. Most of the surgeries were elective. Patients, who were under treatment with antibiotics before the surgery, accounted for 8.6 % (13) of the total procedures, and they were excluded from prophylaxis analysis. If no antibiotic prescriptions had been recorded, it was assumed that antibiotics were not given. If data on a certain parameter of the antibiotic prescription were lacking, this was classified as missing data on this parameter only. The operations were categorized as:

Group A is open operations: Urinary tract including bowel segments, urinary tract without bowel segments, operations outside the urinary tract e.g. implants for penis and sphincter, testicular prosthesis, reconstructive genital operations.

Group B is endoscopic- instrumental operations: Urethra, prostate, bladder, ureter and kidney, percutaneous litholapaxy, ESWL, laparoscopic operations.

Group C is urethroscopy, and

Group D the testicular operations.

Table 1 shows the timing of the antibiotic prophylaxis given in the different groups. Preoperative is defined as before time of incision (within 24 hours); perioperative is defined between time of incision and the end of the operation. Postoperative is defined as the time after the operation is finished.

In group A, 18 (27%) procedures were given preoperative antibiotic prophylaxis and 5 (7.5%) were given prophylaxis after the time of the first incision.

In group B, 14 (21 %) procedures were given preoperative antibiotic prophylaxis and 11 (16.5%) were given prophylaxis after the time of the first incision.

In group C no prophylaxis was given.

In group D, there is usually no indication for giving prophylaxis, but in the 3 (2 %) cases where prophylaxis was given, the indication for giving prophylaxis was because of prosthesis, scrotal haematoma and traumatic capsule rupture.

In 18 (12 %) cases, timing could not be evaluated, either because the moment of the first incision, or the moment of the administration of the first antimicrobial dose, could not be retrieved from the records.

Table 1: Timing of the antibiotic prophylaxis.

Timing of the prophylaxis	A	B	C	D	Total
Preoperative	18	14		1	33
Perioperative	15	2			17
Postoperative	5	11		2	18
Not given	18	16	1	18	53
No data	1	5	3	3	12
Excluded	12	1	2	2	17
Total	69	49	6	26	150

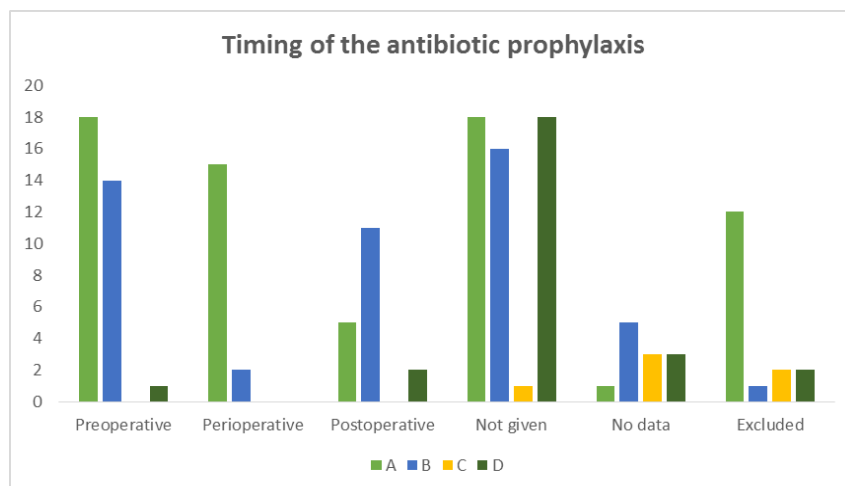


Figure 1: Timing of the antibiotic prophylaxis.

Table 2 shows the duration of the antibiotic prophylaxis in the days after the surgery. In group A, the mean duration of antibiotic prophylaxis after the operation was 11.5 days with a range of 1 days and 10 days. The same mean duration for group B and D, was respectively 8.16 days < 1, 14 > and 5.2 days < 1, 6 >.

Table 2: Mean duration of antibiotic prophylaxis after the operation.

	A	B	D
Mean duration (in days)	11.5	8.16	5.2
Range	(1,10)	(1,14)	(1,6)

Table 3 shows the drug and the first dose given for prophylaxis in the 6 different groups. Antibiotic prophylaxis is used in all surgeries with the use of bowel segments and in 96% of laparoscopic radical prostatectomy surgeries. Group IV and V; contain many different types of surgeries and that may to some extent explain the wide amount of variation in the different types of antibiotics chosen for the prophylaxis. In two of

the procedures, antibiotic prophylaxis with *Ampicillin* and *Gentamicin* against endocarditis was used. *Metronidazol*, *Gentamicin*, *Ampicillin*, and *Trimethoprim* were the drugs most frequently used in combination with other antibiotics. The most common drug used was *Trimethoprim*. As one can see from the table, there are for example 7 different regimens for prophylaxis just for group II, excluding the endocarditis regiment and the doses varies. In conclusion, use of antibiotics follows the patterns of recommendations, but there are still differences in the dosage and choice of drugs.

The different groups are as follows:

- **Group I:** Surgery with the use of bowel segments,
- **Group II:** Laparoscopic radical prostatectomy,
- **Group III:** Testicular operation,
- **Group IV:** Open surgeries,
- **Group V:** Endourological,
- **Group VI:** Urethra surgery and Genital reconstruction.

Table 3: Drug and the first dose given for prophylaxis in the 6 different groups.

Indications	I	II	III	IV	V	VI
<i>Drug (first dose given):</i>						
Yes	10	50	4	13	11	6
No		1	19	21	15	6
Unknown		1				
Metronidazol + Doxycyclin						
1000 mg x 2 + 200 mg x 1	1					
1000 mg x 1 + 200 mg x 1	6			1		
1500 mg x 1 + 200 mg x 1	1					
1500 mg x 1 + 400 mg x 1	2					
Trimethoprim						
160 mg x 1		40		1		1
160 mg x 2		4			1	3
300 mg x 1						
Ofloxacin						
200 mg x 1		1				
300 mg x 1		1	1		1	
Trimethoprim + Ofloxacin						
160 mg x 1 + 300 mg x 1		1				
Metronidazol + Cefuroxim						
1000 mg x 1 + 1500 mg x 1		1				
1500 mg x 1 + 1500 mg x 1				1		
Ampicillin						
1000 mg x 1						1
1000 mg x 4					1	
2000 mg x 2		1				
2000 mg x 3				1		
Trimethoprim + Ampicillin + Gentamicin						
160 mg x 1 + 2000 mg x 2 + 320 mg x 1		1				
Trimethoprim + sulfamethoxazole – Trimethoprim						
160 mg x 2 + 2 tablets x 2						1
Ciprofloxacin						
250 x 1				1		
250 mg x 2			1			

400 mg x 1				1	1	1
400 mg x 4				1		
Cefalotin						
2000 mg x 1			1			
Erythromycin						
500 mg x 2			1			
Mecillinam						
400 mg x 1					2	
Gentamicin						
320 mg x 1				1	2	
Cefuroxim						
1500 mg x 1					1	
Gentamicin + Mecillinam						
440 mg x 1 + 200 mg x 3					1	
Cefalexin						
1000 mg x 2				1		
Ciprofloxacin + Cefuroxim						
500 mg x 2 + 1500 mg x 1				1		
Ampicillin + Gentamicin						
2000 mg x 1 + 300 mg x 1				1		
Ciprofloxacin + Metronidazol						
400 mg x 1 + 1500 mg x 1				1		
Ampicillin + Metronidazol						
2000 mg x 1 + 1500 mg x 1				1		

Table 4: Social demographic distribution of study population.

Gender		N=150	Percent
	Male	97	64.8%
Female	53	35.2%	
Education	No education	13	8.9%
	Primary	103	68.8%
	O level	21	14%
	High level	7	4.6%
	Higher education	6	3.7%
Age	<20	36	22.9%
	20-39	37	24.4%
	40-59	38	25.5%
	≥60	41	27.7%
Antibiotic status	Yes	68	45.33%
	Not Known	65	43.34%
	No	17	11.34%

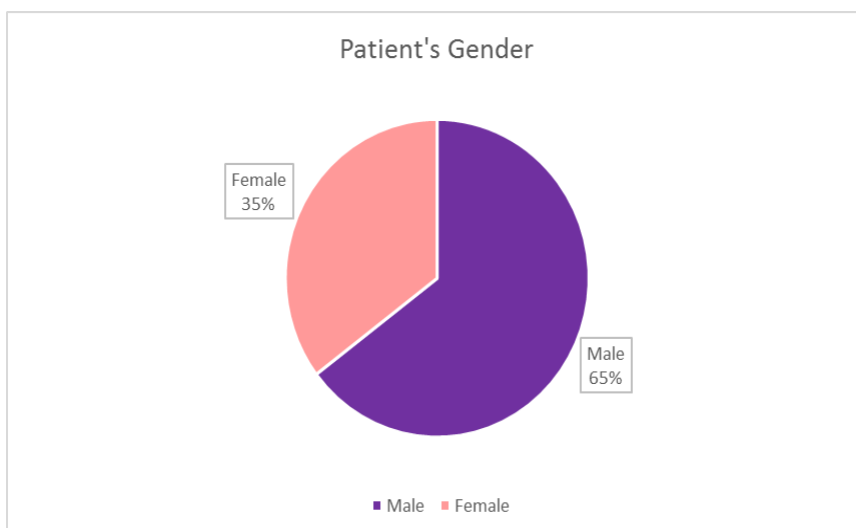


Figure 2: Gender.

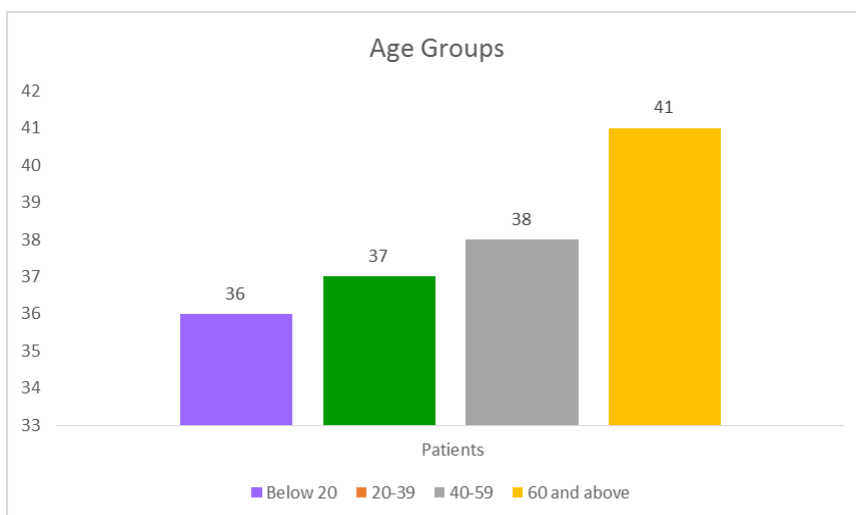


Figure 3: Age.

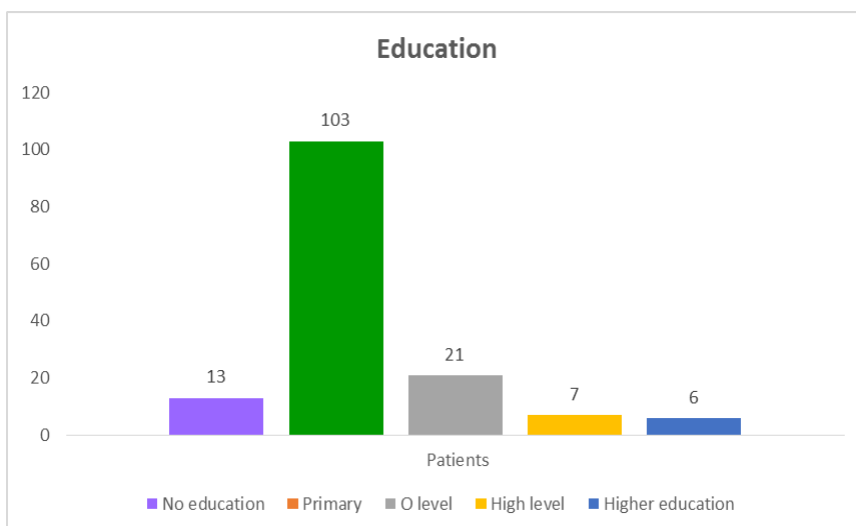


Figure 4: Education.

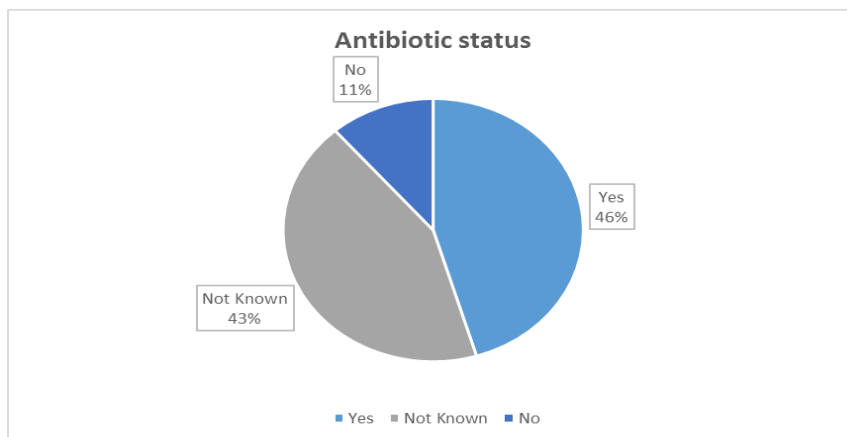


Figure 5: Antibiotic status.

The majority of the respondents had primary education (68.8%) with higher education being the least (3.7%). Among elective operation done there were 97(64.8) for male patients and 53(35.2%) for female patients. Proportionally more patients were sixty years old and

above at 27.7%. Among elective surgery done at 45.33% received prophylactic antibiotics and 43.34% patient's data is not confirmed for preoperative prophylactic antibiotics administration and 11.34% are confirmed for not administrating preoperative prophylactic antibiotics.

Table 5: Administration of prophylactic antibiotic vs wound class.

Types of wounds	Eligibility for antibiotics prophylaxis		
	Yes (%)	No (%)	Total (%)
Clean	39(72.1%)	15 (27.9%)	54(100%)
Clean contaminated	35(88.4%)	5(11.6%)	40(100%)
Contaminated	24(83.3%)	6(16.7%)	30(100%)
Dirty	7(25%)	19(75%)	26(100%)
Total	105(70%)	45(30%)	150(100%)

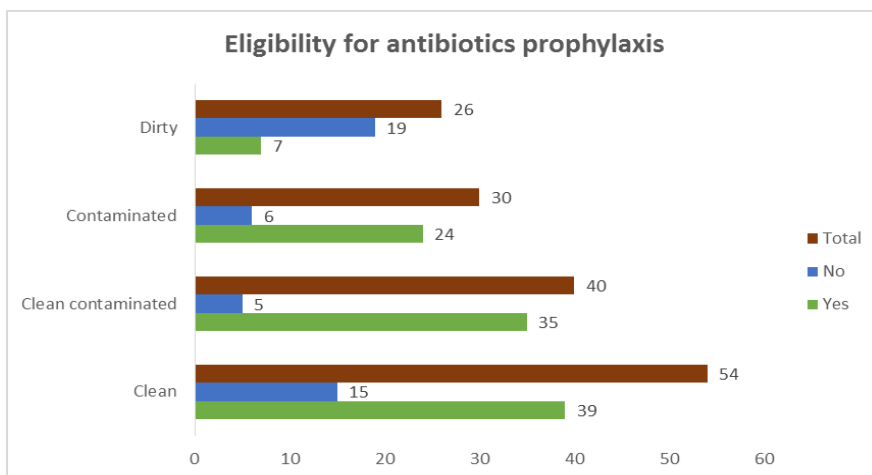


Figure 6: Eligibility for antibiotics prophylaxis.

Eighty-eight point four percent (88.4%) of clean contaminated wound received prophylactic antibiotics. However, 72.1% of clean wounds, 25% of dirty and

83.3% of Contaminated wound 30% of the total were not eligible to receive prophylactic antibiotic and 70% of the total were eligible and received prophylactic antibiotics.

Table 6: Prophylactic antibiotic vs incision.

Incision	Prophylactic Antibiotic		
	Yes (%)	No (%)	Total (%)
Yes	107(89.4%)	14(10.6%)	121 (100%)
No	18(64%)	11(36%)	29 (100%)
Total	125(84%)	25(15%)	150 (100%)

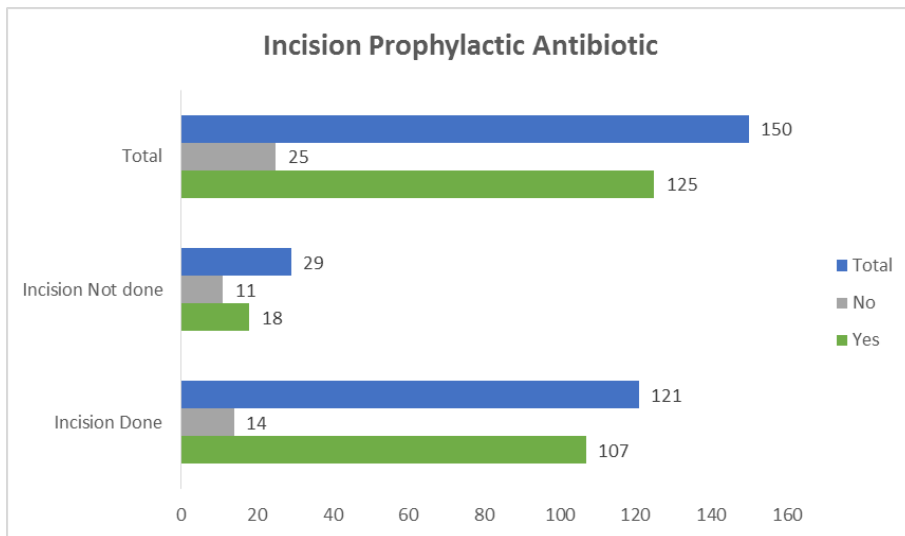


Figure 7: Incision Prophylactic Antibiotic.

Prophylactic antibiotic was administered to 89.4% of elective surgeries in which there were external incision and 64% in surgeries in which there were no external incision.

Table 7: Distribution of timing of prophylactic antibiotic given to the study population.

Timing of prophylactic antibiotic		Total	%
	Intraoperatively	33	22%
	1 hour before operation	17	57.3%
	Post operatively	18	34.1%
Timing of stopping prophylactic antibiotics post-surgery	<24hours	1	0.9%
	24-48hours	2	1.9%
	48-120hours	6	10.8%
	≥120Hours	56	86.4%
Frequency of prophylactic antibiotic administration intraoperatively	Once	17	100%
	Twice	0	0
	Thrice or more	0	0

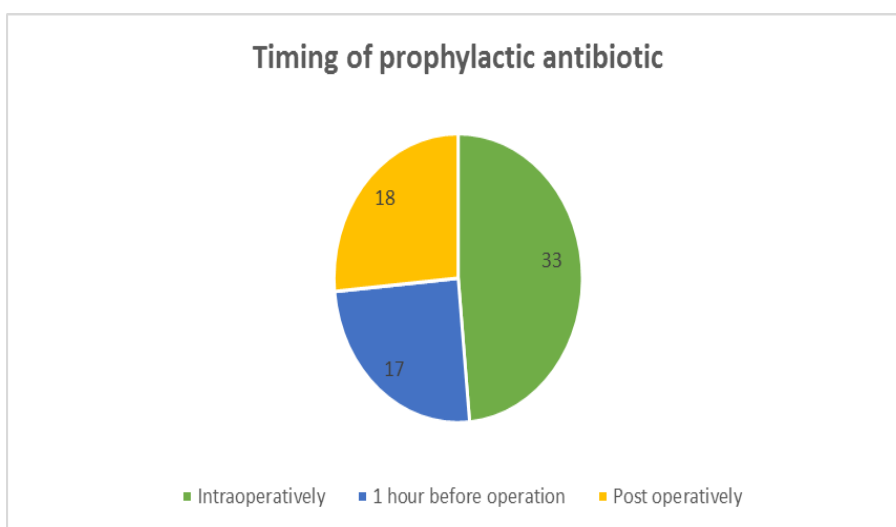


Figure 8: Distribution of timing of prophylactic antibiotic given to the study population.

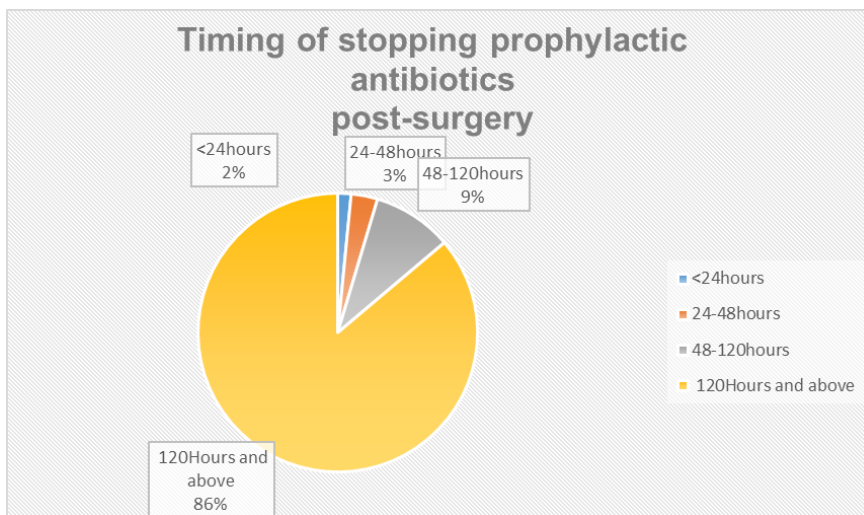


Figure 9: Timing of stopping prophylactic antibiotics post-surgery.

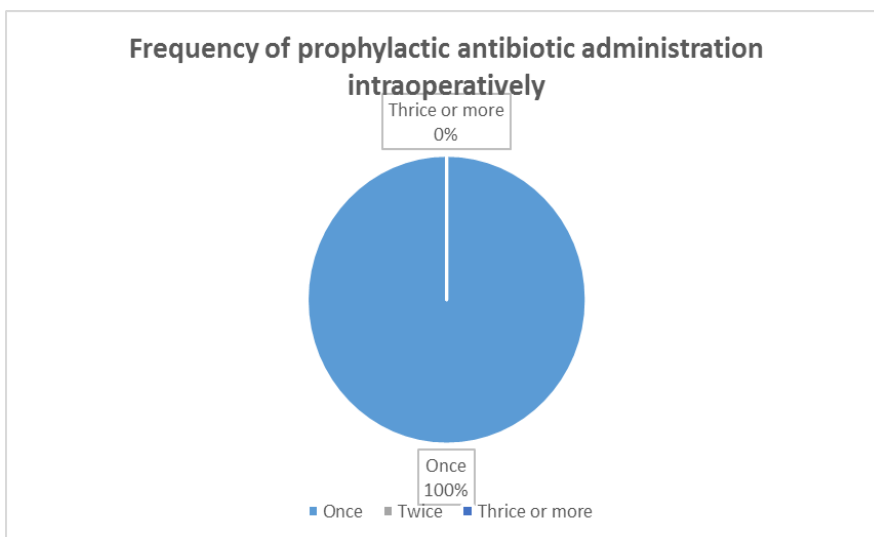


Figure 10: Frequency of prophylactic antibiotic administration intraoperatively.

The majority (57.3%) received prophylactic antibiotic one hour before surgery, followed by 34.1% who received prophylactic antibiotic post-surgery and few (8.3%) received prophylactic antibiotics intraoperatively. The majority 56(86.4%) stopped prophylactic antibiotics

more than five days post operatively while a few (0.9%) stopped prophylactic antibiotics within twenty four hours post-surgery. No additional prophylactic antibiotics was given intraoperatively.

Table 8: Administration of prophylactic antibiotic according to type of surgery.

Surgery type	Prophylactic antibiotic					
	Yes	%	No	%	Total	%
Open prostatictomy	7	87.5%	1	12.5%	8	5.3%
Urethroplasty	6	94.2%	1	5.8%	7	4.6%
Cystectomy	3	85.2%	1	14.8%	4	2.6%
Nephrectomy	2	58.8%	1	41.2%	3	2%
Herniorrhaphy	7	85.9%	2	14.1%	9	6%
Wide local excision	4	72.3%	2	27.7%	6	4%
Amputation	8	78.9%	2	21.1%	10	6.6%
DVU+Cystoscopy	19	80.8%	4	19.2%	22	14.8%
Turp	3	71.9%	1	28.1%	4	2.7%
Skin Grafting	14	87.9%	2	12.1%	16	10.7%
Laparotomy	14	92.3%	1	7.7%	15	10%
Laparoscopic	6	84.6%	1	15.4%	7	4.8%

Surgery Others	13	90%	2	10%	15	10%
Thyroidectomy	7	94.8%	1	5.2%	8	5.4%
BSO	5	71.2%	2	28.8%	7	4.6%
Mastectomy	4	85.4%	1	14.6%	5	3.3%
Contracture Release	2	50%	2	50%	4	2.6%
TOTAL	124	84.5%	26	15.5%	150	100%

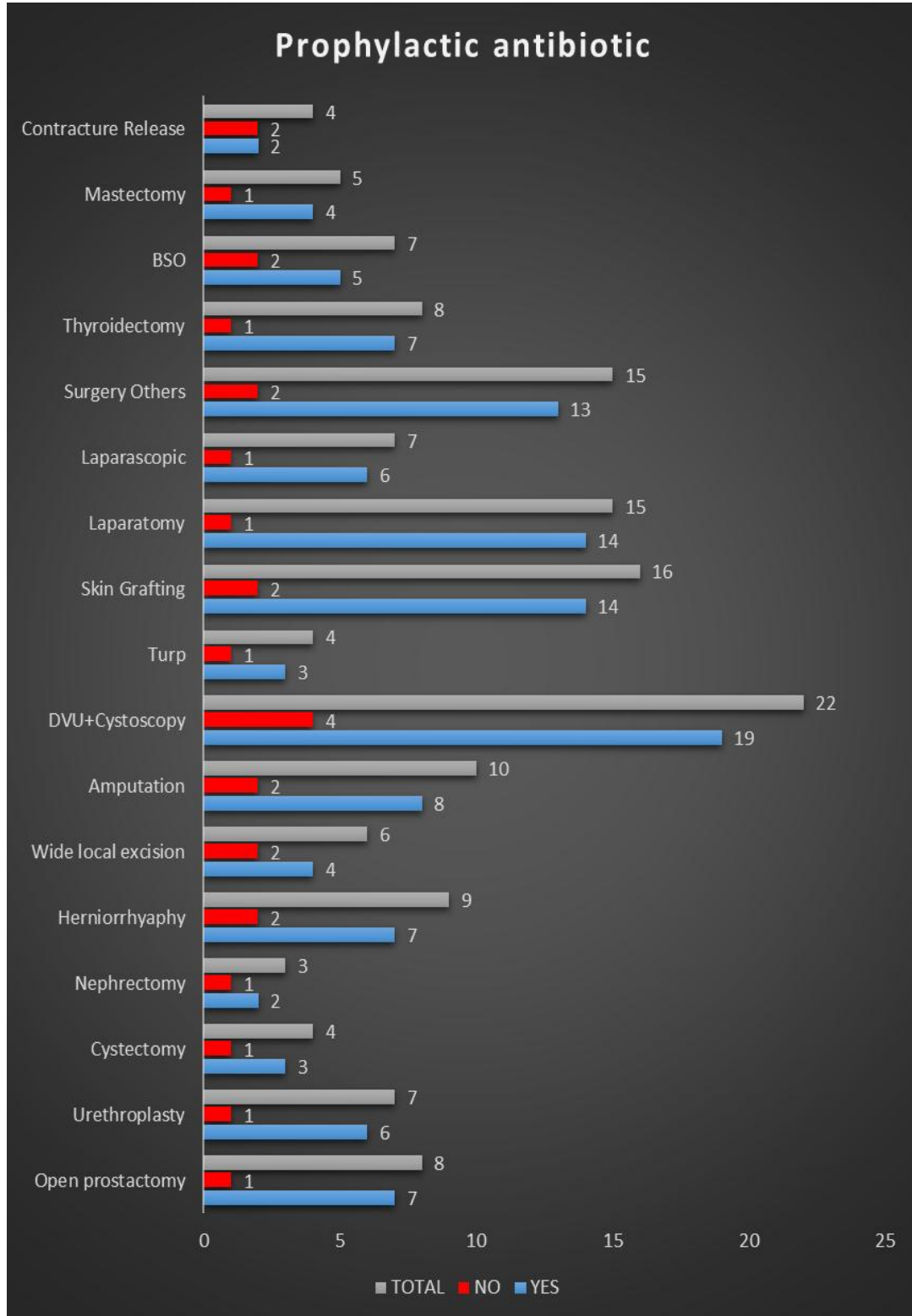


Figure 11: Administration of prophylactic antibiotic according to type of surgery.

The majority of patients who underwent herniorrhaphy, DVU and cystoscopy, thyroidectomy and mastectomy which are clean procedures received prophylactic

antibiotics (85.9%), (80.8%), (94.8%) and (85.4) respectively.

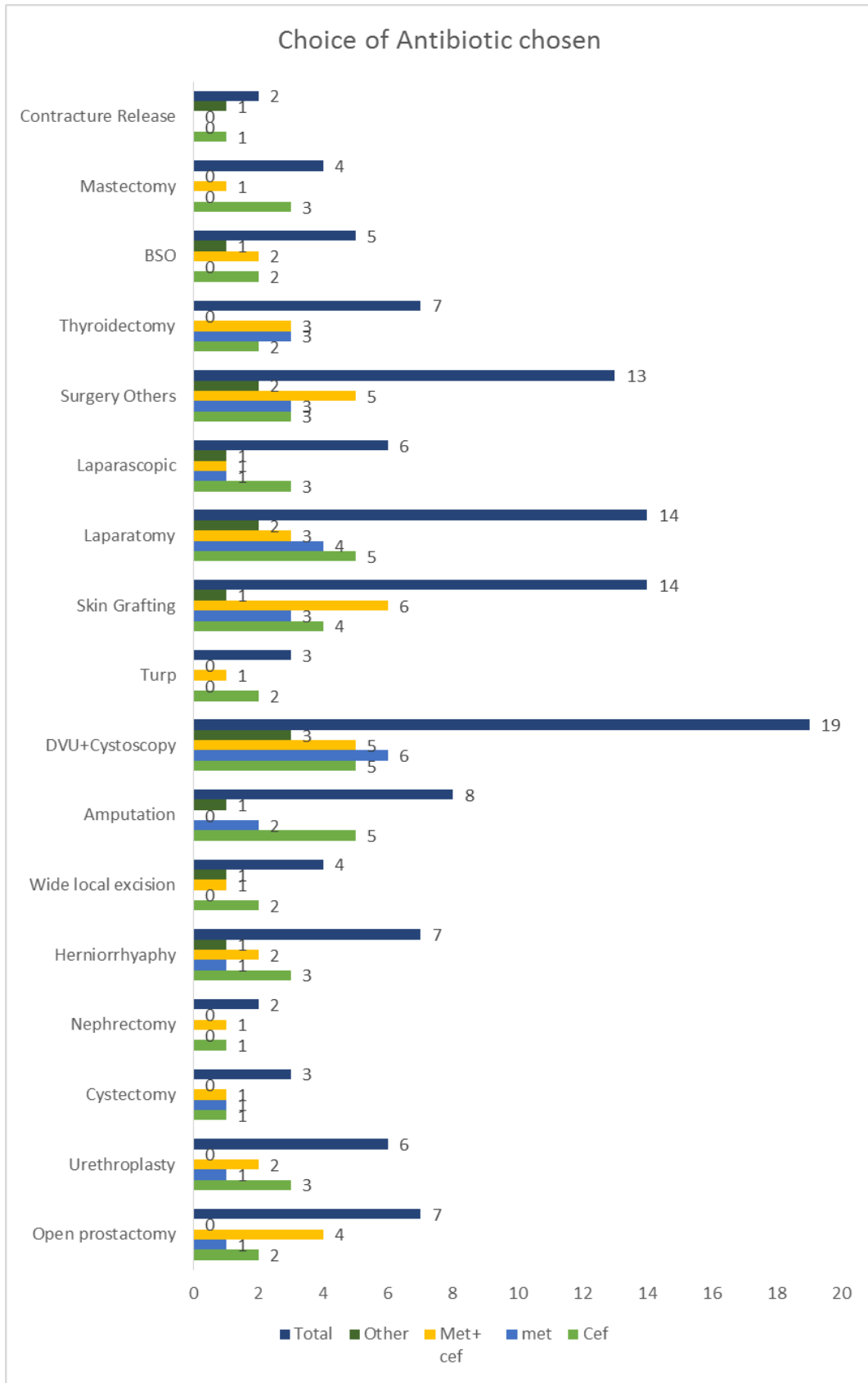


Figure 12: Choice of Antibiotic chosen.

Table 9: Choice of Antibiotic chosen.

Surgery type	Choice of Antibiotic chosen									
	Cef	%	met	%	Met+ cef	%	Other	%	Total	%
Open prostatictomy	2	28.5%	1	14.2%	4	57.1%	0	0%	7	5.6%
Urethroplasty	3	50%	1	16.6%	2	33.3%	0	0%	6	4.8%
Cystectomy	1	33.3%	1	33.3%	1	33.3%	0	0%	3	2.4%
Nephrectomy	1	50%	0	0%	1	50%	0	0%	2	1.6%
Herniorrhaphy	3	42.8%	1	14.2%	2	0%	1	14.2%	7	5.6%
Wide local excision	2	50%	0	0%	1	25%	1	25%	4	3.2%
Amputation	5	62.5%	2	25%	0	0%	1	12.5%	8	6.4%
DVU+Cystoscopy	5	26.3%	6	31.5%	5	26.3%	3	15.7%	19	15.3%
Turp	2	66.6%	0	0%	1	33.3%	0	0%	3	2.4%
Skin Grafting	4	28.5%	3	21.4%	6	42.8%	1	7.1%	14	11.2%
Laparotomy	5	35.7%	4	28.5%	3	21.4%	2	14.2%	14	11.2%
Laparoscopic	3	50%	1	16.6%	1	16.6%	1	16.6%	6	4.8%
Surgery Others	3	23.07%	3	23.07%	5	38.4%	2	15.3%	13	10.4%
Thyroidectomy	2	28.5%	3	42.8%	3	42.8%	0	0%	7	5.6%
BSO	2	40%	0	0%	2	40%	1	20%	5	4.03%
Mastectomy	3	75%	0	0%	1	25%	0	0%	4	3.2%
Contracture Release	1	50%	0	0%	0	0%	1	50%	2	1.6%
TOTAL	46	37.09%	26	20.9%	38	30.6%	14	11.2%	124	100%

Majority of patients who underwent thyroidectomy (42.8%) received both metronidazole and ceftriaxone while ceftriaxone alone could enough. Patients who undergo cystectomy almost all categories (33.3%) received but this surgery need both ceftriaxone and metronidazole as prophylactic antibiotic. Overall combination of ceftriaxone and metronidazole were the mostly used prophylactic antibiotic (30.6%) followed by ceftriaxone alone (37.09%).

CONCLUSION

This study has indicated that some prophylactic antibiotics practices at Prime Hospital is mostly appropriate. Elective clean surgeries received prophylactic antibiotics. Some clean contaminated surgeries did not receive prophylactic antibiotics. Contaminated and dirty elective surgeries received prophylactic antibiotics while it was to be given as treatment. Prophylactic antibiotic has been given post-surgery in some of the surgeries. There was no additional prophylactic antibiotic for the elective surgeries lasting more than 3hours intraoperatively. Prophylactic antibiotic has been prolonged post surgeries given in more than five days in the majority of elective surgeries. Combination of ceftriaxone and metronidazole was the most used prophylactic antibiotic followed by ceftriaxone alone.

28 of 49 (57.14%) patients undergoing laparoscopic radical prostatectomy received prophylaxis preoperative, 11 of 49 (22.44%) patients received prophylaxis postoperatively, and one received none for the same procedure. There was a lack of a clear indication in the timing of the first dose; this may possibly be related to logistics in the surgical group, the arrival time at the operating rooms, the type of anaesthesia used, or most

importantly lack of guidelines. Antibiotic prophylaxis should not be continued for over 24 hours.

Recommendations Prime Hospital should establish prophylactic antibiotics guideline which should be open and accessible by every member of the surgical team. Medical checklist should be practiced effectively Frequent audit of prophylactic antibiotic use is needed to improve proper practices (prophylactic antibiotics uses). Surgeons should adhere to prophylactic antibiotics guidelines.

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