

Prophylactic antibiotic usage in the prevention of surgical site infections in Princess Marina Hospital, Botswana

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Background

Surgical site infection(SSI)

- Infections related to the operative procedure that occurs at or near the surgical incision within 30 days of the procedure or within 90 days if prosthetic material is implanted at surgery

Increases morbidity and mortality

Increases hospital stay and cost

Background

SSI Rates:

- 3- 5% in developed countries
- 41% in developing countries

Depends on :

- population studied
- type of surgery
- size of hospital
- experience of the surgeon
- surveillance method

Risk factors for development of SSI

- Pre-existing infection
- Pre-morbid conditions
- Extremes of age
- Degree of tissue trauma
- Presence of a prosthesis or other foreign body
- Surgical technique
- Prolonged duration of surgery
- Hospital and operating room environments
- Perioperative thermoregulation, glycaemic control etc.

Antibiotic prophylaxis

- Reduces the burden of microorganisms at the surgical site
- To be given within 1-2 hours before incision

Indication

- high risk of infection
- high risk of worse outcomes (immune compromised, cardiac surgery, and/or implantation of a foreign device)

Antibiotic prophylaxis

Selection of antibiotic surgical prophylaxis based on:

- Risk of wound infection according to wound classification
- Normal floral distribution of the site to be operated
- Antibiotic resistance pattern

Wound classification

- **Clean:** uninfected, no inflammation; closed primarily, non- viscus
- **Clean-contaminated:** viscus surgery without unusual contamination
- **Contaminated:** open, fresh accidental wounds, operations with major breaks in sterile technique, or gross spillage from a viscus
- **Dirty:** old traumatic with retained devitalized tissue, foreign bodies, faecal contamination, existing clinical infection or perforated viscus.

Microbiology

- Clean procedures:
 - skin flora (*Streptococcal* species, *Staphylococcus aureus*, and *coagulase-negative Staphylococci*)
- Clean-contaminated procedures:
 - gram-negative rods, enterococci and skin flora
- Viscus Surgery:
 - polymicrobial

Antibiotic prophylaxis

- Antibiotic prophylaxis: justified for most clean-contaminated wounds
- Dirty procedures or established infection are treated for presumed infection, not prophylaxis
- Broad-spectrum antibiotics preferred to narrow spectrum
 - Cephalosporins (Cefazolin)

Botswana National Guideline recommendations

- Cefradine - cardiothoracic, vascular, neurosurgery, gastrointestinal, breast, orthopaedic and gynaecological surgeries
- Combination of ampicillin, gentamicin and metronidazole - high risk biliary surgery
- Combination of gentamicin and ciprofloxacin -urological surgeries

Dose:

- Cefradine 1-2 g IV
- Cefotaxime- 2g IV
- Metronidazole -500 mg IV

Objectives

1. Describe antibiotic surgical prophylactic use at PMH
2. Describe burden of SSI at PMH

Methods

- A prospective study: Feb 2014- June 2015
- Sample: 400 patients at Princess Marina Hospital, Botswana
- Data: demography, type of surgery, peri-operative antibiotics
- Follow-up: one month
- Outcome: development of SSI.
- Microscopy culture and sensitivity tests for suspected SSI.

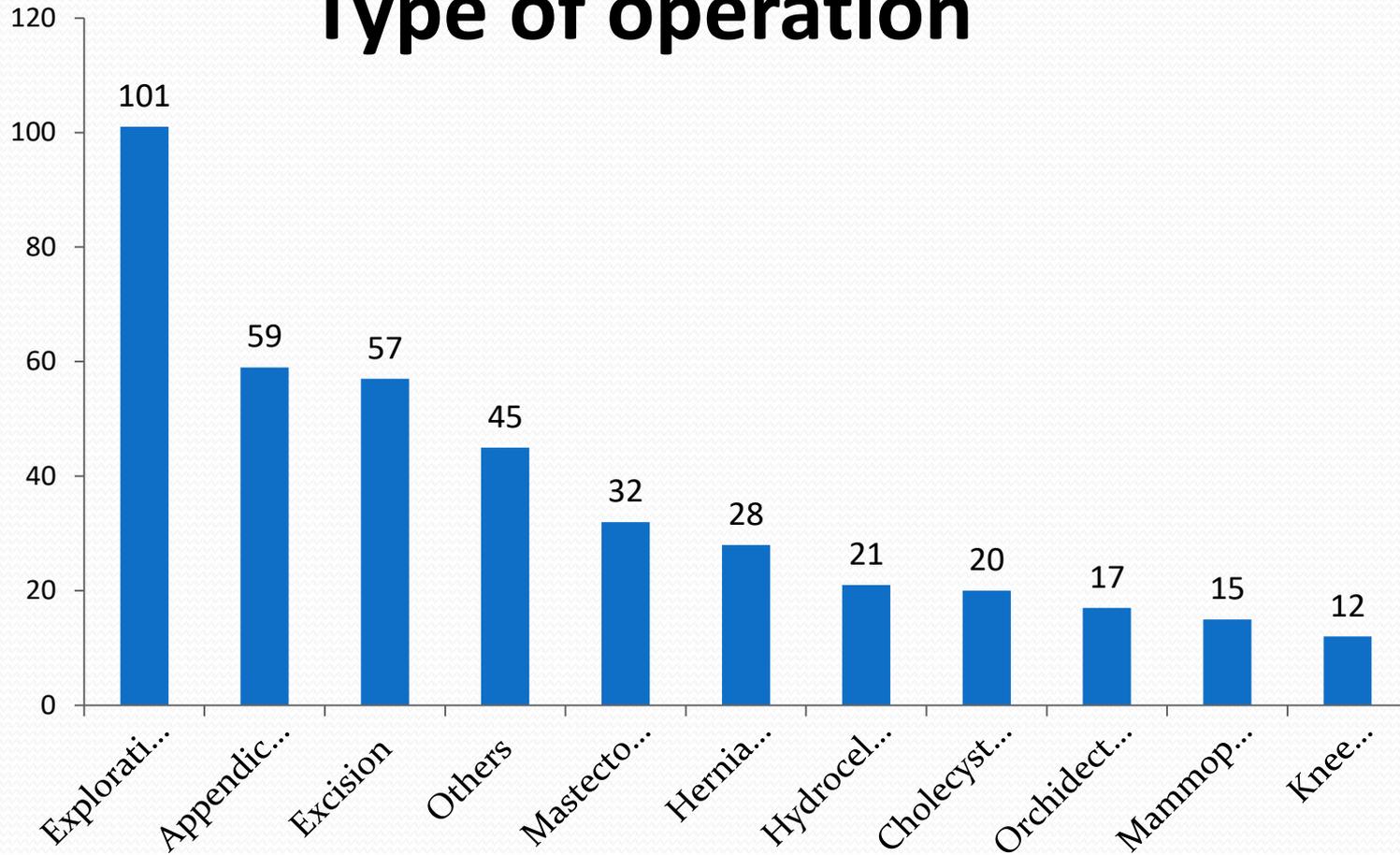
SSI diagnosis

- Presence of one or more of the following
 1. Purulent exudate from a surgical site
 2. Positive fluid culture - from a surgical site that was closed primarily
 3. Reopened surgical site due to at least one clinical sign of infection (pain, swelling, erythema, warmth)- culture positive or not cultured
 4. Surgeon's diagnosis of infection

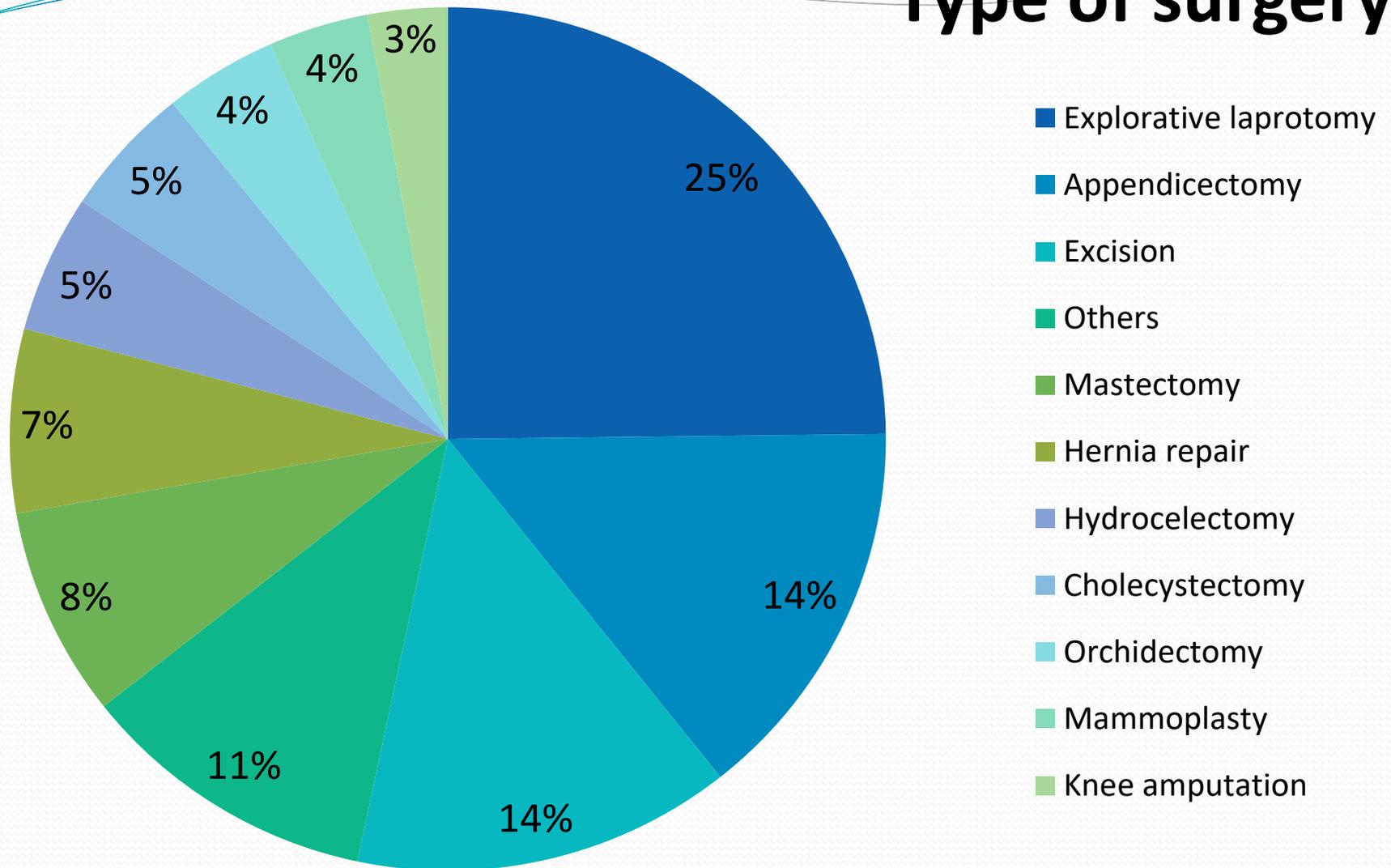
Results

- Median age: 35.5 years (IQR 25-50) with 208 (52%) females.
- 140 (35%) emergency and 260 (65 %) elective surgeries .
- Most common operations were
 - Explorative laparotomy (25%),
 - Appendectomy (14%)
 - Mastectomy (8%)
 - Hernia repair (6.25%),
 - Hydrocoelectomy (5.25%)
 - Cholecystectomy (4.5%).

Type of operation

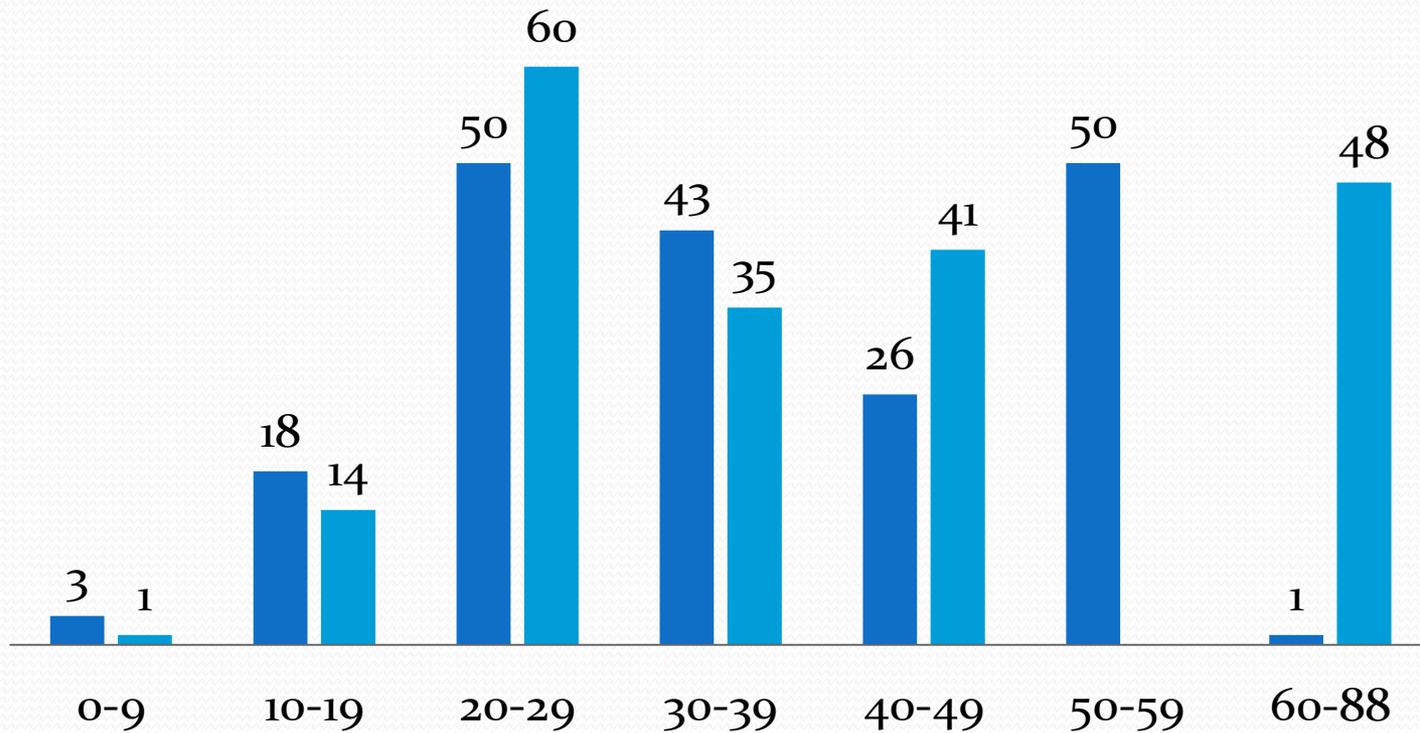


Type of surgery

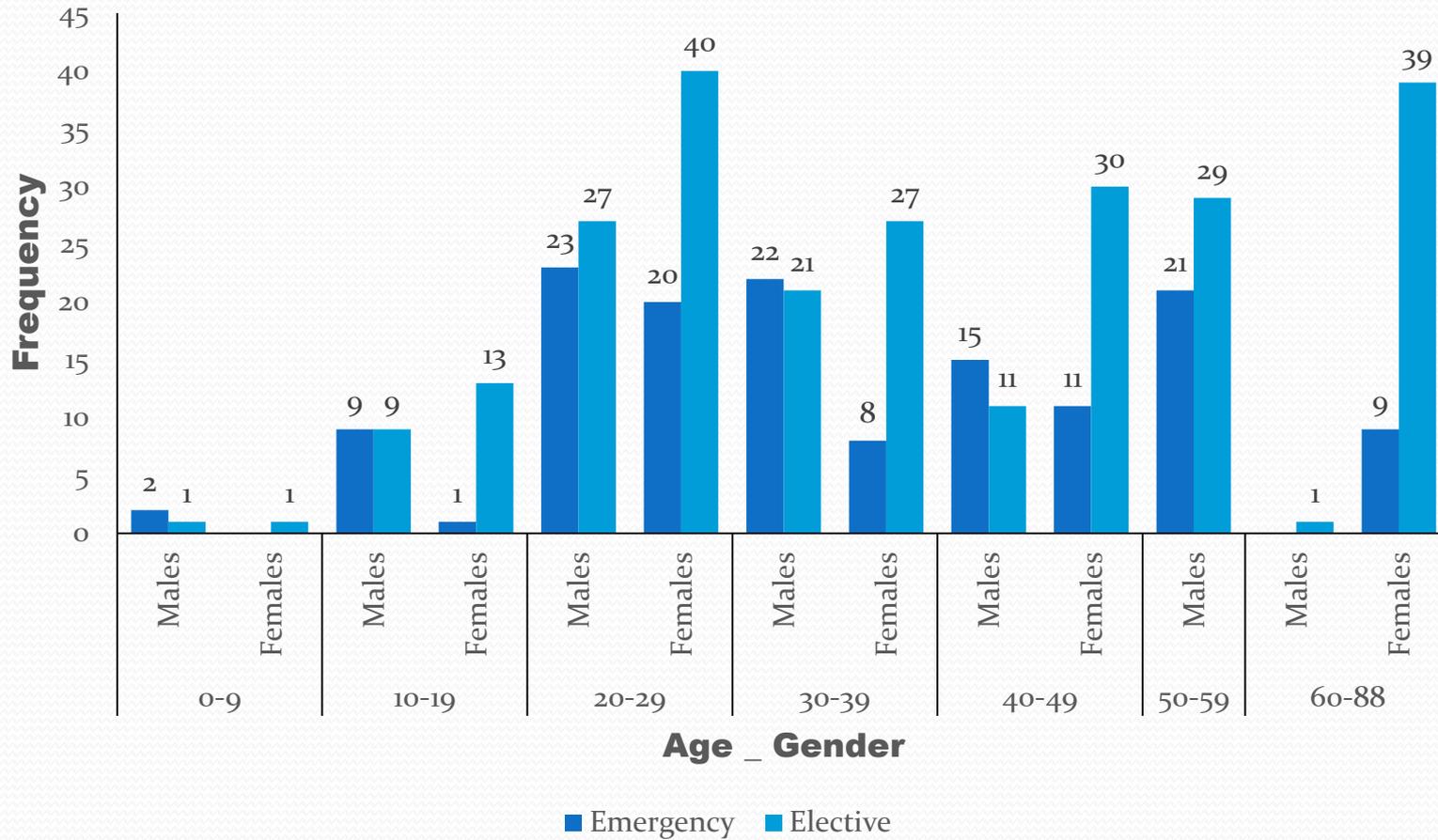


Age vs gender

■ Males ■ Females



Type of surgery by age and gender



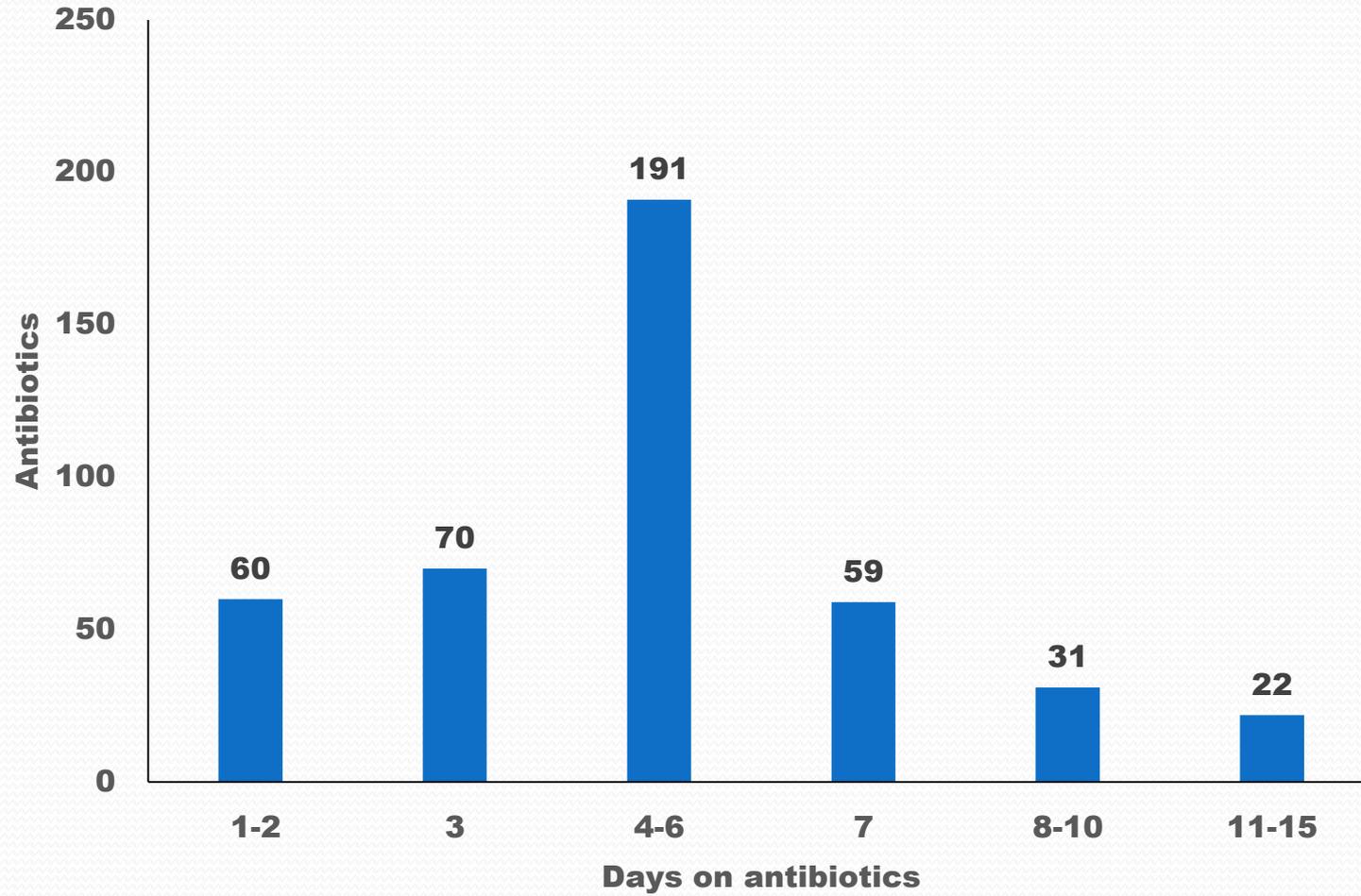
Results

- **Antibiotics:**
 - **Preoperative prophylaxis:** in 60 (15.4%) patients.
 - Cefotaxime (54%), cefradine (34%), metronidazole (32%)
 - 43 (71.7%) patients who started on antibiotics pre operatively continued using them post operatively.

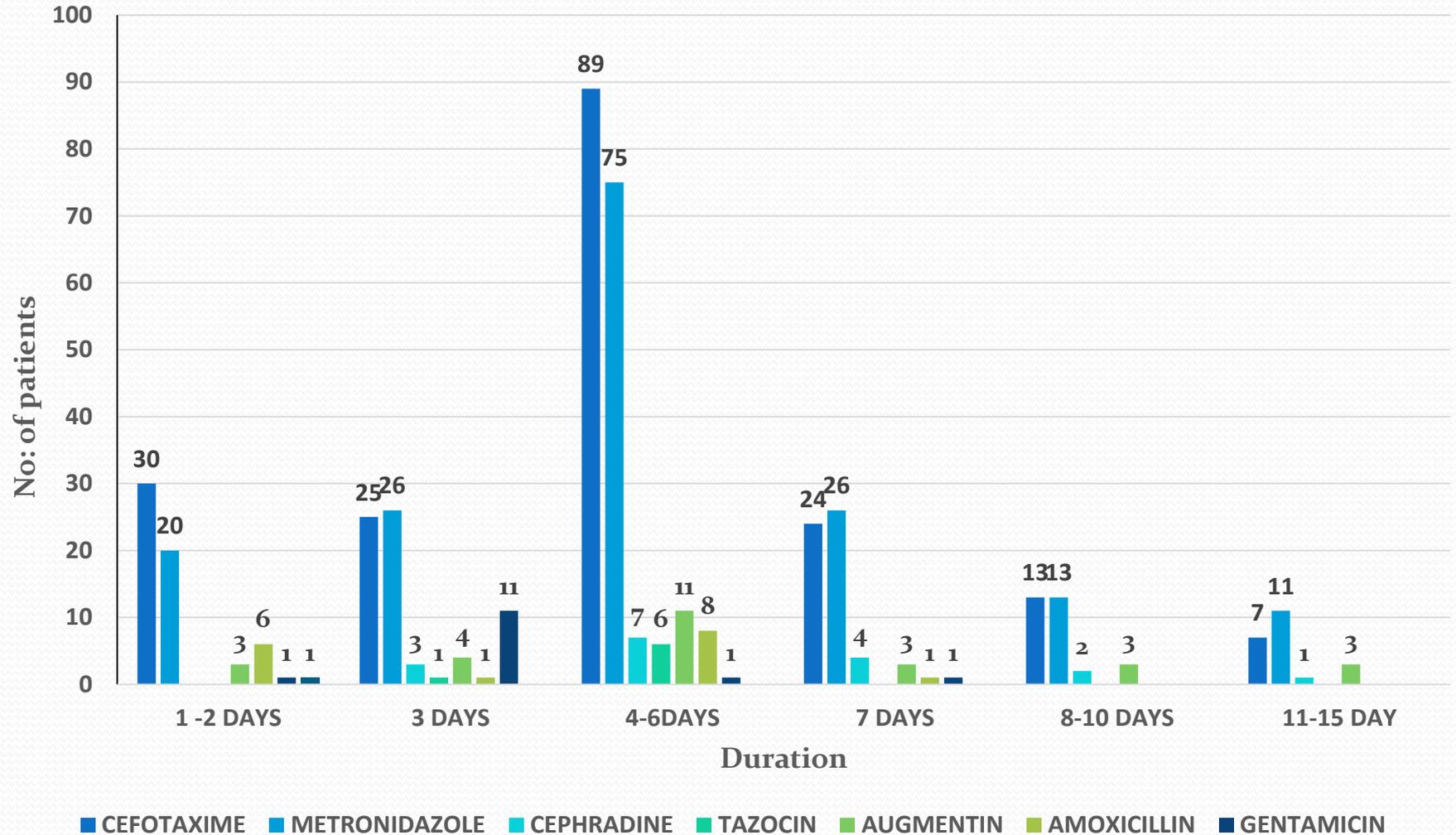
Results

- Antibiotics:
 - A total of 272 (71.6%) patients received post-operative prophylaxis.
 - 229 (84.2%) started postoperatively
 - Post-operative medications - cefotaxime 204 (75%) and metronidazole 184 (67.6 %).
 - Combination of cefotaxime and metronidazole given 159 (58.5%)

Duration of antibiotics



Antibiotics and their duration



Dosage

Preoperative:

- Cefotaxime (1g) – 32 patients , 500 mg in 1
- Cefradine (2g)- in 4 patients, 1 gm in 14
- Metronidazole(500mg)- 18 patients

Post operative antibiotic:

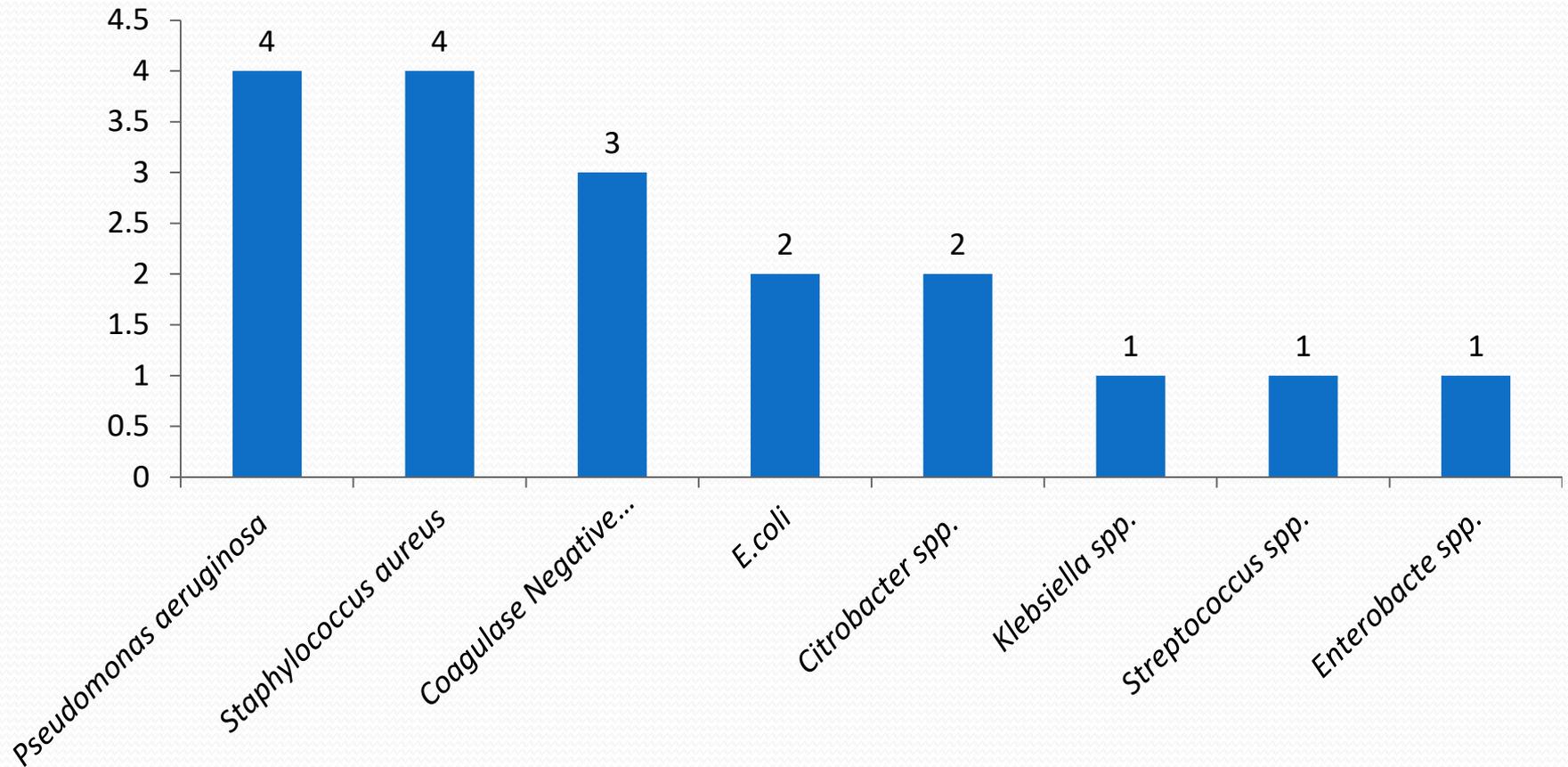
- Cefotaxime (1g) – 192 patients , 500 mg in 9
- Cefradine (1g)- in 8 patients, 500mg in 11
- Metronidazole(500mg)- 152 patients
- Augmentin (1gm) IV- 1 patient
- Gentamicin 240 mg given for 12 patients

Results

During postoperative follow up

- 52 (13%) patients reported discharge from operation site
- SSI diagnosed by a doctor in 35 (8.8%)
- 17 (4.75%) patients yielded positive culture results.
- All 17 had history of antibiotic exposure before culture
- 15/17 (88.2%) patients had not received pre-operative prophylaxis

Organisms



- All *S.aureus* isolated were sensitive to Clindamycin and chloramphenicol.
- One of the *S.aureus* was methicillin resistant.

Results

- Culture positive SSI happened
 - Equal in elective (8) and emergency (8) cases: 1 unclassified
 - 3 of the cases were HIV positive. 11 were women

Organisms related to operations

Operations	Organisms	No.
Excision biopsies/lump	S.aureus	2
	CNS	3
Mastectomy	S.aureus	1
Hydrocoelectomy	S.aureus	1
Explorative laparotomy	E.coli	1
	Klebsiella spp.	2
	Pseudomonas aeruginosa	2
	Enterobacter spp.	1
	Citrobacter spp.	1
Appendectomy	Pseudomonas aeruginosa	1
	E.coli	1
Aortic aneurysm repair	Pseudomonas aeruginosa	1
Salpingectomy	E.coli	1
	Streptococci	1
Circumcision	E.coli	1
	Citrobacter spp.	1
Elevation of depressed skull	Klebsiella spp.	1

Antibiotics susceptibility pattern for Gram positive organisms

Antibiotics	Staph aureus		Coagulase neg staph		Strep	
	Sensitive	Resistant	Sensitive	Resistant	Sensitive	Resistant
Penicillin		4		2		1
Methicillin/Cefoxitin	3	1				
Cefradine		3		3		
Cefotaxime	1		2			
Chloramphenicol	4		3		1	
Erythromycin	2	1	1	1		1
Gentamicin	3	1	1	2		1
Clindamycin	4		1	1		1
Augmentin	2	1	1	1		
Tetracycline		2		1		1
Amikacin	1					
Ciprofloxacin	1					1
Vancomycin					1	

Antibiotics susceptibility pattern for Gram negative organisms

Antibiotics	Pseudomonas		E.coli		Klebsiella		Citrobacter		Enterococci	
	Sensit	Resist	Sensit	Resist	Sensit	Resist	Sensit	Resist	Sensit	Resist
Ampicillin				1		1				
Cefotaxime		1	2	1	1	1	1			
Ceftriaxone								1		
Ceftazidime	4		2							
Gentamicin	2		2	1	1			1	1	
Amikacin	3		4				2			
Ciprofloxacin	3	1	2	1						
Augmentin			1				1			
Tetracycline		1		1	1					1
Cotrimoxazole				1	2			1	1	
Trimethoprim					1			1		1
Polymyxin B				1						1
Chloramphenicol			1							
Erythromycin				1						
Clindamycin				1						
Piperacillin									1	
Pip Tazobactam							1			

Conclusion

- Cefotaxime and metronidazole are commonly prescribed for surgical prophylaxis.
- Pre operative antibiotics given only in 15.4 % patients.
- Over two thirds (71.6%) patients were given post-op prophylaxis
- SSI occurred in 4.75% of patients at PMH
- The most common organism was *Staphylococcus aureus* and *Pseudomonas aeruginosa*
- The timing of initiation of antibiotics, antibiotic selection and duration of antibiotic prophylaxis not according to Botswana national guidelines.
- There is a need to enforce the Botswana guidelines among the caregivers



Thank you