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SURGICAL BACTERIA PATTERN FOLLOWING EMERGENCY LAPAROTOMY AT KENYATTA NATIONAL HOSPITAL
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ABSTRACT

Background: **Surgical site infection (SSI) following emergency laparotomy results in significant morbidity. This study determined microbial pattern and duration of anti-microbial therapy following emergency laparotomy at Kenyatta National Hospital (KNH).**
Objectives: **To determine microbial profile and duration of anti-microbial therapy following emergency laparotomy at KNH.**
Design: **Cross sectional study.**
Setting: **KNH, general surgical unit.**
Subject: **One hundred and twenty (120) patients, 13 years and above scheduled to undergo emergency laparotomy.**
Results: **Thirty point eight (30.8%) percent of patients had SSI. *Escherichia coli (E.coli)* accounted for 15% (18/120) of all infections as mono-isolate. *E.coli* and *Klebsiella pneumonia* accounted for most of poly-microbial infection at 3.3% (4/120). There were no anaerobic isolates. Twenty nine point percent (35/120) of patients who received anti-biotic therapy for more than 5 days accounted for most of infections at 23.3% (28/120).**
Conclusion: ***E.coli*** **remains the most significant single infectious agent in this study. The other less occurring bacteria were *Enterobacter spp., staphylococcus spp., streptococcus spp.* and *Klebsiella spp.* Cost benefit analysis on the need for anti-biotics targeting anaerobic therapy might be useful. Judicial use of anti-biotics targeting microbial spectrum with therapy duration of five dayswithin our surgical units might reduce risk of infections and anti-microbial resistance.**

INTRODUCTION

Emergency laparotomy is the most common abdominal surgery in KNH at 67% (1). Incidence of SSI from various studies ranges between 19-40% (2, 3). CDC estimated risk of SSI following emergency laparotomy varies at 25.2%-40.1% (2, 4). Microbial contamination could be exogenous or endogenous and this is a necessary precursor for abdominal SSI (4). Abdominal infection usually is endogenous as a result of contamination from coelomic mucosal flora. Infection commonly is poly-microbial, comprising aerobic, anaerobic, gram positive and gram negative micro-organisms (5-8). Appropriate choice and use of anti-microbial therapy/prophylaxis, should be guided by microbial profile, this could reduce the risk of abdominal infection (9-13).
Microbial contamination of the abdomen is a necessary precursor of infection viewed in the following relationship (4).

$$\frac{\text{Dose of bacterial contamination} \times \text{virulence}}{\text{Resistance of the host patient}} = \text{Risk of abdominal SSI}^{4}$$

Significant dose of 10^5/gram of tissue is necessary to cause infection (4). Virulence is determined by the ability of the infecting organism to produce toxins which provoke the host to mount systemic inflammatory response (4). Source of micro-organism could be exogenous from the environment, commonly it is from the skin or gut mucosa (4). Resistance of the host to infection is determined by American societyanaesthesiology (ASA) score of more than two which is an independent predictor of developing SSI (5). Endogenous source of abdominal SSI is gastrointestinal tract (GIT) with upper GIT containing 10^3-10^5bacteria/ml while lower GIT 10^{11}-10^{13}. Infection commonly is poly-microbial however, *E.coli* accounts for 31.8-45.3% of single agent infection whereas anaerobic infections account for 1.6-14.7%, candida infection occurs in 4% (5-8). Appropriate choice and use of anti-microbials with surveillance to study

trends in SSI and feedback to the surgical team could reduce SSI (9-13).

MATERIALS AND METHODS

This was a cross sectional study conducted at KNH general surgical unit over a period of seven (7) months. One hundread and twenty patients who met the inclusion criteria were voluntarily included in the study once it was approved by UON/KNH ethics research committee. A pretested structured questionnaire was used to obtain information which included pre-operative bio data and surgical diagnosis. In the post-operative period, intra-operative details, follow up including wound examination, in case of infection, type of infection, micro-organism and duration of anti-biotic therapy were documented.

Data were cleaned, coded and entered in SPSS version 20 for analysis. Descriptive statistics were analysed where discrete variables were summarised with frequencies and percentages. Continuous variables were summarised using mean, median, mode and standard deviation. Association between duration of anti-biotic therapy and SSI were analysed using chi square or Fischer exact test.

RESULTS

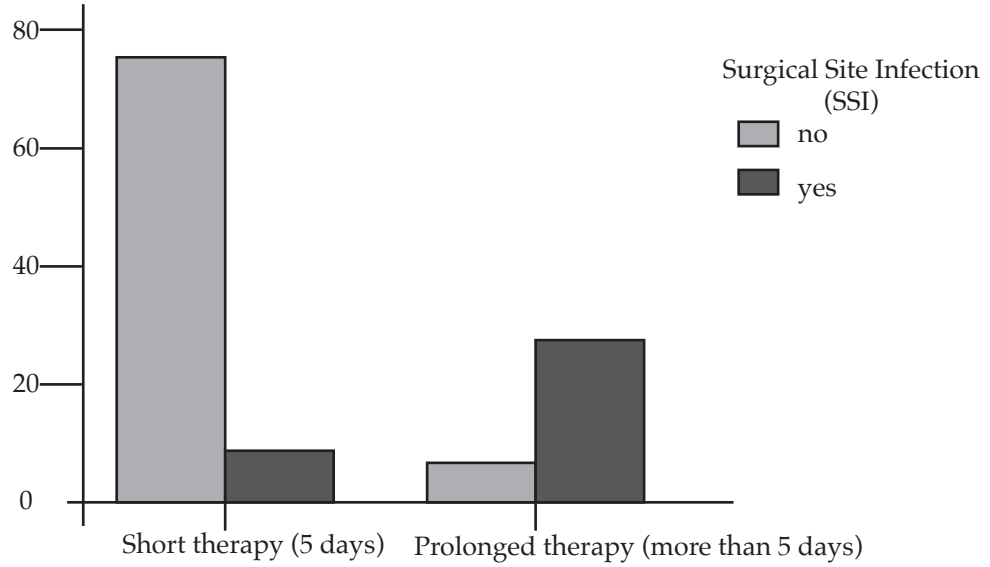
The study involved 120 patients, thirty point eight (30.8%) percent of these patients developed SSI. Most common mono-isolate was *E.coli* at 15%, whereas most common dual-isolate was *E.coli* and *Klebsiella pneumonia* 3.3%. *Candida albicans* and *streptococcus pyogenes* was isolated in one case (0.8%), there were no anaerobic isolates in Table 1.

Table 1
Distribution of micro-organisms

			Surgical Site Infection(SSI)		Total
			no	yes	
	no infection	Count	83	0	83
		% of Total	69.2	0.0	69.2
Microscopy + Culture	*Escherichia coli*	Count	0	18	18
		% of Total	0.0	15.0	15.0
	Proteus mirabilis	Count	0	1	1
		% of Total	0.0	0.8	0.8
	Escherichia coli + Klebsiella pneumonia	Count	0	4	4
		% of Total	0.0	3.3	3.3
	Escherichia coli + Proteus mirabilis	Count	0	1	1
		% of Total	0.0	0.8	0.8
	Streptococcus pyogenes + Candida albicans	Count	0	1	1
		% of Total	0.0	0.8	0.8
	Pseudomonas aeruginosa	Count	0	2	2
		% of Total	0.0	1.7	1.7
	Staphylococcus aureus	Count	0	1	1
		% of Total	0.0	0.8	0.8
	Klebsiella pneumonia	Count	0	8	8
		% of Total	0.0	6.7	6.7
	Enterobacter spp.	Count	0	1	1
		% of Total	0.0	0.8	0.8
Total		Count	83	37	120
		% of Total	69.2	30.8	100.0

Twenty nine point two (29.2%, 35/120) of the patients received anti-biotic therapy for more than five days. This was associated with significant infection rate of 23.3% (28/120), p-value (0.000). Figure 1.

Figure 1
Association between anti-biotic therapy duration and SSI



DISCUSSION

Mono-isolates accounted for 25.8% of all infections with *E.coli* being the most common which was consistent with other studies (2, 5-8). The other less occurring bacteria were *Enterobacter spp*., *staphylococcus spp*., *streptococcus spp.* and *Klebsiella spp.* Poly-microbial infections accounted for the rest and were mainly dual isolates which was not similar to other studies (5-8). There were no anaerobic isolates which was similar to local study (2).

In conclusion, periodic SSI surveillance could contribute to understanding of local microbial profile as well as trends in SSI. Hospital based anti-biotic stewardship program should be in place to guide use of anti-biotics based on local microbial profile. Cost benefit analysis on the need for anti-biotics targeting anaerobic therapy might be useful. Anti-biotic therapy duration of more than five days results in significant risk of infection.

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