# CHAPTER ONE

## 1.1 INTRODUCTION

Antibiotics are one of the most common drugs prescribed in hospitals today. It has been estimated that up to a third of all patients receive at least one antibiotic during hospitalization. The cost involved is therefore correspondingly high and up to 40% of a hospital's drug expenditure may be devoted to the purchase of antibiotics [1-3].

In the past decade, there has been an alarming trend towards increase antimicrobial resistance in many human pathogens around the world. Of the many possible factors responsible for these developments, the overuse and inappropriate prescribing of broad spectrum antibiotics has been implicated [4,5,6,7].

The in-hospital use of antibiotic drugs has been a major concern in the last few decades for several reasons. For the purchasers of health care services and administrators, antibiotic drugs account for a major proportion of the escalating drug budget, especially in hospitals. The overuse and misuse of antibiotic drugs is considered to be one of the reasons for increasing resistance among various pathogens. These worries have led to the implementation of strict antibiotic policies in hospitals in many countries, with different strategies and different outcomes. Monitoring of drug use is essential in order to follow the effects of, and adherence to, the hospital's antibiotic policies. Patient medical records may be reviewed for this purpose, but this method can be quite exhaustive [6].

The ultimate goal of drug utilization research must be to assess whether drug therapy is rational or not. The principal aim of drug utilization research is to facilitate the rational use of drugs in populations. For the individual patient, the rational use of a drug implies the prescription of a well documented drug at an optimal dose, together with the correct information, at an affordable

price [8]. The observed patterns of drug use can be compared with the current recommendations and guidelines for the treatment of a certain disease [9].

There have been numerous studies on patterns of antibiotic usage in hospitals [1]. Many of these studies were however conducted in developed countries. Data from developing countries are scarce [1].

Antimicrobial use should be monitored in terms of the type and degree of irrational use and several well-established methods exist. Aggregate antimicrobial drug consumption data can be used to identify the most expensive and highly used antimicrobials, or to compare actual consumption with expected consumption (from morbidity data). Anatomical Therapeutic Classification (ATC) / Defined Daily Dose (DDD) methodology can be used to compare antimicrobial consumption across institutions, regions and countries [3, 9, 10, 11]. Indicators can be used to investigate antimicrobial use in primary health care, e.g.:

• % patients prescribed antibiotics;

• % of upper respiratory tract cases (usually viral) treated with antibiotics;

• % of diarrhoeal cases (usually viral) treated with antibiotics;

• % cases with infections treated in accordance with clinical guidelines.

Focused antimicrobial use evaluation (drug utilization review) can identify problems concerning the use of specific antimicrobials or the treatment of specific infections, particularly in hospitals [10].

In view of increasing antibiotic resistance as well as the escalating cost of antibiotic therapy, the Ministry of Health of Malaysia embarked on a project to assess antibiotic usage in its hospitals in 1989. The main objectives of this study were to (i) ascertain pattern of use of antibiotics, (ii)

identify deficiencies and implement remedial measures, and (iii) evaluate the effectiveness of these remedial measures. This was a prospective, descriptive and cross-sectional survey of antibiotic prescriptions issued for inpatients at six general hospitals situated in various parts of the country. The sampling unit was an antibiotic prescription regardless of whether the prescription issued was for a single agent or a combination of antibiotics. The doctors in the study hospitals were aware of the survey that was being carried out. This by itself would have influenced the prescribing practices of the doctors. Despite this, the lack of compliance with issued guidelines was very evident [1].

A survey by the Intercontinental Medical Statistics Pharma Strategy Group (IMS HEALTH) of antibiotic usage in hospitals in France, Germany, Italy, Spain, and the United Kingdom has illustrated the diversity between countries, the implications for antibiotic resistance, and how difficult it would be to have a European Union policy on prescribing antibiotics in hospital to prevent the emergence of resistant organisms. The survey was part of a regular audit of antibiotic treatment in hospital in 18 countries. Data on antibiotic use showed that in Italy and Spain the number of days of antibiotic treatment had declined between 1995 and 1997 whereas they have increased in France, Germany, and the UK. The use of combination treatment has increased over the same period in the UK compared with Germany, Italy, and Spain where its use has declined [12].

The Finnish Hospital Infection Program (SIRO) conducted the first national prevalence survey of nosocomial infections (NIs) in 30 Finnish acute care hospitals during February–March 2005. The objective was to analyze the amount and type of antimicrobials administered in acute care hospitals based on data collected in this national survey. All inpatients present on the study day in acute care wards for adults were examined (n=8234). Infection control practitioners, who attended a 1 day training course organized by SIRO, collected data with link nurses and ward

staff. Data on antimicrobials were recorded on the study day and retrospectively for the previous 6 days (a 7 day window), allowing for estimation of use-density among the study population. No data on dose, timing or dosing interval of antimicrobials or on antimicrobials administered as surgical prophylaxis in operating theatres were recorded. The study provided an overview of antimicrobial use in Finnish acute care hospitals. The prevalence of antimicrobial use was high; more than one-third of patients had received an antimicrobial or antibacterial on the study day. In previous studies with a similar study design, from 16% (Denmark), 18% (Germany), 28% (Scotland) to 40% (USA) of hospital patients were given antibacterials. NIs contributed markedly to the usage in the study. This aspect further underlines the importance of prevention of NIs [13].

In 2004, the Ministry of Health in China published the Guidelines for Antibiotics Clinical Use and Provisions for Prescription Management as part of a national effort to improve the rational use of antibiotics and the containment of antimicrobial resistance. A pilot study was initiated in December 2004 to monitor the clinical use of antibiotics in hospitals. A baseline assessment using a retrospective survey was also conducted in December 2004. The objectives of the pilot project include: to monitor the antibiotics clinical use alongside with the antimicrobial resistance, to disseminate the information of antibiotics usage and the antimicrobial resistance, to provide analysis on the pattern of antibiotics usage and antimicrobial resistance and to develop appropriate measures for containment, and to provide evidence for revising the Guidelines for Antibiotics Clinical Use. In each hospital, the Pharmacy Department is responsible for the monitoring or collecting data on utilization and the Department of Microbiology is responsible for monitoring data on antimicrobial resistance [14].

To understand the situation of antibiotic usage in primary care units in Taiwan, all prescriptions were collected over a 1 week period during March 2 to March 7, 1992, December 2 to December 7, 1992, and January 14 to January 19, 1994 from out-patient clinics of public health stations located in various parts of Taiwan. In addition to all medications prescribed, information regarding patient age, sex and diagnosis were also collected. The proportion of antibiotics prescribed in total patient-visits, in patients of various age groups, in patients with various diagnoses, and the kinds of antibiotics prescribed were analyzed. Since there was no guideline for antibiotic prescription for physicians in the primary care units in Taiwan except some regulations from the medical insurance that restrict some antibiotics as second line drugs for treatment of infections, it is not surprising to find that antibiotic usage was very common and often inappropriate [15]

Costs and use of antimicrobial agents in 1976 at 19 hospitals were surveyed by review of pharmacy records. Total costs of antimicrobial drugs at individual hospitals ranged from $0.65 to $1.75 per patient day and accounted for 16% to 41% of total pharmacy drug costs. There was marked variation among hospitals in use of specific antimicrobial agents, especially cephalosporins and clindamycin. The cephalosporin and aminoglycoside antibiotics accounted for 66% of the total cost of antimicrobial agents. An 18-month antimicrobial drug control program at one hospital decreased antimicrobial drug costs by 31%. The major effect was in reducing cephalosporin use. The results of the control program document that a significant portion of hospital antimicrobial use is inappropriate and can be eliminated without apparent detriment to patient care [16].

Drug-use indicators were measured in a secondary health care facility in Lagos, Nigeria. The study was conducted in the year 2000 at the Ikeja General Hospital, Lagos, Nigeria. Drug use indicators are a set of standardized indices used to measure drug use in outpatient facilities. They

provide a measure of the optimal use of these resources and can help in correcting deviations from expected standards and in planning.

Retrospective prescribing data was used and patient records were selected using a systematic sampling method. Standardised methods of investigating drug use indicators were employed in the conduct of the study. These methods recommend a study of 100 patient records in a single health facility or 30 records in 10 different clinics/ health facilities. The study was planned to investigate 600 patient records to increase the precision of the parameters. The records studied were for patients attended to at the outpatient department of the hospital in the first three months of the year 2000.

Drug use indicators include average number of drugs per patient encounter, percentage of patient encounters with a prescribed injection, percentage of patient encounters with a prescribed antibiotic to mention a few. Drug use indicators in Nigeria show very high levels and often reflect irrational drug use .The average numbers of drugs prescribed per patient had been found to vary from 3 to 7, the prescribing rate of injection has a range of 40-70% and antibiotic use rate exceeds 50%. Antibiotics were prescribed for many conditions they were not indicated for and to treat presumed infections especially cough and fevers that could not be diagnosed sufficiently on clinical grounds. This high rate of antibiotic prescribing at this hospital has been documented and has a number of implications. Firstly, newer and more expensive antibiotics are frequently prescribed which may be unaffordable to most patients and poor compliance in those who may be able to start a course but are unable to finish [17].

High levels of antibiotics use, often clinically unnecessary, have led to a steady increase in drug resistance. Research programmes alone are unlikely to improve antibiotic use, and findings should guide the development of priority programme activities, which include a carefully designed mix of activities by governments, health delivery systems, health training institutions, professional societies, pharmaceutical companies, consumer organisations, and international

organisations. Strategies that lean too heavily on professional education are unlikely to result in large-scale or long-lasting improvement. Patient demand is often believed to influence doctors' prescribing decisions. Various studies document physicians' opinions that they fear losing patients if they do not provide what patients desired. Access to quality laboratory services is often seen as pivotal to the correct use of antimicrobials. Also, lack of laboratory facilities (or patients' inability to pay for lab services), have been blamed for over prescribing of antimicrobials. Interestingly, some studies show that when laboratory facilities are available, their use is not necessarily higher. Antibiotics are often believed to have the ability to prevent disease. For example, in the Philippines, antibiotics are commonly taken to prevent diarrhoea especially after eating foods of doubtful hygienic status. Studies in Zimbabwe and in the Philippines found that STDs are believed to be preventable by taking an antibiotic immediately after visiting a prostitute [18].

### 1.2 Rationale for the study

The Ministry of Health of Ghana in 1983 published a list of Essential Drugs with Therapeutic Guidelines to aid the rational use of drugs. The Government of Ghana, through the National Drug Policy remains committed to ensuring the availability and accessibility of good quality medicines for all people, and that these medicines are affordable and are rationally used [19]

The Standard Treatment Guidelines have been prepared to assist and guide prescribers, pharmacists, dispensers and other healthcare staff in providing quality care to patients [19, 20].

There is currently no policy or guidelines for prescribing antibiotics, at Cocoa Clinic. Also, the Clinic is getting prepared to begin implementation of the National Health Insurance Scheme (NHIS).

Based on these facts it has becoming increasingly necessary to conduct this study at the Clinic in order to monitor antibiotic usage and this would serve as a baseline for detection of significant changes in prescription patterns and act as a guideline for antibiotic education programmes [7].

**1.3 AIM**

To provide a survey of antibiotic usage at Cocoa Clinic.

**1.4 OBJECTIVE:**

1. To determine the antibiotics commonly prescribed for various conditions at the Clinic
2. To determine average number of antibiotics prescribed for the patients
3. To determine antibiotics commonly prescribed irrationally and whether they were prescribed in accordance with the standard treatment guidelines.
4. To determine whether laboratory investigations were done either before or after the prescribing of antibiotics
5. To determine the frequency of multiple antibiotic prescriptions and the disease conditions in which they are prescribed. .
6. To determine whether the prescription was for treatment or prophylaxis
7. To determine the proportion of antibiotics prescribed in patients of various age groups.

# CHAPTER TWO

**Methodology**

Review of patients' folders, Assess drug availability from pharmacy records, Informal interviews of prescribers, scrutiny of laboratory records and observations at pharmacy.

## 2.1 Study Design

This is a Retrospective Survey of Antibiotic Usage in Cocoa Clinic for the month of July 2008.

## 2.2 Study site

The study was done at Cocoa Clinic Accra, the medical department of Ghana Cocoa Board. This is a forty bed hospital which sees on the average six thousand out-patients monthly and an average of seventy in-patients each month.

The Clinic offers a wide range of services ranging from diagnostic, health advocacy, specialist clinics, dietetics, laboratory, pharmaceutical, in and outpatients' services.

The Clinic also offers specialist clinics in internal medicine, gynaecology, ophthalmology, surgery and dietetics.

## 2.3 Sampling

All Patients visiting the Clinic during July 2008 records were examined. This included records from the Out-patient Department (Treatment room and those detained), theatre and ward (in-patients) as well as those coming for review. Only those prescribed antibiotics and were served in the Clinic's pharmacy was studied. The study sample was representative because it comprised prescriptions from all the centres of the clinic.

### 2.4 Inclusion criteria

All prescriptions containing a single or combination of antibiotics that were served from the pharmacy which are both for in-patients and out-patients attending the Clinic for the month of July 2008.

### 2.5 Exclusion criteria

Topical antibiotics and antituberculous drugs. No data on dose, timing or dosing interval of antimicrobials or on antimicrobials administered as surgical prophylaxis in operating theatre were recorded [21]

### 2.6 Data Collection

All the necessary data was taken from computerized records collected under the supervision of the hospital's biostatistician for the month of July 2008. This record is more reliable since it includes a detailed exercise done with postgraduate health informatics students from the University of Ghana, Legon on vacation attachment then. The records unit compiled the daily OPD and Ward Activities which took place at the facility [22]. Also, corresponding antibiotics served at the clinic's pharmacy were accessed from computer entries.

These records are valid and reliable since actual transactions are carefully and routinely entered in the computer daily. In addition, from observation, July happens to be one of the months with a high patient attendance and can be representative enough for generalization of results. Patients' folders were accessed for the relevant medical and medication records.

Information collected included:

1. diagnosis
2. whether microbiological investigations were done and confirmed prior to prescription

3. where there was no microbiological confirmation, the most likely infecting pathogen(s) against which prophylaxis was directed [1]
4. whether the prescription was for treatment or prophylaxis
5. patients demography- age and sex

# CHAPTER THREE

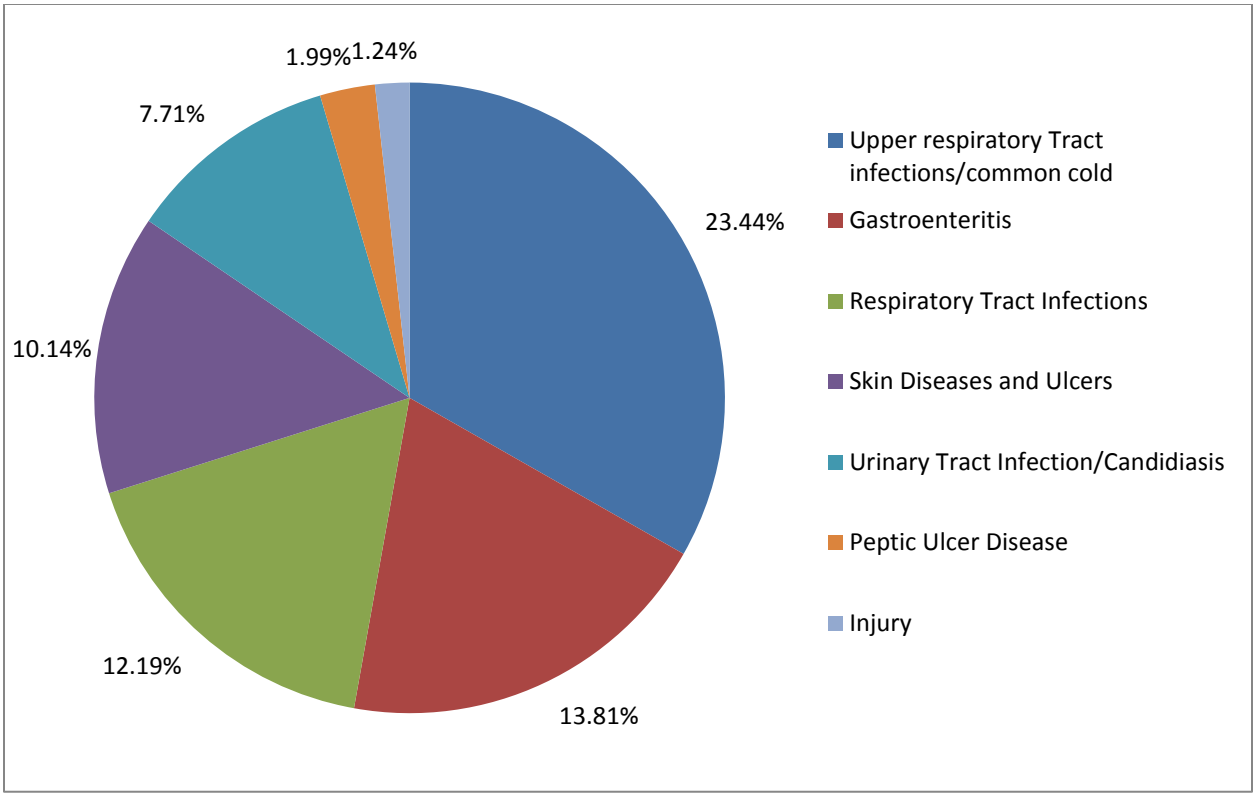
## Results/Analysis

### 3.1 Socio - Demographic data

A total of 6564 cases were seen and out of these the total number of antibiotic prescription served at the clinic's pharmacy among the various age groups within this period was 1688 (Table 3.1). Thus, 25.72% of all prescriptions contained antibiotics and this compares favorably with average of up to 40% of a hospital's drug expenditure devoted to the purchase of antibiotics [1-3]. Of this 846 (50.1%) were male and 842 (49.9%) were female. There were no records for those under one year. Age grouping with the highest attendance (33.35%) was 15-44years. It was noted that 484 records had no age specified which is quite significant (28.67%).

### 3.2 Conditions for which antibiotics were prescribed

The most common infection treated was upper respiratory tract infection accounting for 377 (23.44%) of therapeutic prescriptions. Gastroenteritis was next (13.81%) followed by Lower respiratory tract (12.19%) and skin and soft tissue infections (10.14%) then urinary tract infections (7.71%). (Fig 3.1) In certain cases prescriptions covered multiple diagnoses. Toilet and suture of wounds was the most common procedure where antibiotics were given for prophylaxis. The duration of prescriptions for surgical prophylaxis ranged from one to seven days.




N=1608

Fig 3.1: Conditions for which antibiotics were prescribed

### 3.3 Antibiotic usage in different age groups

Table 3.1 also shows the percentage of antibiotic prescription in the various age groupings who visited the clinic during the study period. Those within the age group of 15-44years received the highest percentage of 33.35% followed by those below 15 years (33.46%). There was no record for those below 1 year.

**Table 3.1 -** Antibiotic usage in different age groups

| Age (years) | Number of Antibiotic prescriptions issued | % of total antibiotic prescription (n=1688) |
|---|---|---|
| < 1 | Not Applicable (N/A) | N/A |
| 1-4 | 187 | 11.08 |
| 5-14 | 209 | 12.38 |
| 15-44 | 563 | 33.35 |
| 45-59 | 162 | 9.60 |
| 60-70 | 56 | 3.32 |
| >70 | 26 | 1.54 |
| Unknown | 484 | 28.67 |
| Total | 1688 | 100 |

### 3.4 Number and Type of Antibiotics Prescribed per Patient

There were 1608 (95.26%) single antibiotic prescriptions and 80 (4.74%) prescriptions of combination antibiotics. In 75 (4.44%) of these the prescription involved two antibiotics (Table3.2). Combinations of antibiotics were more common in patients detained for observation or on admission and also in peptic ulcer disease patients being treated for *helicobacter pylori* infection.

**Table 3.2** – Number of antibiotics prescribed per patient

| No. of antibiotics prescribed | No. of prescriptions issued | % of total antibiotic prescription |
|---|---|---|
| 1 | 1608 | 95.26 |
| 2 | 75 | 4.44 |
| 3 | 5 | 0.30 |
| >3 | 0 | 0 |
| Total | 1688 | 100 |

A total of 15 different antibiotics alone or in different combinations were prescribed totaling 1773 occurrences. These comprised penicillins, quinolones, cephalosporins, Metronidazole, macrolides, sulphonamide/trimethoprim, tetracycline, and clindamycin. Amoxicillin + Clavulanic acid was the most commonly prescribed antibiotic per patient either as a single agent or in combination with other antibiotics. (Fig 3.2)

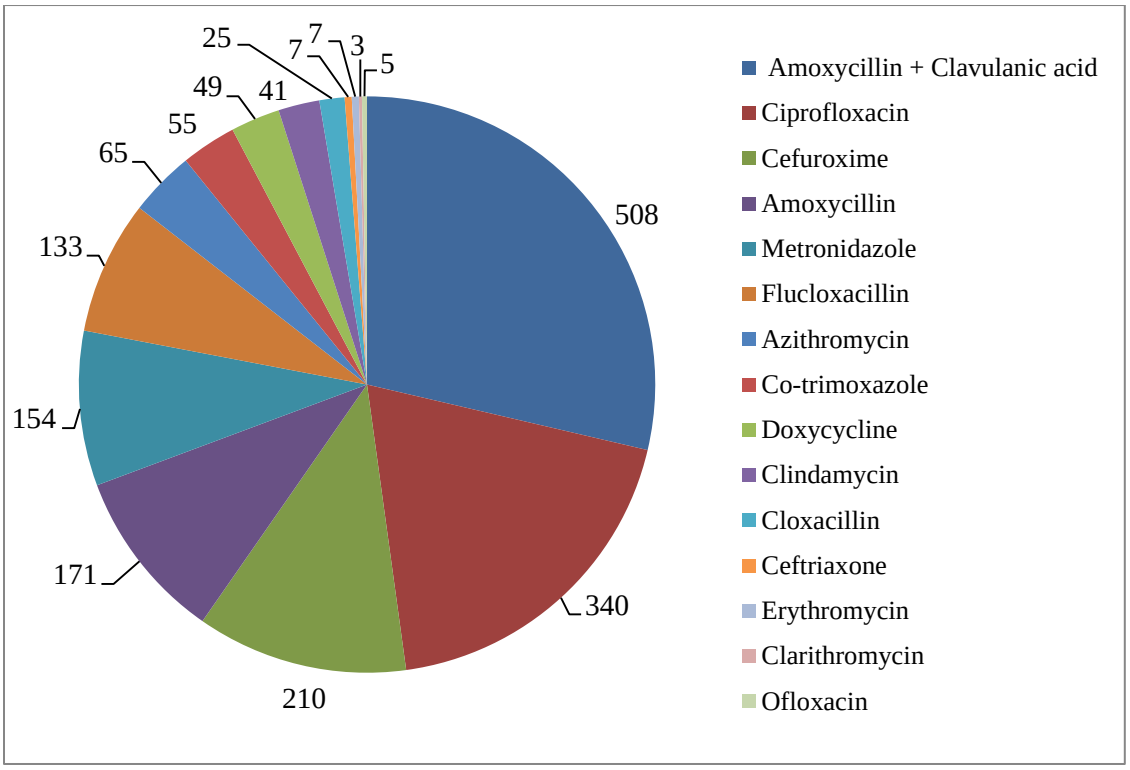
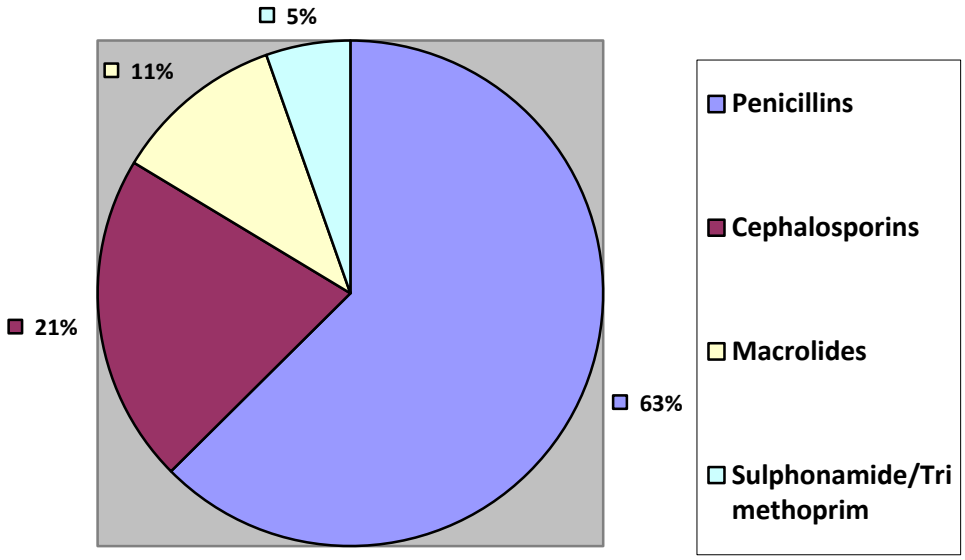



Fig 3.2: Type of Antibiotic Prescribed

### 3.5 Antibiotics Prescribed for the management of Upper respiratory tract infections /common Cold Antibiotics and Lower Respiratory tract infections (RTI)

In respiratory tract infections the antibiotics commonly prescribed were the macrolides (azithromycin, Erythromycin), penicillins (amoxicillin+clavulanic acid, amoxicillin), Co-trimoxazole, and cephalosporins (cefuroxime). Out of these the commonest type of antibiotic prescribed were the penicillins (e.g amoycillin + clavulanic acid) (Fig 3.3).

The minimum number of antibiotics prescribed per patient was one and the maximum two. The average number of antibiotics prescribed in RTI was 1.005 (SD=0.072).



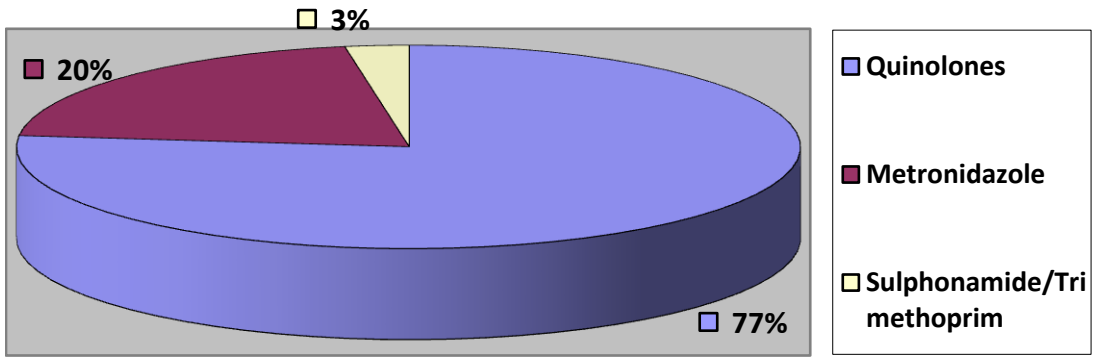

N=593

Fig 3.3 Classes of antibiotics Prescribed for the management of RTIs

### 3.6 Antibiotics prescribed for the management of Gastroenteritis

The commonly prescribed antibiotics were the quinolones (ciprofloxacin), metronidazole and co-trimoxazole. The most frequently prescribed for this condition were the quinolones (ciprofloxacin) (Fig 3.4**).** The minimum number of antibiotics prescribed was one and the

maximum was two. The average number of antibiotics prescribed in gastroenteritis was 1.025 (SD=0.162).

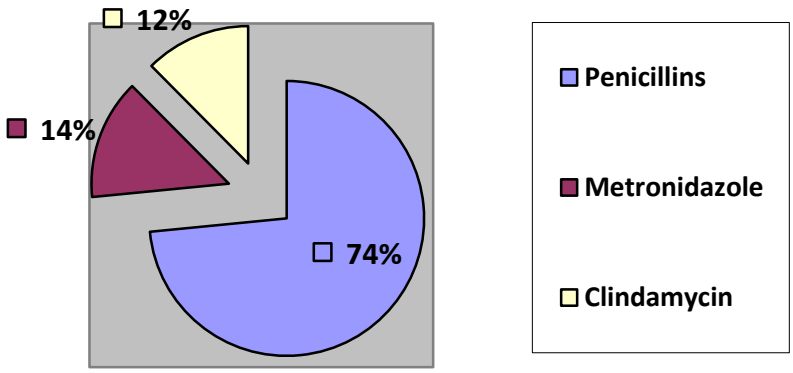



N=228

Fig 3.4 Classes of antibiotics used in gastroenteritis

### 3.7 Antibiotics prescribed for the management of Skin Diseases and ulcers

Penicillins (flucloxacillin, cloxacillin), metronidazole and clindamycin were frequently prescribed for skin and soft tissue infection and the penicillin, flucloxacillin, was most commonly prescribed (Fig 3.5). Also, the minimum number of antibiotics prescribed was one and the maximum was two. The average number of antibiotics prescribed in skin diseases was 1.086 (SD=0.281).

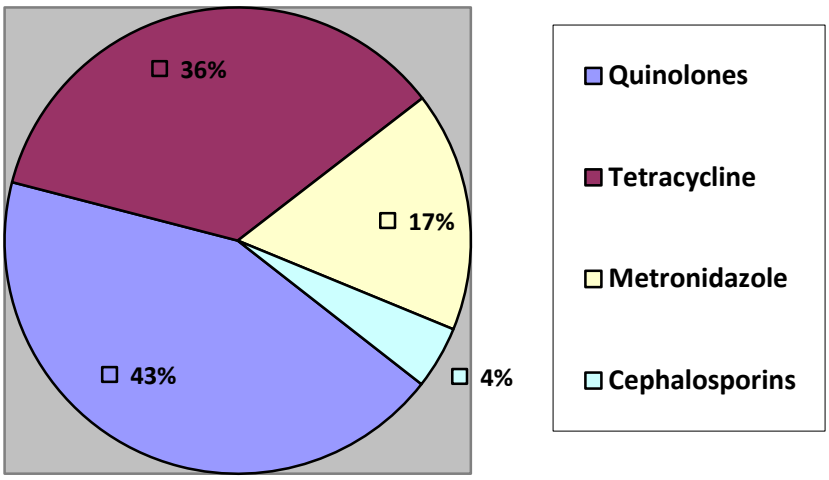



N=177

Fig 3.5 Antibiotics prescribed for the management of Skin Diseases and ulcers

### 3.8 Antibiotics prescribed for the management of Urinary Tract Infections /Vaginal Candidiasis

For urinary tract infections the quinolones (ciprofloxacin), tetracyclines (doxycycline), cephalosporins (cefuroxime) and metronidazole were prescribed and the quinolone, ciprofloxacin was the commonest (Fig 3.6). The minimum number of antibiotics prescribed was one and the maximum was two. The average number of antibiotics prescribed in UTI was 1.113 (SD=0.318).



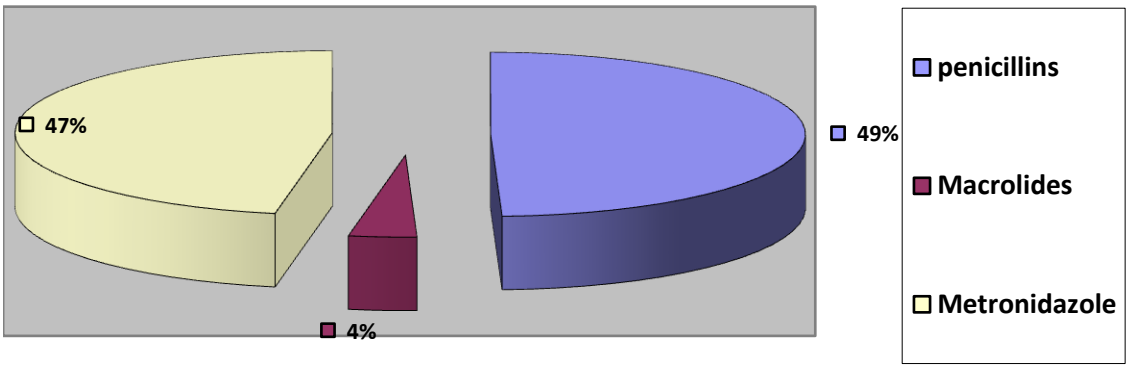

N=138

Fig 3.6 Pie chart showing the classes of antibiotics used in UTI

### 3.9 Antibiotics prescribed for the management of Peptic ulcer disease (PUD)

The frequent ones were the penicillins (Amoxycillin), macrolides (Clarithromycin) and metronidazole. The penicillin (Amoxycillin) was the commonest prescribed (Fig3.7). The

minimum number of antibiotics prescribed was one and the maximum was three. The average number of antibiotics prescribed in PUD was 1.938 (SD=0.619).

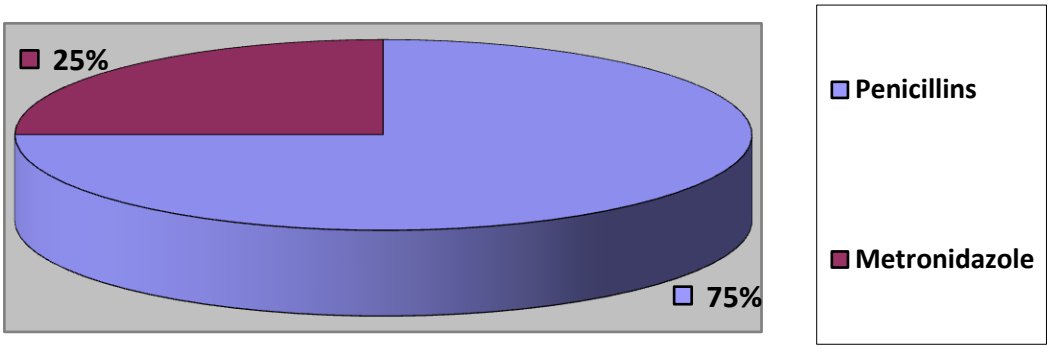



N=87

Fig 3.7 Classes of antibiotics used in PUD

### 3.10 Antibiotic prescribed for the management of Wounds and Injuries

The antibiotics often prescribed included the penicillins (Amoxycillin, flucloxacillin Amoxycillin+clavulanic acid), and metronidazole of which the penicillin (flucloxacillin) was the most frequently prescribed (Fig3.8). The minimum number of antibiotics prescribed was one and the maximum was two. The average number of antibiotics prescribed in wounds and injuries was 1.4 (SD=0.50).




N=28

Fig 3.8 Antibiotics prescribed for the management of wounds/injuries

### 3.11 The purpose for which antibiotics were prescribed

The purpose of prescribing antibiotics was therapeutic in 1608 (95.26%) of prescriptions and in 60 (3.55%) it was prophylactic (Table 3.3). Prophylactic antibiotic prescriptions were more common in surgical as well as injury cases and also in Skin Diseases. In 20 prescriptions the intention was unknown.

**Table 3.3** - Purpose of prescribing Antibiotics

| Type of prescription | Number of prescription issued (%) | | |
|---|---|---|---|
| | Single agent (%) | Combination (%) | Total (%) |
| Therapeutic | 1530 (90.64) | 78 (4.62) | 1608 (95.26) |
| Prophylactic | 58 (3.44) | 2 (0.12) | 60 (3.55) |
| Intent Unknown | 20 (1.18) | - | 20 (1.18) |
| Total | 1608 (95.26) | 80 (4.74) | 1688 (100) |

### 3.12 Laboratory investigations

Of the 1,608 therapeutic prescriptions only 180 (11.12%) were based on laboratory investigation results. However, of these, 126 were done before prescriptions were given. Empirical prescriptions were based on the most likely infecting pathogen.

# CHAPTER FOUR

**Discussions & Conclusion**

## 4.1 Socio - Demographic data

Since the immunity of older patients is generally poorer than that of younger adult patients, antibiotic usage might well be more frequent in the older patients [15]. However, in the present study we found that patients of 15-59 years received more prescriptions for antibiotics than patients older than 60 years.

Also, sometimes children over 12 years are often regarded as adult. This is inappropriate because many 12-year-olds have not been through puberty and have not reached adult height and weight [23]. This sometimes reflects in the prescription of some antibiotics particularly ciprofloxacin for urinary tract infections. Children less than 18 years of age have a higher chance of getting bone, joint, or tendon (musculoskeletal) problems such as pain or swelling while taking ciprofloxacin. Ciprofloxacin should not be used as the first choice of antibiotic medicine in children under 18 years of age. Ciprofloxacin should not be used in children under 18years old, except to treat specific serious infections, such as complicated urinary tract infections and to prevent anthrax disease after breathing the anthrax bacteria germ (inhalational exposure) [24].

In this study however, link of age and type of antibiotic was not included in the results.

## 4.2 Antibiotics Prescribed for the management of Upper and Lower Respiratory tract infections/common Cold

From this study, the most common indication for treatment was respiratory tract infection including common cold. The respiratory tract comprises the upper and lower parts: the upper respiratory tract comprises the sinuses, middle ear, pharynx, epiglottis and larynx, while the lower respiratory tract consists of the structures below the larynx – the bronchi, bronchioles and alveoli [23]. It is well known that the aetiology of common cold is viral [19, 23]. For most patients

with the diagnosis of common cold, antibiotic usage is unnecessary, especially for adult patients. The symptoms resolve without antibiotic treatment within a week. If the "cold" lasts longer than a week and there is persistent fever and cough associated with increased phlegm or offensive nasal discharge there is a possibility of secondary bacterial infection of the respiratory tract or influenza [19]. It is estimated that less than 10% of patients with the diagnosis of common cold are suffering from any bacterial infection [15].

Many cases of sore throat (pharyngitis) are not due to infection at all but are caused by other factors such as smoking. Where infection is the cause, most cases are of viral aetiology and reflect part of the 'colds and flu' spectrum [23]. There is only one common bacterial cause of sore throat. *Streptococcus pyogenes,* the group A beta haemolytic streptococcus. The aim of any diagnostic procedure is to distinguish the streptococcal sore throat, which is amenable to antibiotic treatment, from viral infections, which are not. Therefore if streptococcal infection is suspected a throat swab should be taken for culture [23]. Treatment of viral sore throat is normally directed at symptomatic relief, for example with rest, antipyretics and aspirin gargles [23]. If streptococcal infection is suspected, treatment may be started before the results of throat swab culture are known. Informal interview of prescribers showed that antibiotic treatment of common cold as well as sore throat was for most situations empirical not based on laboratory results. Treatment was targeted mainly at streptococcal infection. Although many busy clinicians would commence treatment on clinical grounds alone, the problem of resistance has led to increasing pressure on prescribers to restrict empirical antibiotic use, particularly for conditions that are frequently viral, of which pharyngitis is a good example [23]. In this study the commonly prescribed antibiotics were the penicillins especially Amoxycillin + Clavulanic acid and Amoxycillin. Prescriptions for Azithromycin and cefuroxime from observation are also increasing. There is now convincing evidence that cephalosporins are more effective both in terms of clinical response and eradication of the organism from the oropharynx [23].

Occasionally, the common cold is complicated by otitis media in children [19]. The diagnosis of otitis media is essentially made clinically and laboratory investigations have little role to play. Treatment has to be given empirically. It should be effective against the three main bacterial pathogens, *Strep. Pneumoniae, Haemophilus influenzae, and Strep. pyogenes.* The broad spectrum agent amoxicillin which is recommended for oral treatment since it is better well absorbed was commonly prescribed in this study in some cases up to about 14 days even though up to 10 days of treatment is ideal. It is conveniently given three times a day. Some prescribers however preferred Amoxycillin + clavulanic acid.which is far more expensive.

In lower respiratory tract infection, example non severe pneumonia, the draft of the revised Ghana Standard Treatment Guidelines recommends as first line treatment with Amoxycillin oral 1g 8 hourly for 7 days and if patient is allergic to penicillins, erythromycin 500mg 6hourly or azithromycin 500mg daily all for 7 days [19]. Virtually all the prescriberss in this study preferred the more expensive second line treatment with amoxicillin + clavulanic acid 1g orally 12hourly for 7 days. In some cases some make the frequency 8 hourly which is not necessary. Diagnosis is mainly based on chest x'ray and full blood count.

These results suggest that antibiotics were overused. This probably is a world-wide phenomenon since Davey et al. also reported that a high percentage of patients with upper respiratory symptoms were prescribed antibiotics in United Kingdom [15]. The pattern of infections encountered was quite similar to that described in many countries.

### 4.3 Antibiotics prescribed for the management of Gastroenteritis

Many gastrointestinal infections are mild and self-limiting and never reach medical attention. Gastroenteritis is the commonest syndrome of gastrointestinal infection, presenting with symptoms such as vomiting, diarrhoea and abdominal pain. It is very common in children [8, 23]. The commonest cause in this age group is viral. There is therefore usually no need to prescribe antibiotics. Fluid and electrolyte replacement is the corner stone of treatment of diarrhoeal disease. Most patients can be managed with oral rehydration regimens, but severely dehydrated patients require rapid volume expansion with intravenous fluids [19, 23].

Antibiotics especially metronidazole and co-trimoxazole suspensions were commonly prescribed either alone or in combination for paediatrics diagnosed of uncomplicated diarrhoae in the study. The requirement for antibiotic treatment in gastrointestinal infection depends on the causative agent, the type and severity of symptoms, and the presence of underlying disease. Bacterial infections are usually diagnosed by stool culture. Serious infections such as enteric fever always require antibiotic therapy [23]. In such instances during the study, records from patients' folders indicate that laboratory investigations were frequently done and the drug of choice was ciprofloxacin. In this study anti-infective therapy commonly administered empirically include; for adult, ciprofloxacin 500mg 12 hourly for 7 days sometimes in combination with metronidazole. (The Draft revised STG recommends duration of three days); metronidazole was also prescribed for amoebic diarrhoea and giardiasis averagely for 7 days in both adults and children but this duration is longer compared to 5 days in the STG.

### 4.4 Antibiotics prescribed for the management of Skin Diseases and ulcers

The skin and soft tissue infections encountered in the clinic for which antibiotics were prescribed include cellulitis, boils and impetigo (which is a superficial bacterial skin infection and this is common in children).

These skin conditions for the most part are treated empirically. Based on informal interview, the organisms mainly targeted are *Staphylocccus aureus* and/or *Streptococcus pyogenes*. Swabs were taken for culture and sensitivity in most cases when healing prolongs. The antibiotics which were commonly given were flucloxacillin 500mg for adults and 62.5mg – 250mg for children all taken orally 6 hourly for 7 days as recommended in the STG. In certain cases in particular cellulitis, the antibiotic of choice was clindamycin 300mg orally 8 hourly for 7 days as against oral Amoxycillin 500mg-1g with flucloxacillin 250-500mg 6 hourly for 7 days recommended in the STG. In all cases if patients are allergic to penicillins erythromycin was given. Also, in most cases of chicken pox infections which are viral, flucloxacillin is prescribed (which may not be necessary) with the caution of taking care of any possible bacterial infection even though the lesions were not known to be super infected. There were cases also of antibiotics such as doxycycline being given for non severe acne vulgaris (pimples) in addition to topical antibiotic preparations.

### 4.5 Antibiotics prescribed for the management of Urinary Tract Infections /Vaginal Candidiasis

Urinary tract infection (UTI) was one of the most common complaints requiring antibiotic prescription. It is a problem in all ages [23]. UTI refers to any bacterial infection of the urinary tract [19]. Although many cases would clear spontaneously given time, symptomatic UTI usually merits antibiotic treatment to eradicate both symptoms and pathogen [23]. Laboratory investigations were in most cases done particularly for patients on admission to confirm treatment that has been started empirically to treat UTI. The organisms mostly targeted were *Escherichia coli* which is the most frequent pathogen. In patients with indwelling urinary catheter, even with the very best of care, most will have infected urine after 10-14 days of catheterization [23]. Thus, it was observed from the study that cloudy or strong smelling urine in

such patients were put on antibiotics to treat UTI. The most commonly used antibiotic was ciprofloxacin, oral, 500mg 12 hourly for 7 days in adults and either co-amoxiclav, oral, or cefuroxime, oral, in children. These were in line with the STG. In certain cases some patients were prescribed co-trimoxazole in a dose of 960mg 12 hourly for 7 days.

Vaginal candidiasis is another condition where antibiotics were used irrationally. *Candida albicans* is a very common yeast-like fungus which forms part of the gastrointestinal tract of virtually all healthy individuals [23]. Vaginal candidiasis may be treated by systemic antifungal agents [23]. Treatment in the clinic often combined fluconazole which is highly effective in vaginal candidiasis, with doxycycline 100mg 12 hourly for 5 to 7 days.

### 4.6 Antibiotics prescribed for the management of Peptic ulcer disease

Also, there are two common forms of peptic ulcer disease, those associated with the organism *Helicobacter pylori* and those associated with the use of NSAID's [19, 23]. Majority of patients presenting with duodenal ulcer are infected with *H. pylori.* Antibiotics alone, or acid suppressing agents alone, do not eradicate *H. pylori*. Both therapies act synergistically [23]. Eradication of *H. pylori* should therefore be done using a 7-day course of a proton pump inhibitor (PPI) plus a combination of two of the following antibiotics as indicated; Amoxicillin, oral, 1 g 12 hourly or 500 mg 8 hourly, Clarithromycin, oral, 500 mg 12 hourly or 250 mg 12 hourly, Metronidazole, oral, 400 mg 12 hourly or 400mg 8 hourly [19]. It was observed during the study that in certain cases only one of the recommended antibiotics was prescribed together with the PPI and in some cases the triple therapy extended to 14 days. Amoxicillin 1 g was also in certain cases given 8 hourly. In addition, some patients did not need antibiotics since *H. pylori* infection was not present.

### 4.7 Antibiotic prescribed for the management of Injury

Wounds commonly seen in the clinic may be small or large and may be deep or superficial [19]. Some may become infected. In the study almost every case of injury had antibiotic cover with the intention of either preventing or treating infection especially the large and the deep ones. The commonest antibiotics were flucloxacillin and Amoxiclav orally. In certain cases wound swabs are taken for culture and sensitivity tests mostly after antibiotic prescription is given. Metronidazole was added when anaerobic bacteria infection is suspected.

Surgical antibiotic prophylaxis aims to reduce the rate of postoperative wound infections. The risk of infection depends primarily on the anatomical site of the surgery; however, host and operative factors are also important. Antibiotics chosen for prophylaxis should be active against bacteria most likely to cause significant infection [23]. Informal interview with the prescribers involved perfectly agrees with the above reasons for surgical prophylaxis. Long courses for postoperative antibiotics were not usually common.

### 4.8 The purpose for prescribing antibiotics

Approximately two-thirds of all prescriptions were for purposes of treatment and the rest for prophylaxis. This was quite similar to patterns described elsewhere [1].

Evaluation of antibiotic use with the aim of treatment shows that microbiological examination preceding treatment was not performed in most cases (88.8%). The majority of prescriptions were therefore made on an empirical basis. The pattern of some prescriptions for example in the treatment of skin and soft tissue infections (example cellulites) and common cold reflects lack of compliance to the Ghana Standard Treatment Guidelines (STG).

### 4.9 Laboratory investigations

Although syndromic diagnosis of infectious diseases has been an accepted standard of care in sub-Saharan Africa, there is accumulating evidence to support routine incorporation of

laboratory testing into diagnostic algorithms when available. Clinical diagnoses have been repeatedly associated with increases in misdiagnosis, morbidity, and mortality. There is evidence that lack of laboratory test use in this region may also be associated with disproportionate antibiotic use and increased empirical antibiotic administration and medication costs [25].

### 4.10 Pharmacist's interventions

Informal interview of the clinic's pharmacists and records from patients' folders revealed that a number of interventions in antibiotic usage were done more especially during general ward rounds. This mostly involved the selection of the appropriate drug; that is the agent with the narrowest possible spectrum which was administered for the shortest possible time. Also, for children, doses were adjusted based on parameters such as body weight. In addition, some antibiotics prescribed were substituted in consultation with the prescribers at the pharmacy especially when treatment was empirical.

It was also observed that some doctors went in for more expensive options example Co-Amoxiclav when Amoxycillin could serve the same purpose. The pharmacist played a key role in selection of combinations of antibiotics for mixed infections.

### 4.11 Recommendations

More study is required to determine the trend or pattern in antibiotic usage and the factors influencing this such as commercial information provided by sales representatives of pharmaceutical companies. Periodic survey of antibiotic usage at the Clinic as part of the nosocomial infection surveillance and control programme [7, 26] is recommended. Prospective study is preferred since more control is possible over collection of data and a more valid answer to any query is likely [27].

The Pharmacy Department should be responsible for the monitoring or collecting data on utilization and the laboratory should be responsible for monitoring data on antimicrobial resistance.

### 4.12 Limitations

Some limitations of the studies include:

(a) Not all folders were traced. This was due to improper filing or patient died and the file was archived.

(b) Some errors were detected in the entries at the pharmacy especially quantities of medicine issued and entries done more than once

(c) Not all prescriptions for antibiotics were served at the clinic's pharmacy. Some patients preferred buying their medication outside and also some of the antibiotics prescribed were not immediately available.

(d) Sometimes some of the antibiotics served were for prescriptions from other hospitals or clinics.

(e) Data collected by the biostatistician were for purposes other than that for the study

### 4.13 Conclusion

It is necessary to take action to improve prescribing habits in order to reduce the unnecessary usage of antibiotics thus enhance rational antibiotic use. The results of this survey revealed that there is the need for an antibiotic formulary or clinical guidelines. The Clinic's Drugs and Therapeutics committee can play an important role in this regard and also perform drug utilization studies and prescription reviews to improve drug use in general and management.

Doctors tend to use newer, more expensive agents, as opposed to cost effective, proven, and well-established antimicrobial agents.

Prescribers must be encouraged to make more use of laboratory investigations and must not depend solely on clinical diagnosis.

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**Appendix**

**Topic: A survey of antibiotic usage at Cocoa Clinic, a quasi-government hospital.**

Patient no …….. Age …….. Sex M / F Diagnosis ……

| No. of Antibiotic Px | Name of Antibiotic prescribed | Route | Strength | Dosage | Duration of Therapy | Laboratory Investigation | |
|---|---|---|---|---|---|---|---|
| | | | | | | Done before prescription | Done after prescription |
| | | | | | | | |
| | | | | | | | |
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| **Pharmacist interventions** Yes ☐ No ☐<br>1a) if yes what was the intervention that was made?<br>……...<br>…… | Purpose of prescription | | |
|---|---|---|---|
| | Therapeutic | Prophylaxis | Intent unknown |
| | | | |

**Topic: A survey of antibiotic usage at Cocoa Clinic, a quasi-government hospital.**

Patient no …….. Age …….. Sex M / F Diagnosis ……

| No. of Antibiotic Px | Name of Antibiotic prescribed | Route | Strength | Dosage | Duration of Therapy | Laboratory Investigation | |
|---|---|---|---|---|---|---|---|
| | | | | | | Done before prescription | Done after prescription |
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| **Pharmacist interventions** Yes ☐ No ☐<br>1a) if yes what was the intervention that was made?<br>……...<br>…… | Purpose of prescription | | |
|---|---|---|---|
| | Therapeutic | Prophylaxis | Intent unknown |
| | | | |