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**MASTER OF SCIENCE THESIS
HEALTH CARE MANAGEMENT**

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TOPIC

The occurrence of medication errors and the occurrence of risk factors for medication errors in state hospitals in Ghana:

Patients' safety improvement in focus

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**SCHOOL OF MANAGEMENT AND
GOVERNANCE**

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SUMMARY

Patient safety is very paramount in the provision of quality care. The patient, who is to be cured or cared for is to be at the centre of the care process without which the objective of care will not be achieved. As care givers attempt curing the sick, they inadvertently make mistakes that either worsen the situation of the patient or result in death. These errors are inevitable but with acknowledgement of the possibility of the incidence of errors in the care process, it could be reduced to the barest minimum.

Patients expect more than just diagnosis and prescription. They need information about their health status, participation in the process of care, assurance for their safety, transparency in the treatment procedure, anticipation of the outcome of the treatment and cooperation in all the stages of care.

This study involved three state own general hospitals in Ghana, aimed at finding out the occurrence of medication errors and the occurrence of risk factors for medication errors in the hospitals. The instruments used were;

- (1) The trigger tool developed for the purposes of reviewing the records of patients with the aim of finding out the occurrence rate of the errors and
- (2) Questionnaires for doctors, nurses, pharmacists and patients to find out the risk factors for medication errors.

A population of 160 with age range of 18-45 and hospital stay of not less than one week was selected for the review, out of which 28 errors representing 17.5% of the total population.

The general occurrence rate was found to be 8.2% indicating that out of every 1000 patients admitted for more than one week, 82 patients are likely to experience an Adverse Drug Event in one way or the other. The lower age group recorded the highest ADEs. It was realized that gender has no influence on the chances of experiencing an ADE since equal number of ADEs were recorded.

Ceftriaxin and Diclofenac Tablets were among the least prescribed drugs but recorded the highest ADEs. They, thus appear to be the most frequently responsible drugs for ADEs in the hospitals. Infections/Parasitic disease was the highest in the admissions registered as well as the highest in the incidence of ADEs.

Over 70% of the health professionals work over 12 hours in a day. Apart from some nurses (23.3%) who attend to at most 80 patients in a day, the rest, doctors and pharmacists (84.8%) attend to more than 80 patients in a day. All prescriptions are communicated by handwritten and were 67% susceptible to errors.

About a third of the professionals handed over by leaving a note. This is likely to leave a gap in the process resulting in miscommunication. There is little or no patients' participation in the hospitals as over 65% of them did not have knowledge about their medication status and clinical processes.

In conclusion, safety is not the best since there has been ample evidence that the occurrence rate is rather high and the risk factors for errors are prevailing in the hospital setting. There is however the need for pragmatic effort by management to intensify coordination between the stages of care and the professionals and patients interaction in the course of care delivery. A conscientious effort should be made at streamlining and coordinating the prescription and drug administration within the hospital by involving doctors, nurses, pharmacists and patients.

CHAPTER 1

INTRODUCTION

1.1 Background to the study

The provision of quality, safe and accessible healthcare has become the primary objective of most countries in the world, especially of developing countries. The demand for safe reliable and evidence-based care is a trend in discussions at the local, regional and national levels. This implies that governments in developing countries including Ghana have become more aware of and are becoming more committed to the provision of effective and reliable healthcare for their citizens.

Health consumers have become more conscious of their health needs and for that matter now demand a safe and quality healthcare system, that is reliable and evidence-based. The government of Ghana, becoming more conscious about improvement in healthcare, has now established medical schools in all state-owned universities and post-graduate diploma studies. Medication errors are among the setbacks in the government's quest to improve the safety of the patient. The Ghana health service has regional administrative offices in all the 10 regions of the country and district or municipal administrative offices in each of the 110 districts of the country.

A comprehensive Patient Charter developed by the National Governing body of the Ghana health services highlights the patients' rights and responsibilities in the care process irrespective of age, sex, ethnic background and religion. In the charter, health facilities must therefore provide for and respect the rights and responsibilities of patients/clients, families, health workers and other healthcare providers.

The health facilities must be sensitive to patients' socio-cultural and religious backgrounds, age, gender and other differences as well as the needs of the patients with disabilities. The charter is aimed at protecting the rights of the patient in the Ghana Health Services. The GHS, even though a decentralized public institution with the Regional and District/Municipal/ Metropolitan administrations, governs by the top-down or vertical management structure. Thus, the policies and programs are developed at the governing council level for the regional, districts and the hospitals to implement. This situation gives little or no autonomy to the Regional, districts and the hospitals. The current changing situation in the demand focus of the health consumer (patients) towards quality and safe care has become a world wide phenomenon. This is a result of increasing patient awareness and participation in the healthcare process.

Notwithstanding the above management style, the Central Regional Health Administration has taken a step further to improve the health delivery process by trying to identify areas in the delivery process that are detrimental to the health needs of the people. It is, however, the need of the Central Regional Health Administration in collaboration with the various hospital administrations to ensure a better health service for all categories of ailment by focusing on interventions for medication errors. This study will concentrate on the three general hospitals, namely the Regional, University and District Hospitals.

1.2 Statement of the Problem

Health care provision in Ghana has become competitive with current level of patients' awareness about their health needs, rights and responsibilities, irrespective of sex, gender, ethnic background, level of education and status in the society. The proliferation of private hospitals and health centres, traditional and spiritual healing centres in the wake of high hospital attendance calls for an improvement in the public health services.

The current high cost of health care definitely demands a more effective and safe health care process. A care that is accessible, reliable, evidence-based and cost effective. The health system will not be planned to cause harm but it is, as a human institution, susceptible to errors in the process of providing the services. Obviously, no system is perfect and for that matter a health system as that of a developing country such as Ghana will not be an exception. Notwithstanding that, frantic efforts are to be made at all levels to ensure adequate and perfect system.

One most important area where imperfection could occur is the medication process but mostly little or nothing is done to change the situation. Medication errors could not be deliberate but complacency and ignorance could lead to its occurrence if no attention is paid to it. These errors do occur in the all units of the hospital but most specifically care patient admitted to be cured should not be at any risk as the system should be in a better position to cure a patient than the home or the street. Making a system perfect could be a mirage but aiming at perfection is a step in the right direction to provide the best to ensure the safety of the patient under the canopy of cure. Hence the identification of the causes and the elimination of medication errors is a giant step at ensuring patient safety.

1.3 Objective

The main objective of this research is to produce appropriate recommendations on the prevention of medication errors as applicable in the Ghanaian context as one of the means of improving patients' safety in the inpatient settings of the Ghana health system.

1.4 Rationale

The Central Regional directorate in collaboration with the three general hospitals in the municipality in their quest to improve the healthcare for the people has started a number of programs, especially finding better ways of identifying the causes of medication errors, their bottlenecks and their rate of occurrence in the health system. This research identifies the causes and the occurrence of medication errors and proposes appropriate strategies to eradicate or at least to reduce the occurrence of medication error and create a new page for management and administrators both at the hospital and the regional administration to enhance the objective of the Ghana Health Services.

The findings from this research will be a factor for the regional health service to realise its mission of improving the health status of the people in the central region and for that matter the people of Ghana. The various hospitals under research will use the outcome in the implementation

process of their quality assurance programs. This research is also to explore and to add new knowledge to the quality and safety improvement strategies and again serve as a basis for further research into other specific areas of health care in Ghana and possibly for Africa.

1.5 Research questions

In achieving the objectives of the study, certain questions were used to guide the study. These questions helped to review the relevant literature and develop a framework for the study. In developing the conceptual frame work for identifying the occurrence and causes of medication errors the following questions were asked;

1. What is the occurrence of medication errors?
2. What is the occurrence of risk factors of medication errors in state hospitals in Ghanaian hospitals?

1.6 Limitation of the study

A few weaknesses of the study which are beyond the researcher's control could influence the results and the generalization of the findings and recommendations. The researcher's limited knowledge in pharmacology and epidemiology could be a setback in the data collection process but the involvement of qualified general practitioners and pharmacists in the development of the instrument (Trigger Tool) for the patients chart review authenticates the process and for that matter the reliability of the outcome.

The respondents may not give a true response to some of the items that sought to identify valuable information such as responsibility for a medication error and reporting of incidents so as to protect their professional integrity .A few items of the questionnaire for the nurses could not be retrieved and could affect the outcome of the results. An initial difficulty in the field work was that some of the doctors and the nurses were sceptic about the study because they thought the outcome would cast a slur on their profession but when given the opportunity to speak to a cross section of them at a short seminar organized by the Regional Director on my behalf, participation was very good.

1.7 General Outline of the Study

Chapter 2 dwells on contextual issues such as a general introduction to Ghana, the Ghana Health Services structure from the Minister to the Hospital organizational structure. The chapter then puts the Central Regional Health Administration and the Regional, District and the University Hospitals in focus for evaluation and finally a summary of the chapter is presented. Chapter three contains the theoretical framework which ends with the conceptual framework. The methodology of the study is described in chapter four where, among others, there is an illustration of the choice of sample size and sampling techniques and the data analysis procedure to be used in the study.

In chapter five, the findings from the study are developed whilst the sixth chapter contains the summary of the findings, conclusions and recommendations. This same chapter will embody recommendations for further research based on the findings of the study.

CHAPTER 2

CONTEXT ANALYSIS

2.0 Introduction

This chapter describes the situational context within which the research was conducted. It contains a short history about Ghana, Literacy and healthcare in the Central Region, the Ghana Health Service, the Central Regional Health Service, accessibility to healthcare in the Central Region and the Hospitals in context.

2.1 General Introduction about Ghana

2.2 Literacy, Trend and Access to health care in Ghana

2.3 The Ghana Health Services

2.4 The Central Regional Health Services

2.5 Accessibility to health care in the central Region

2.6 The University, District and The Regional Hospital and health care in the Cape Coast District

2.1 General Introduction about Ghana

Ghana, one of the British colonies was formally known as the Gold Coast. It is located on longitudes $2\frac{1}{2}^{\circ}$ W and $1\frac{1}{2}^{\circ}$ E Latitudes $4\frac{1}{2}^{\circ}$ S and $10\frac{1}{2}^{\circ}$ N of the equator. It is boarded to the east by Togo, west by Ivory Coast, south by the Atlantic Ocean and the north by Burkina Faso (Upper Volta). Ghana has an area of 92,100sq miles (238.533sq kilometers) and 670kilometres from the northern border to the southern coast. Figure 1 below shows the political area of Ghana.

Ghana has ten regions and 138 districts with Accra as the national capital. According to the Ghana Statistical Service (2005 estimates), the population of Ghana is 21,100,000 with a density of 78.9 persons per square kilometer and growth rate of 2.25 per minimum. It is a multi-lingual state with over 40 language groups. Some of the major ethnic groups are the Akan, Ewe, Guan, Ga Adamgbe and Mole-Dagbani. Despite the cultural differences among Ghanaians, most cities and towns are cosmopolitan, where people live in good co-existence.

Ghana is a developing country with her economy dominantly an agricultural one. The country depends very much on primary products and is endowed with a lot of natural resources such as gold, diamond, manganese, cocoa, bauxite, timber and also with cocoa, gold and timber being the main composition of Ghana's export. The contribution of cocoa as a single export crop for the country has been overwhelming, often contributing more than 40% of total export earnings.

Notwithstanding its position as one of the most successful examples of an economic turnaround in Sub-Saharan Africa, Ghana remains heavily dependent on international financial and technical assistance with the domestic economy revolving around subsistence agriculture which accounts for 36% of the countries Gross Domestic Product (GDP) and provides employment for over 60% of her workforce (World Fact Book2006).

Figure 1: The Map of Ghana indicating the political regions and boundaries



Source: www.ghanaweb.com

The terrain is composed of plains and scrubland, rain forest and savannah. Ghana has a tropical climate with two main seasons, the wet and the dry. The wet season is influenced by the south-west monsoon winds whilst the dry season (hamatan) is influenced by the north east trade wind.

2.2 Literacy, Trend and Access to health care in Ghana

The 1992 constitution has made provisions for a basic education of every child from age 6 to 15, irrespective of ethnicity, religion, gender and geographical location. The basic education system in Ghana is compulsory and free, made up of six years of primary school and 3 years of Junior Secondary School. Successful Junior Secondary School (JSS) students who obtain aggregate 6-30 in their best six subjects in the Basic Education Certificate Examination move to the next level being Senior Secondary School (SSS). A successful completion of the SSS gives one the opportunity to proceed to college, polytechnic or university for post-secondary education. Over half (57.4%) of the total population of Ghana is literate (Ghana population census 2000). According to the 2000 census, 16.4% are literate in English only, 2.5% in a local language only and 38.1% in both English and a Ghanaian language. This implies that Ghanaians are more versed

in learning and interacting in English language than their own indigenous language(s). There are also a higher proportion of female literates (50.2%) than male (33.6%). Differences in access to economic opportunities, reinforced by some cultural practices are largely responsible for the much higher illiteracy rate of females in rural population.

In general, the goal of healthcare in Ghana is to improve the welfare of all the people living in the country. A key condition of this goal is the good health of its citizenry. Improving the performance of health systems and fostering linkages with other relevant sectors is, therefore, needed to achieve this goal (PPME-GHS, 2005).

Health care in Ghana is twofold: orthodox and alternative medicine. It is estimated that about 70% of the population of Ghana uses alternative medicine which includes traditional health care whilst 30% rely on orthodox medical care. The orthodox health care delivery in the Ghanaian context consists of a greater emphasis on curative care or treatment, preventive activities such as immunization programs, promotional activities such as antenatal care and family planning and rehabilitative services. Additionally, health care is organized at a three-tier level; primary, secondary and tertiary levels. On the other hand, alternative medical treatment includes traditional medicine, herbal and psychosomatic treatments (including faith-based medical regimes), and quite often, a combination of the two.

The Ghana Health Sector Five Year Program of Work (2002-2006) aimed to reduce health inequalities between the north-south divide of the country, between urban and rural areas as well as inequalities linked to gender, education and disability. The program falls under the Ghana Poverty Reduction Strategy II which places emphasis on three priority areas including the following;

- bridging equity gaps in access to quality health and nutrition services
- ensuring sustainable financing arrangement that protects the poor
- enhancing efficiency in service delivery.

According to the Ghana Human Development Report (GHDR, 2007), 57.7% of Ghanaians has access to a health facility within 30 minutes of their places of residence. This is also linked to the distribution of health facilities in the system. Urban localities generally enjoy good access to health compared to rural areas as urban areas tend to have a relatively better concentration of health facilities and better road net works as well as other factors that enhance access. The Ghana Statistical Service definition of access to health care in terms of distance to health facilities can be criticized on the grounds that it does not take into consideration the cost of health services, education about the essence of patronising the facilities and the transportation means of getting to the facilities. People could be very close to a health facility but if they do not have the financial means and the ability to read and make informed decisions about the benefits of the facility, they cannot access it for their benefit.

The doctor/ nurse to patient ratio invariably have impact on the access as it affects the quality, efficiency and the timing of health delivery to the people. Higher ratios impact negatively on health access through longer waiting periods for health care. It also impacts negatively on health and efficiency of health personnel due to stress associated with long working hours. In 2001, population/ doctor ratio was 20,036 nationally. This situation improved to 18,274 in 2003 and then a further improvement in the same year to 16,759 before a further reduction to 17,733 in 2004 (GHDR, 2007).

2.3.0 The Ghana Health Service

The Ghana Health Service (GHS) is a public service body established in 1996 under Act 525 as required by the 1992 Constitution of the republic of Ghana. It is an autonomous executive agency responsible for the implementation of national policies under the control of the minister for health through its government council - the Ghana Health Services Council. It is an essential part of the key strategies identified in the Health Sector Reform Process, as outlined in the Medium Term Health Strategy, which are necessary steps in establishing a more equitable efficient, accessible and responsive healthcare system. It is the mission of the GHS to deliver health in a humane, efficient and effective manner by well trained, friendly, highly motivated and client oriented personnel.

2.3.1 Mandate of the Ghana Health Services

The Ghana Health Service has the mandate to prudently manage comprehensive and accessible health service with special emphasis on primary health care at regional, district and sub-district levels in accordance with approved national policies.

The objectives of the GHS are to;

Implement approved national policies for health delivery in the country
Increase access to good quality health services and
Manage prudently resources available for the provision of the health service.

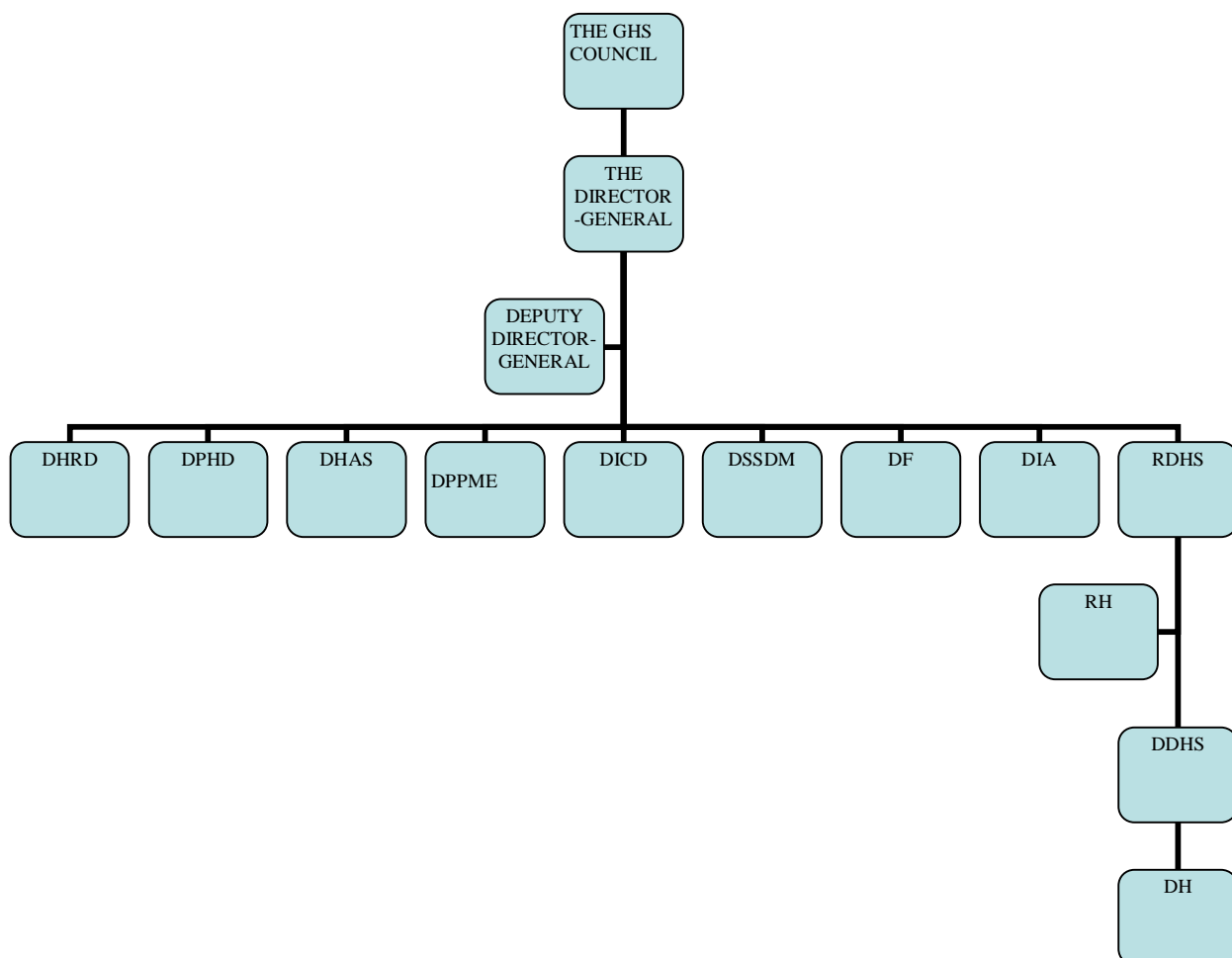
In order to achieve the objectives set above, the GHS performs among others to;

- Develop appropriate strategies and set technical guidelines to achieve the national policy goals.
- Undertake management and administration of the overall health resources within the service.
- Promote healthy mode of living and good health habits by people.
- Establish effective mechanisms for disease surveillance, prevention and control.
- Determine charges for health services with the approval of the Minister of Health.
- Provide in-service training and continuing education.
- Perform any other functions to the promotion, protection and restoration of health.

2.3.2 Organizational Structure of the Ghana Health Services

Administratively, the GHS is organized at three levels: the national, regional and district levels. Functionally it is organized at five levels; national, regional, district, sub-district and community levels. Below are the organizational structures of the national, regional and the hospital administration.

Figure 2....The Ghana Health Services Structure



Key

DHRD=Director Human Resource Division

DPHD=Director Public Health Division

DHASS=Director Health and Administrative Services

DSSDM=Director Supply Services and Drug Management

DPPME=Director Policy Planning and Evaluation

DICD=Director Institutional Care Division

DF=Director Finance

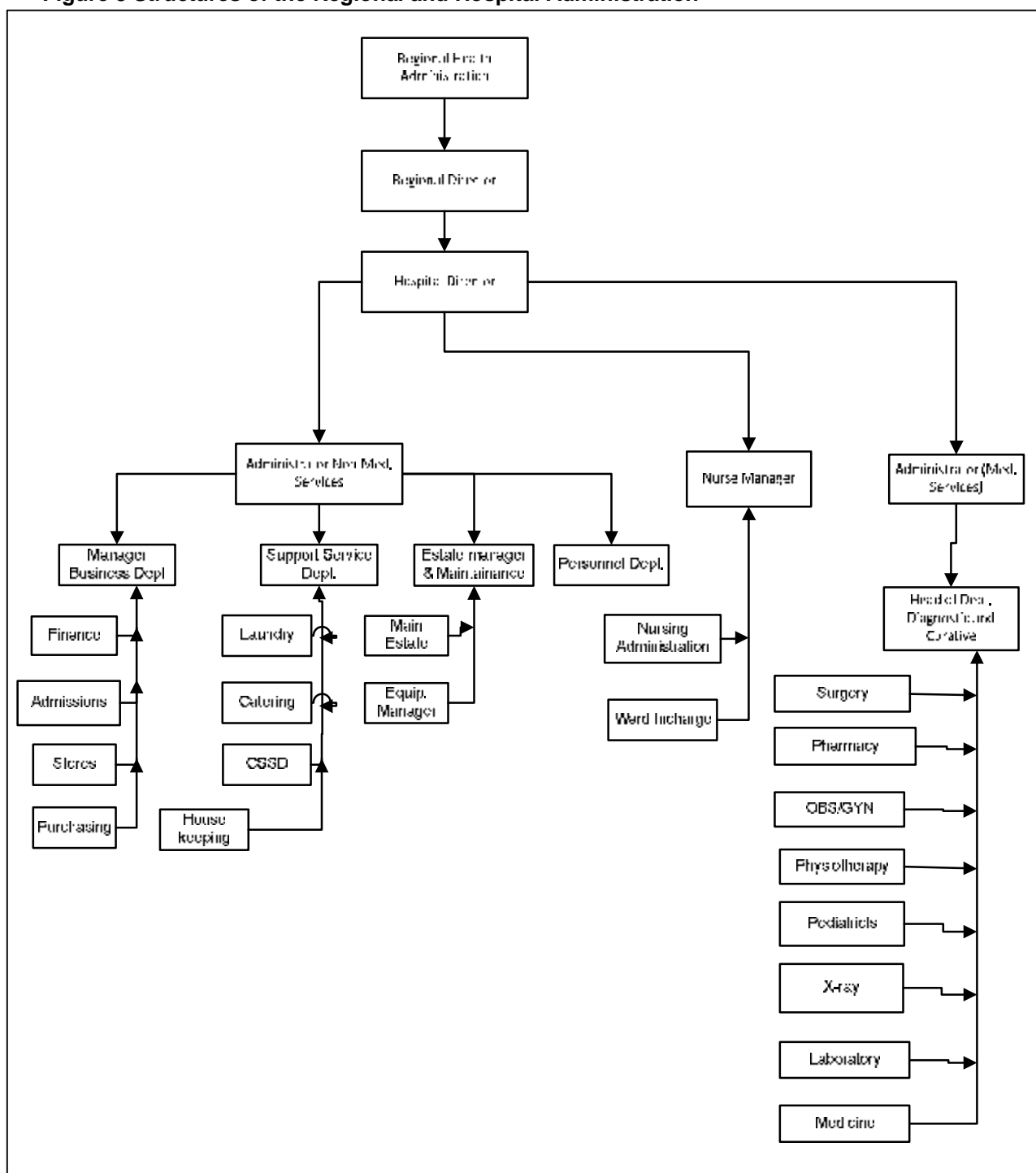
DIA=Director Internal Audit

RDHS=Regional Director of Health Services

DDHS=District Director of Health Service

CSSD=Central Surgical Sterilization Department

Figure 3 Structures of the Regional and Hospital Administration



All the state owned hospitals implement policies designed by the Ghana Health Services Council through the regional council. Critically considering the Ghana Health Services structure and the structure of the regional health and hospital administration, there is no department in charge of research and development.

The research and development unit could have been part of the national and at least the regional health administration.

2.4 The Central Regional Health Administration

The Central Regional Health Administration is located in Cape Coast, the Central Regional Capital. The region has a total number of 222 health facilities distributed throughout the region. Table 1 contains a summary of the health facilities and their ownership status. The Cape Coast District has eight state hospitals and two quasi-government ownership.

Table 1: Health Facilities by Ownership

District	Government	Private	CHAG MISSION /	Quasi Government	NGO	Total
AES	9	22				31
Agona	12	11	2			25
C/Coast	8	13	1	2	1	25
Gomoa	14	4	1			19
Mfant	9	8	1			18
U/DENKYIR	9	5	1			16
KEEA	13	2				15
AEE	10	4	1			15
AAK	13	2				15
THLD	7	5	1			13
Assin N	5	5	2			12
AOB	6	2	1			9
ASSIN S	6	2	1			9
Total	122	85	13	2	1	222

Source; Central Regional Health Services Annual Report (CRHSAR, 2007)

The doctor/ population ration as at the end of 2007 in the region was 1 to 25603 and in the Cape Coast district it was 1 to 3503 (CRHSAR 2007). As at the end of the year 2007 the central region with a population of about 1,843,403 had a total of 72, an increase of 22 doctors within one year. This number is not enough to reduce the work-load of the doctors. See table...2

Table 2: Doctor/population ratio

	2006 Projection	2007 Projection	No. Of Doctors 2006	No. Of Doctors 2007	Doc Pop Ratio 2006	Doc Pop Ratio 2007
Assin North	121,630	124,184	4	6	30407	20697
Assin South	100,918	103,037	0	0	-	-
Agona	180,065	183,846	3	3	60022	61282
Abura/Asebu Kwamankese	102,058	104,201	1	1	102058	104201
Asikuma Odoben Brakwa	101,267	103,393	4	5	25317	20679
Ajumako Enyan Essiam	104,178	106,365	1	1	104178	106365
Awutu Effutu Senya	192,545	196,589	3	3	64182	65530
Cape Coast	133,791	136,600	25	39	5352	3503
Gomoa	220,661	225,294	2	3	110330	75098
Komenda Edina Eguafo Abrem	127,369	130,043	3	3	42456	43348
Mfantseman	173,154	176,791	1	3	173154	58930
Twifo Hemang Lower Denkyira	125,007	127,632	1	1	125007	127632
Upper Denkyira	122,846	125,425	2	4	61423	31356
Central Region	1,805,487	1,843,403	50	72	36110	25603

Source; Ghana Health Services Annual Report 2007

According to the 2007 report of the Central Regional Health Services, the nurse population ratio is 1 to 1,627 just over 0.06% in the region and 1 to 521 in the Cape Coast district. The total number of nurses in the region is 1,133 and 262 in the Cape Coast district representing just over 0.01%. See table 3.

Table 3: Nurse Population Ratio

District	2006 projection	2007 projection	number of nurses 2006	number of nurses 2007	nurse pop ratio 2006	nurse pop ratio 2007
Assin North	121,630	124,184	46	55	2644	2258
Assin South	100,918	103,037	32	34	3154	3030
Agona	180,065	183,846	105	111	1715	1656
Abura/Asebu Kwamankese	102,058	104,201	53	63	1926	1654
Asikuma Odoben Brakwa	101,267	103,393	40	52	2532	1988
Ajumako Enyan Essiam	104,178	106,365	48	56	2170	1899
Awutu Effutu Senya	192,545	196,589	113	124	1704	1585
Cape Coast	133,791	136,600	262	262	511	521
Gomoa	220,661	225,294	44	57	5015	3953
Komenda Edina Eguafo Abrem	127,369	130,043	61	65	2088	2001
Mfantseman	173,154	176,791	87	106	1990	1668
Twifo Hemang Lower Denkyira	125,007	127,632	42	51	2976	2503
Upper Denkyira	122,846	125,425	91	97	1350	1293
Central Region	1,805,487	1,843,403	1,024	1,133	1763	1627

Source: CRHSR, 2007

Attendance to public health facilities in the region has increased considerably from 2005 to 2007 with a significant increase by about 90% from 2006 to 2007. Table 4 contains a summary of the OPD attendance to the various health facilities. Over 80% of OPD attendance in the region is in the state hospitals followed by Mission hospital (12%) and less than 5% attend the rest. Malaria is observed to be the top cause of hospital attendance in the region (see table 5)

Table 4 OPD Attendances by Ownership

	2005(%)	2006 (%)	2007(%)
GHS	71	73.9	81
MISSION	16	18.5	12
QUASI	10	7.2	4
PRIVATE	3	0.4	3

Source; CRHSR, 2007

Table 5 Ten Top Causes Of OPD Consultation C/R-2005- 2007

Disease	No. of cases (2005)	No. of cases (2006)	No. of cases (2007)
Malaria	200,687 (44.5%)	288,078 (42.3%)	570315(45.6%)
Upper resp. tract. Inf.	33,661 (7.5%)	43,767 (8.9%)	112377(9.0)
Disease of the skin	23,883 (5.3%)	23,955 (4.9%)	57425(4.6)
Hypertension	11,334 (2.5%)	15,766 (3.2%)	55126(4.4)
Rheumatism/Joint Pains	10,081 (2.2%)	12,177 (2.5%)	35108(2.8)
Anaemia	12,578 (2.8%)	10,369 (2.1%)	32327(2.6)
Preg. Related complication	9,805 (2.2%)	8,691 (1.8%)	21653(1.7)
Accident	9,899 (2.2%)	8,391 (1.7)	22572(1.8)
Acute Eye Infection	7,876 (1.3%)	8,107 (1.6%)	14131(1.4)
Gastro Intestinal Disorders	12,975 (2.2%)	7,555 (1.5%)	-
All others	118,237 (26.2%)	67,521 (13.7%)	217394(17.4)
Total new cases	451,016	494,377	1249719

Source: Ghana Health Services Annual Report 2007.

Since 2005, malaria has been the highest cause of OPD attendance in the region recording as high as 45.6% of the total attendance in 2007. Hypertention has almost doubled from 2005(2.5%) to 2007(4.4%). All other diseases reduced considerably in 2006 but increased by 3.7% in 2007.

2.5 Summary

The region has a population of almost two million with a doctor population ratio of one 1:25603 and nurse/population ratio of 1:1627. It is further observed that the ratio of doctor and nurse/population is 1:3503 and 1:521 respectively, in the Cape Coast District. More than half of the population is within 30minutes of access to a health facility. There is a high level of illiteracy even though there is an improved access to educational facilities. Health care facilities are available within 30minutes of reach but malaria is the highest cause of OPD and admissions and mortality rate. Policies are formulated from the Ghana health Services Council and then implemented by the regional, district and hospital administration.

CHAPTER 3

THEORETICAL ANALYSIS

3.0 Introduction

In this chapter a detailed literature outline related to the study is captured. It outlines literature on effective health care and patient safety, medication errors and adverse events, the concept and indicators of medication errors and a relation of the health care system to industry and commerce. The final part of this chapter contains the conclusion.

3.1 The issue of effective health care and patient safety

The Institute of Medicine (2007) refers to effective health care as care that is based on the use of systematically acquired evidence to determine whether an intervention, such as a preventive service, diagnostic test, or therapy, produces better outcomes than alternatives. This assertion implies that an effective health care should have the best out of a number of interventions including doing nothing to reach a better result. Chassin (1997) has indicated that care givers should engage in evidence –based practice so as to consistently avoid both underuse of effective care and overuse of ineffective care that is more likely to harm than help patients. Sackett et al. (1996) consider effective health care as a health care that is evidence-based. They elaborate further that evidence-based practice is the integration of best research evidence with clinical expertise and patient values. The key points in the concept of effective health care as defined by Sackett and colleagues are;

- Best research evidence
- Clinical evidence and
- Patient values.

‘Best research evidence refers to clinically relevant research, often from the basic sciences of medicine, but especially from patient-centered clinical research into the accuracy and precision of diagnostic tests (including the clinical examination); the power of predictive markers; and the efficacy and safety of therapeutic, rehabilitative, and preventive regimens. Clinical expertise means the ability to use skills and past experience to rapidly identify each patient’s unique health state and diagnosis, individual risks and benefits of potential interventions, and personal values and expectations. Patient values refers to the unique preferences, concerns and expectations that are brought by each patient to a clinical encounter and must be integrated into clinical decisions if the patient is to be served’.(Institute of Medicine 2007)

Gerteis et al. (1993), in their view, have identified several dimensions of patient centered care as respect for patients’ values, preferences and expressed needs; coordination and integration of care; information, communication and education; physical comfort; emotional support-relieving fear and anxiety; and involvement of family and friends. This view encompasses all the patients’ attributes, needs and concerns.

The Institute of Medicine defined patient safety in 1999 as “freedom from accidental injury because of medical care or medical errors” and charged hospitals to create a culture of safety in their institutions (Institute of Medicine 1999). According to Van Loghum Houten, Bohn Stafleu (2007), patient safety is “practically no chance that the patient suffers physical and/or psychological injury due to the failure of health providers to deliver care according to professional standards and/or the shortcomings of the healthcare system.” In their context of patient safety, they stress on delivering responsible care which means preventing unnecessary injury to patients as far as possible. This context highlights the registration of incidents, complications and complaints. There is emphasis on incidents and complications intersected by adverse events. The culture of safety and professional competence are the two main issues that can be directly linked considering the recommendations of the Institute of Medicine and the viewpoint of Bonn and Loghum (2007). “Safety is not a dichotomy but a concept that can be graded just as beauty, seize or strength. Although safety cannot directly be measured in seize and number, it can be quantified if it is interpreted as a degree of reduction of risk (Bonn Stafleu van Loghum, Houten, 2007). Invariably risk is complementary to safety. Safety consciousness can be improved and maintained throughout a system or setting mainly when there is a greater awareness of possible risks. A study-result, based on investigating a random sample of US hospitals, reviewed that the quality of safety climates predicted medication errors, nurse back injuries, urinary infections, patient satisfaction, patient perceptions of nurse responsiveness and nurse satisfaction (Pronovost et al, 2006).

Safety studies have been conducted in various units of US hospitals which have provided good outcomes. For instance, a study of safety culture was set up in an American intensive care unit to provide an answer to the question of “how do we know that we are safe now from the past?” They concluded that healthcare currently lacks a robust safety score card including measures of:

How often do we harm patients?

How often do we do what we should, that is, use evidence based medicine?

How do we know we have learned from mistakes?

How well are we improving culture?

The same research concluded that the science of measuring patient safety was immature.

In the recommendation, the report stated that organisations find a balance between measures that are scientifically sound, affordable, and usable and easily applied throughout the health institutions (Scott T., Mannion R., Marshall M., Davice H., 2003).

‘The inclusion of scientific evidence within clinical practise guidelines has now become more or less standard in the western world. Wolf and colleagues (1999) maintain that practical evidence-based recommendations on how to manage healthcare problems are seen by practitioners, peers and policy makers as potentially powerful tools for the achievement of effective and efficient care provided that they are well developed and implemented. Quality emphasis indicates that the organisation has a safe culture in which failures are discussed without fear of blame and where quality and patients come first’. (Kaisi and Co 2004)

Culture has been a major issue in the implementation of safety improvement measures. Not only that, but costs is also playing an important role in hindering the implementation process. There is, therefore, the implication that when the issue of culture and costs are overcome, safety measures will be very comfortable to implement.

The cultural issue transcends from the board through to the patients. This means that the willingness of the board to approve the safety strategy and provide the needed funds will encourage the management to implement these strategies.

The other problem will be affordability and confidence in the health delivery system on the part of the consumer. Overcoming the above mentioned will then answer the question of how often do we harm patients, how do we do what we should, how do we know we have learned from our mistakes and how well are we improving cultures. For a safety policy to function properly, objectives that are consistent with a mission, vision and strategy of the organisation are needed. Action instead of talk should be combined with sufficiently high ambition-level Forkland, (1999).

3.2 Medication Errors and the Adverse Drug Events in the care process

Medication errors and adverse drug events (ADEs) continue to be the single largest source of repetitive health care mishaps, continually placing patients at risk. Rozich J.D, Haraden C.R and Resar R.K (2003). Medical errors may occur as a result of lack of professional competence or system failure. The Institute of Medicine (1999) defines medical errors as “the failure of a planned action to be completed as intended or the use of a wrong plan to achieve an aim among other things, problems in practise, products, procedures and systems. This definition does not embrace acts that do not result in desired outcomes not as a result of negligence, unavoidable risks of a medical routine or procedure and co-morbid illnesses. The IHI and Premier convened a group of experts to develop a model for a design of the medication system in January 2000. The design was to capture the concepts of error as a surrogate for harm. As a result, the experts considered the World Health Organization concepts of ADEs” a response to a drug which is noxious and unintended and which occurs at doses normally used in man for prophylaxis, diagnosis or therapy of disease or the modification of physiological function” Bates D.W, Boyle D.L, Vander Viet et al,(1995). Bates and Colleagues (1995) refer to ADEs as instances where patients are unintentionally harmed as a result of drug use. This implies inefficiencies, ineffectiveness and system failure and lack of adherence.

“By using the index of the National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) the experts refined even further as the magnitude of harm suffered by a patient was then classified into subsets of data. The classification has five categories(E-I) ranging from category E, defined as harm that contributed to or resulted in temporary harm that required intervention, to category I which is the most serious and is defined as harm that contribute to or resulted in the death of a patient.

Category E: harm that contributed to or resulted in temporary harms to the patient and required intervention

Category F: harm that contributed to or required initial or prolonged hospitalization

Category G: harm that contributed to or resulted in permanent patient harm

Category H: harm that required intervention to sustain life

Category I: harm that contributed to or resulted in the death of a patient’

Everdingen and Co. (2007), pose a question of “why are so many errors made in medical care, what are the reasons behind these errors and why are they not corrected”. These simple questions

are preludes to earlier identification of possible errors, formulation of appropriate strategies and the maintenance of safety in health care organizations.

Evidence based strategies have always been left in the cabinets and shelves due to the non-enthusiastic and low-ambitious level of leadership. More talk, more write-ups and good strategies formulation without action is detrimental to safety improvement.

In a publication online by Anne S. (2006), the result of the first implementation of Belgian Ward-Based clinical pharmacy services targeting patients at high-risk of drug-related problems, a total of 1066 interventions were made within a seven month period. The most frequent drug-related problems were under-use, (15.9%), wrong dose (11.9%), inappropriate duration of therapy (9.7%) and inappropriate choice of medication ((9.6%). These resulted in discontinue a drug use (24.5%), add a drug (18.6%) and change a dose (13.7%). This, however is a clear indication of the fact that all is even not well with the Western Hospitals.

Undoubtedly, an optimum hospital resources coupled with management performance will improve on the patients' safety. Nolan and colleagues (2001) indicates that the assessment of hospital performance, although in its infancy in low-income countries, provides ample evidence that current deficiencies must be stressed. It is however important that equitable rule-out of new programs or new interventions that need a functioning hospital sector, including the treatments of AIDS-patients with anti-retroviral drugs will be impossible if system deficiencies are not tackled. In addition to few staff in the first-referral hospitals in Kenya and for that matter other African countries, the resources are available to the main inpatient paediatric clinical services providers, clinical officers and nurses are sub-optimum.

3.3 Risk Factors of Medication Errors

Kilbride and Colleagues (2002), draw into the various attempts at providing a simple definition for medication error, the failure of a planned action to be completed as intended or the use of a wrong plan to achieve an aim. They further identify among the following as the causes of medication errors;

- Over-load of work on health professionals
- Lack of expertise and training
- Poor communication among professional in the care process
- Lack of appropriate technologies (computer aided diagnosis and prescription
- Poor labelling
- Prescription errors(ineligibility of physician's hand writing and typographical errors)
- Non cohesion in the handing over.
- Victimized culprits of error leading to non-reporting
- Non involvement of patients and or their relatives in the care process.

3.3.1 Overload of work

If we can still experience preventable events that could harm or worsen the condition of patients, then there is surely an underpinning factor to the occurrence of errors and could be serious in the African context. The African has gained much trust in the Western medicine due to its proven and evidence-based characteristics, coupled with improved technology in health care. Even though, a good number of Africans patronise the hospitals for diagnosis the majority in the rural areas still seek traditional interventions for their ailments. This could stem from the fact that the ratio of traditional healer per population in sub-Saharan Africa is about 1:500 while that of doctors was about 1:40,000 about a decade ago (Abdool and Co 1994). It is possible the ratio has changed but there could be a wide difference due to the migration of medical professionals to the developed world.

The availability of doctors is critical to health, being that, they often determine the type of medical test to be performed on patient-samples, carry out surgeries and prescribe the appropriate medication. Hendey and Colleagues (2005) have indicated that the deficiency of doctors in the health may lead to higher errors in diagnosis and prescription and such medical errors are likely to increase especially in countries where a doctor may be responsible for the inpatient wards as well as consult for ambulant patients. This accession is not over emphasized since it is the situation in Sub-Saharan Africa of which Ghana is part. Working more hours in a complex environment demands rapt attention but can result in much stress which is prone to accident, Annankoma k. (1998). This accession is applicable in the situation where doctors, nurses and paramedics have to work long hours resulting in possible errors in the course of their duty.

Most countries in Sub-Saharan Africa at independence inherited a weak and dualistic health-care structure. These structures are almost mirror images of their domestic economies with the traditional and modern sectors co-existing side by side. In modern terms health services were understaffed, distorted and located in urban areas. As a result, the greater population which resided in rural areas relied on traditional medicine to meet their basic health needs. According to the World Bank 1989-report, 'apart from some vertical disease eradication programmes, broad based public health efforts were insignificant. Curative care was equally underdeveloped. For example for 4 or 5 countries the average number of people per doctor varied between 12000 and 100000 (Burkina Faso), compared to a South Asian average of 6000. As a result mortality rates which were particularly pronounced among the under five were comparatively higher than those countries with similar levels of income capital and were caused by communicable and waterborne diseases such as respiratory infections, diarrhoea, tuberculosis and measles'.

In Ghana, the nurse population ratio of 1 to 1,627, just over 0.06% in the Central, 1 to 521 in the Cape Coast district and doctor/ population ratio of 1 to 25603 in the Region and in the Cape Coast district, 1 to 3503, according to the Central Regional Health Service Report (CRHSAR 2007), undoubtedly attests to the fact that there is a lot of pressure on the few medical personnel in the district. This is a real risk factor for medication errors since it can result in long hours of work and attending to a large number of patients.

Figure 4 Patients waiting to see consult one doctor at the University hospital



It was only 8am on a Monday and these patients were already waiting to see a doctor at the University Hospital in Cape Coast. This number will possibly be tripled by 12noon.

3.3.2 Expertise and Training

The emphasise is not just on doctors and nurses for providing good health care services but qualified medical pharmacists and knowledge in modern medical innovations play an important role in the detection of prescription errors, substituting of unavailable prescribed drugs with available ones and alerting doctors of new drugs on the market. According to Smith (2003), measures to improve drug use may be conceived at different levels and focused on any of a broad range of issues stemming from policy and regulation at a governmental level to prescribing practices and adherence rates at a practitioners-client level. The dynamic nature of the health system demands a regular upgrading of professionals and practitioners in order to be at breast with the demands of clients Stockwell (2002). According to Cornia G.A., (1996), large scale campaigns were implemented to reduce the incidents of infectious diseases and training for health workers was upgraded in many countries. The skills of some non-physician providers may overlap with a subset of physician services, often creating tensions among clinicians (Cooper et al 1998). On the job training is important especially for newly recruit doctors and already practising staff to reduce conflict of procedure based on new ideas (Onomma et al 1997). Tunddea (2002) observes that lack of continuous education in challenging and dynamic system such as the health care system may result in consequences that will collapse it. This observation is valuable since a disaster in the health care setting will involve life. Inadequate training and experience is a gap between the system objective and procedure towards achieving it Bilant 1997). The internet can be a powerful tool for undergraduate and continuing medical education for all types of health professionals. A variety of internet-based educational programs have made their curricula and training materials available on the web. There are also educational videos, lectures, virtual classrooms and simulation programs to teach surgical skills (Cross the Quality Chasm2007). Since Ghana is a developing country, yet to reach an appreciable level with the needed

infrastructure to enhance the use of advanced technologies such as advanced medical technologies, the government has introduced the Fibre Optics Telecommunication Network

Technologies which will use lasers to generate a suitable light source which can produce very tightly focused pulses of light many times a second. The final installation of the technology, coupled with the needed infrastructure will enhance on-the-job training since professionals can upgrade their knowledge and skills via the internet through distance learning. This will enhance the use the internet in the training of health professionals. For now that the facilities are not adequate for distance learning where medical personnel can be at post and take advantage of training opportunities via the internet, further training for practising medical personnel means leaving the hospital for the period, which will aggravate the problem of shortage of staff. Even though there are some post-graduate training schools for health professionals, a few of them are able to take advantage due to the shortage of personnel as already stated.

3.3.3 Appropriate Technology

Information technology cannot be overemphasised when considering improvement in today's healthcare due to the demand, expectation and the changing nature of healthcare becoming competitive. Health consumers need participation in their care processes, faster or quicker and appropriate and safe delivery, on time and to their needs.

Health providers also need more accurate; evidence based, quicker, timely and patient centred procedure to deliver care. Duvieux et al. (2000), indicate that computer-assisted diagnosis and management can improve quality. There are many opportunities to use information technology (IT) to make healthcare more patient-centred, for example by facilitating access to clinical knowledge through understandable and available websites and online support groups. (Cain et al. 2000). With improved IT in healthcare it will be easy to translate general statements and strategies into specific agenda for improvement. According to the Institute of Medicines recommendations (Institute of Medicine (2007), for improving the 21st century health care system: healthcare should be safe, effective, patient centred, timely, efficient and equitable. The 6 aims listed could be a foundation for formulating strategies and implementation of safety improvement policy guidelines for the healthcare institutions. Boonsra and Colleagues (2003) indicate that, quality in the process of care is influenced negatively by dispensing procedures and labelling of medicines which further affects patients' knowledge which is seen as a prerequisite for adherence to medication. Agyapong et al. (2002) indicated in a study conducted in 2002 in the Ghana health facilities that there was an improvement in the link between patient information and labelling and adherence rates. Many software applications now being developed provide decision support for prescribing clinicians (Epocrates, 2005).

3.3.4 Poor Communication / Handing over

A good relationship at the work place enhances a healthy effectiveness and productivity. In an environment such as the hospital setting demands the most effective communication at all the stages of the delivery process. Effective communication is an important tool especially in the transition points of care such as the intensive care unit and the general care, recovery and the general ward. Poor inter personal relationship can to a large extent affect the smooth

communication at transition points. Communication during handing over is very essential in the care process since that will avoid the duplication of therapy and omission of therapy. 'The delivery of care often involves moving the locus of care from and providers. One strategy for reducing errors during these care transitions is to reconcile medication order between transition points. This reconciliation involves comparing what a patient is taking in one setting with what is being provided in another to avoid errors of transcription and omission, duplication of drugs, and drug-drug and drug-disease interactions (Pronovost et al., 2003). The Ghana Health Services Standard Rule for health professionals does not encourage a gap in handing over. Communication at various points in the care setting is supposed to be well coordinated such that there is no room for additions and omissions in the drug administration.

3.3.5 Poor Labelling

'Drug information is communicated through labelling and packaging, marketing practices and advertisements. Poorly designed materials and inadequate representation of the risks and benefits to providers and consumers have led to many errors, including inappropriate prescription; confusion among products, affecting dispensing and administration; and compromised ability to monitor the effects of drugs adequately. In particular, drug names that look or sound alike increase the risk of medication errors. Abbreviations, acronyms, certain dose designations and other symbols used for labelling also have caused errors. Even the layout and presentation of drug information on the drug container or package label can be visually confusing, particularly if it is designed for marketing rather than clinical purposes' (<http://books.nap.edu/catalog/11623.html>).

3.3.6 Prescription

Computerized prescribing of drugs offers great potential benefits in such areas as dosing calculations and scheduling, drug selection, screening for interactions and monitoring and documentation of adverse side effects (Schiff and Rucker, 1998). Hunt et al. (1998) have written that many studies have been conducted on the use of clinical decision support systems (CDSSs) to improve drug dosing and most (9 out of 15) show some positive effect. Electronic prescribing is safer (Bates et al., 1998) because it eliminates handwriting and ensures that the key fields (for example, drug name, dose, route, and frequency) include meaningful data.

Akouko (2007) mentions that in the May 5, 2006 issue of the Daily Graphic, a patient was operated on the wrong leg by three surgeons at the Korlebu Teaching Hospital in Ghana. He further stresses the fact that, there are several incidents including prescription errors that have not been properly documented. Doctors, nurses and paramedical staff are kind hearted people who have chosen their profession expressly to care and to comfort patients but could they be responsible for the mistakes that harm or further complicate the situation of the very patients they are curing? Are they honest in the registration of complications as a result of their mistakes? Akouko (2007) laments the fact that there is significant number of mistakes that occurred in Ghana Health Care system through medication errors through doctors' handwriting, wrong interpretation and wrong labelling but the records are not straight and for that matter little effort has been done resulting in aggravating the situation. The frequent changes in prescribed medications during hospitalization combined with erroneous discharge letters further add to the

problem of medication errors: Wilson et al. (2001). Hackdak et al. (1996) are of the view that the indigenous African knows the cure for his ailment and might have unsuccessfully cured it before coming to the hospital. The clinical decision support systems (CDSSs) are currently not available in almost all the state health facilities in Ghana. The system will not be cost effective due to the high initial cost that is involved and the cost of maintenance to sustain it. 3.3.7 Victimization

Strong punitive action subjected to offenders in a clinical process or medical practises result in the non-reporting of incidents and shortcomings. This is as a result of fear of being reprimanded. This culture of fear militates against the improvement process of an institution. Quality improvement and for that matter safety, can be assured if there is a strong culture of free reporting of adverse events and medical errors and the subsequent assessment of the situation leading to new strategies. A safety strategy formulated as a result of a medical error reported will act as a searchlight to the incident and subsequent possible occurrences. The purpose (The Baldrige National Improvement Act of 1987 H.R. 812) of the Malcolm Baldrige National Quality Award in 1988 is to improve quality and productivity in the USA by establishing guidelines and criteria that can be used by organisations to evaluate their own quality improvement efforts.

3.3.8 Patients/ Relatives involvement

Patients increasingly want to obtain information and to be involved in decision making (Deber et al. 1996; Mansell et al. 2000; Hickam, 1997). Patients will play a vital role in the care process as long as they are the consumers (Leisen 2001). Because patients are highly variable in their preferences, clinicians cannot assume that they alone can make the best decision for their patients (Balint, 1993; Emanuel and Emanuel 1992). Patients have a role to play in the diagnosis of their illness (Sabbah et al. 1997). The patient may be on drug before reporting to the consulting room (Jukkens et al. 2000). Patients have much trust in the diagnosis and prescription by the doctor and pharmacist (pharmacy counter), Akouko (2007). About 70% of the patient never questions the doctor or pharmacist about the dosage regimen even if he or she does not understand during prescription. The patient, however, prefers seeking interpretation from a literate relative who might not even have any knowledge about the pharmacology of drugs. Most practitioners do not interact well with the patients to create a cordial relationship which will enable the patient gain the confidence to question or explain him or her adequately. Most patients and relatives view the doctor or practitioner as supreme in the hospitals whose decisions are final. In some instances where the patient or his relative tend to ask about a procedure he is being taken through, the patient or relative is perceived as knowing better than the professional and for that matter considered to be challenging the decision made. The Ghanaian culture that tends to give much reverend to authorities transcends into the health care setting.

3.4 Conclusion

There is ample evidence that the situation of patients' safety is not the best considering the literature revelations of various levels of medication errors reported even in the developed countries where all seem to be better. Evidence in literature suggests that the problem of medication errors in Ghana could be worse since the indicators of possible errors are glaring. It is however, relevant to find out to which extent the indicators as observed in the literature trigger the occurrence of medication errors and to which extent the occurrence of risk factors for medication errors prevail in state hospitals in Ghana.

CHAPTER 4

RESEARCH METHODOLOGY

4.0 Introduction;

This chapter describes the method and techniques used in the collection and analysis of the data. These include the research design, population, target, sample and sampling procedure, research instruments, pilot testing of instruments, data collection procedure, and data analysis procedure.

4.1 Research Design

The research design is a descriptive research design. The descriptive survey design was used because the purpose of the study was to provide Ghanaian hospitals with information on the extent to which medication errors occur and the presence of factors that generally increase the chance of medication errors.

A quantitative approach was used in the data collection because it has the advantage of allowing the researcher to reach conclusions with a known degree of confidence about the making of statements (Scheerens and Hendriks, 2002; Weiss, 1998).

4.2 Population Target

The study was performed in the Central Region of Ghana. The targeted populations for this research are inpatients, doctors, nurses and pharmacists from the three main general hospitals in the Cape Coast District of this region: the Central Regional, District and the University hospitals of the Central Region of Ghana. These hospitals have the same administrative structures and the same policy guidelines.

The Central Region, and for that matter Cape coast District and the three hospitals were chosen for ethical reasons. The researcher, even though a citizen of Ghana, does not come from or never lived anywhere in the Central Region and for that matter Cape Coast. This way, the review of the patients' charts could be performed as confidential as possible. The three hospitals were also chosen because they are representative of state general hospitals in Ghana and for that matter the findings and the recommendations will go for all state general hospitals.

4.3 Sample and Sampling Procedure

Research question 1: inpatients in 2004-2007, 18-45 years, admission \geq 1 week

For research question one (the occurrence of medication errors) the inclusion criteria for the patients were:

- admission for more than one week
- Age between 18-45
- admission between 2004-2007

These patients were selected on the bases of their charts on the shelves with years of admission labelled on them. The sampling was done by:

- picking the first applicable twenty charts from each column of the shelves,
- then the approximated middle twenty of the same column
- finally the last twenty charts in the columns

This process was carried out separately for males and females and was repeated in all the three hospitals until 1200 (600 males and 600 females), 800 (400 males and 400 females) and 600 (300 males and 300 females) totalling 2600 charts were obtained from the Regional, District and the University hospitals respectively.

From this larger group of 2600 inpatients, a smaller and final group of 160 patients was randomly selected: two charts were picked after every twenty charts and this procedure was repeated for both males and females until the required number of charts was obtained. Table 7 contains a summary of the 160 patients whose charts were selected for the study.

Only inpatient charts were reviewed because the focus of the study is on the errors that occur in the medication process within the wards of the hospitals. The age range was also pegged at between 18 and 45 for consistency. The year range was carefully chosen because most of the charts before 2004 could have gone into archives and for that matter when selected could either fall short of the required information or most of the parts could have gone waste or rotten due to mishandling or lost or faded transcription. The year 2008 was also excluded because most of the charts would still be in active circulation and again the information would not be well documented for the purpose of the study.

Table 6

Number of inpatients included in the study for research question 1 (occurrence of medication errors) by randomly picking patient charts

Hospital	Male (n)	Female (n)	Total (n)
Regional	35	35	70
District	25	25	50
University	20	20	40
Total	80	80	160

Research question 2: inpatients & doctors, nurses, pharmacists (at the time of study)

For research question two (the occurrence of risk factors for medication errors), 160 inpatients (aged between 18 and 45 inclusive), 10 doctors, 30 nurses and 6 pharmacists were selected from the three hospitals at the time of the study and were administered with a questionnaire. The doctors, nurses and the pharmacists were selected on the bases of availability. Table 6 above provides information on the response to the questionnaire. The small number of the professional sample size is as a result of limited time for the data period and lack of corporation on the part of some professionals to take part in the survey coupled with the limited number of staff on duty within the study period.

The closed age range of patients was selected purposely because in the researcher's view they are the most active young and middle age group that can respond rapidly to actions and reactions of medication in the wards. Furthermore, that age group is supposed to be the most active and informed in terms of education to be able to take active part or contribute to their care by complaining rightly or informing correctly. Notwithstanding the above, the lower (18) year group fall directly into the definition of the adult male and female wards of the research focus while the upper limit (45) was a cut-off point for the sake of consistency.

Table 7

Number of respondents to questionnaires on the occurrence of risk factors for medication errors (research question 2)

Hospital	Doctors		Nurses		Pharmacists		Patients (on admission time of study)
	Available (n)	Responded n (%)	Available (n)	Responded n (%)	Available (n)	Responded n (%)	
Regional	10	4	22	15	3	2	70
District	6	3	15	10	2	2	50
University	4	3	8	5	2	2	40
Total	20	10 (50)	45	30 (66.7)	7	6 (85.7)	160

Usually, low numbers do not require percentages in presenting results but in this research they are included for the purposes of comparison.

4.4.0 Research Instruments

For research question one (occurrence of medication errors), the instrument used is the review of inpatients charts by means of the Trigger Tool.

For research question two (occurrence of risk factors for medication errors) questionnaires were used to document the presence of risk factors for medication errors in the hospitals.

4.4.1 Review of patients' medical chart.

The chart review was self conducted with consultation (interpretation of difficult medical expressions and procedures) with the Medical Director of the District hospital. The researcher was assisted in the review by a general practitioner who was on house-man-ship at the Regional Hospital.

4.4.2 The “Trigger Tool” as an instrument for the review

According to the Institute of Health Improvement (www.ihl.org) a “trigger tool” is a screening instrument with which adverse events (harm done to the patient due to the manner in which the care is provided) can be found efficiently and quickly. The tool contains ‘triggers’ which are signals that give clues about an adverse drug event (ADE). The tool contains known ADE triggers and instructions for identifying and measuring the number and degree of harmful medication events. The trigger tool is developed by the IHI for detecting ADEs and has been tested in 86 hospitals. (Resar R.K Rozich J. D and Haraden C.R, 2003).

The tool is flexible for modification for the purpose of the user or research. For instance it could be modified for use in the Intensive Care Unit (ICU) of a hospital, the theatre, surgical ward, or gynaecology or certain care processes or departments such as the emergency unit; medical ward etc. The researcher used the tool because it is easy to use, effective and a method that provides accuracy in the identification of ADEs.

For the purpose of this study, the original tool was modified to suit the Ghanaian context (see Table 9.) since almost of the drugs and triggers were not applicable in the situation. However, the other parts of the tool (Tables 10 and 11) were adopted and used with the modified (applicable) tool.

4.4.3 Review Procedure

From each patient chart, personal information is recorded first. Then the focus comes to the diagnosis and the prescription. At this point, a trigger and a signal are looked for in the chart (see Table 11). To confirm whether a trigger really indicated an ADE, the trigger was reviewed in the context of the care procedure. When a trigger only or a signal only is detected, an ADE cannot be confirmed, but an ADE is confirmed when a trigger and a signal are both present in the chart.

The presence of a signal alone is an indication of a possible ADE. The table below contains the drug, trigger, signal, confirmation and N/A (not applicable). When a trigger was identified a dot (.)

was placed and when an ADE is confirmed a plus (+) is followed, but when an ADE is not confirmed, a minus (-) is placed.

The results of the chart review as well as the patients' background information were recorded on a Case Register Form (CRF) for each patient (Table 12).

Table 8 The applicable 'trigger tool' To the Ghanaian situation

No.	DRUG	TRIGGER	SIGNAL	TRIGGER IDENTIFIED (.)	ADE CONFIRMED (+)	N/A (-)
1.	Quinine	IVF(intravenous fluid)	Tinnitus			
2.	Flucloxacillin	Inj. Hydrocortisone	Vomiting, nausea			
3.	Ceftriaxin	Hydrocortisone	Vomiting, Dizziness, Nausea			
4.	Diclofenac	Inj. Largatil 50mg	Heart burns, Nausea, Palpitation			
5	Magnesium Sulphate	IVF	Unconsciousness, high blood pressure			
6	Atesunate Amodiaquine(tablets)	IVF	Weakness, severe headaches			
7	Laxis	Incision and dainage	Weakness and dryness of the mouth			
8	Amoxycillin	Gentamycin	Heart burn, nausea and vomiting			
9	Injection Analgin	Sodium Bicarbonate	Severe Headache, Nausea, Dizziness			
10	Macain	IVF	Derilius, Severe Heart burns(death)			
11	Diclofenac Tablets	IVF	Heartburn, Severe Headache			
12	Analgin	Hydrocortisone Injection	Severe Headache, Nausea, Dizziness			
13	Amodiaquine Cloxaxcilline Tablets	Phenegan Injection	Dizziness, Nausea and Vomiting			
14	Chloroquine Injection	Fancider Tablets, IVF	Dizziness, Vomiting			
15	IV Aminophillin	Hydrocortisone, Pregnisollin	Sweating, Dizziness			
16	Niphedipine	IV Calcium Chloride	Heartburn			
17	Diazepam	Flumazenil	Drawziness, Delirius			
18	Aspirin	Sodium Bicarbonate	Hyperventilation, Tinnitus, Deafness, Vasodilatation			
19	Ibuprofen	Activated charcoal	Nausea, Vomiting and Tinnitus			
20	Paracetamol	Methionine, Activated charcoal, Acetylcysteine	Nausea, Vomiting			
21	Morphine	Ivaloxone Hydrochloride	Coma, Respiratory Depression and Pinpoint Pupils			
22	Amitriptyline	Activated charcoal, Diazepam, Sodium Bicarbonate IV IV	Dry Mouth, Coma, Hypotension, Hypothermia, Arrhythmias			

23	Nifedipine	IV Atropine, IV Calcium Chloride, Activated charcoal.	Nausea, Vomiting, Dizziness.			
24	Ferric Amonium Citrate	Desferrioxamine	Nausea, Vomiting, Abdominal Pain, Diarrhoea, Rectal bleeding			

Table 9. List of triggers and process of identification

TRIGGER		PROCESS OF IDENTIFICATION
1	Diphenhydramine	Hypersensitivity reaction or drug effect
2	Vitamin K	Over-anticoagulation with warfarin
3	Flumazenil	Over sedation with benzodiazepine
4	Droperidol	Nausea/emesis related to drugs used
5	Naloxone	Over sedation with narcotic
6	Sodium Polystyrene	Hyperkalemia related to renal impairment or drug effect
7	Antidiarrheals	Adverse drug events
8	PPT >100 seconds	Over -anticoagulation with heparin
9	INR >6	Over-anticoagulation with warfarin
10	WBC < 3000 X10 ⁹ /ul	Neutropenia related to drug or disease
11	Serum glucose <50mg/dl	Hypoglycaemia related to insulin use
12	Rising serum creatinine	Renal insufficiency related to drug use
13	Clostridium Difficile positive stool	Exposure to antibiotics
14	Digoxin level >2mg/ml	Toxic digoxin level
15	Lidocaine Level >5mg/ml	Toxic lidocaine level
16	Gentamicin or Tobramycin levels peak >10mg/ml. trough > 2ug/ml	Toxic levels of antibiotics
17	Amikacin levels peak >30ug/ml, trough >10ug/ml	Toxic levels of antibiotics
18	Vancomycin level >26ug/ml	Toxic levels of antibiotics
19	Theophylline levels >20ug/ml	Toxic levels of drug
20	Over sedation, lethargy, falls	Related to over use of medication
21	Rash	Drug related/ adverse drug event
22	Abrupt medication stop	Adverse drug event
23	Transfer to higher level of care	Adverse drug event
24	Customized to individual institution	Adverse drug event

PTT =Prothrombin time

INR = International normalized ratio.

WBC = White blood cells.

Table 10 Chart review procedure

Particular attention was paid to the following when reading through the chart as indicated by Kilbridge and Colleagues (2001).
Discharge Summary; it may contain adverse events.
Procedure note (diagnostic, surgical); looking at the narrative sections for adverse events
Physician progress note; this may indicate changes in plan of care related to effects of medications.
Laboratory reports; looking for trigger laboratory results
Physician orders or Medication Administration Records (MARs); looking for trigger medications.
Nurse flow sheets; looking for altered level of consciousness, skin rash
Nursing multidisciplinary progress note; looking for over sedation, lethargy fall, hypotension, rash, nausea/ vomiting or other adverse events.

Table 11 Case Registration Form (CRF)

Background Information	Chart ID
1. Age;	-----
2. Gender;	-----
3. Disease/ Reason for Admission;	-----
4. Length of hospital stay;	-----
Medication Information (1)	
5. Drugs;	-----
6. Trigger;	-----
7. ADEs;	-----
8. Confirmation;	-----
Medication Information (2)	
9. Drugs;	-----
10. Trigger;	-----
11. ADEs;	-----
12. Confirmation;	-----
REMARKS	-----

4.4.3.0 Questionnaires;

To find out the occurrence of risk factors for medication errors (research question 2) questionnaires were prepared focusing on the concepts outlined in the literature by Kilbride and Colleagues (2002). These concepts have been operationalized into indicators (Table 6). For this research, each indicator has been translated into questions for doctors, nurses, pharmacists and patients to solicit information about the prevalence of these risk situations that may increase the chance of medication errors. (See appendix for the final questionnaire)

Table 12 Concepts and indicators of risk factors for the occurrence of medication errors

CONCEPT	INDICATORS	Indicators are translated into questions (appendix) for:
Overload of work	Hours of work, days of work, number of patients cared for, Complexity of work.	Doctors, nurses, pharmacists
Lack of expertise and training	Qualification, Experience, Upgrading of knowledge, opportunities for further training.	Doctors, nurses, pharmacists
Appropriate Technologies	Computer aided diagnosis, prescription and ordering.	Doctors, nurses, pharmacists
Labelling	Legibility of inscription, Content colour, shape, size etc.	Doctors, nurses, pharmacists
Prescription	Legibility of hand writing, typographical errors, duration of prescription, etc.	Doctors, nurses, pharmacists
Communication among health professionals	Healthy working relationship, emotional condition of colleagues, conflict resolution, staff/patient relation.	Doctors, nurses, pharmacists
Handing over	Number of shifts, Briefing on hand-over, hand-over notes, hand-over gaps	Doctors, nurses, pharmacists
Victimization	Free reporting, queries, fear of intimidation	Doctors, nurses, pharmacists
Patient,/relative Participation	Knowledge on diagnosis, dosage and dosage regimen of drugs etc	Patients

A general introductory text preceded each of the main instruments for the respondents.

Our hospitals are supposed to be the place to identify, repair and maintain our weak and broken parts just as the workshop for maintenance of our vehicles. But in reality that seems not to be the case. Instead, literature has proved that there are events that occur as a result of the very institutions (hospitals) which are expected to provide the care we need rather cause harm to us in their (care providers) attempt to cure us. You are appealed to, to contribute to this study by participating in responding to the questionnaire.

4.4.3.1 Questionnaire for inpatients

The questionnaire designed for the patients was based on the indicators for the concept of patients' participation in his own care (Table 6). The research instrument for the patients were all closed-ended and much straight forward to be translated to the patients for easy understanding. The instrument contained nine items where patients responded YES and NO (Table 17). It was also envisaged that some patients would be uncomfortable (either in pain or psychologically unstable) as at the time of administering the instrument and for that matter would not have the patience to read and think between principles and facts as it may be.

The questionnaire for the patients was translated by the researcher with the help of a general practitioner who was on house-man-ship at the regional hospital and assisted the researcher in the process.

4.4.3.2 Questionnaire for Doctors, Nurses, and Pharmacists

The instruments (questionnaires) for the doctors, nurses and pharmacists were developed by operationalizing the concepts of risk factors as outlined in Table 6 into indicators. The questions were then composed from the indicators. The purpose for asking those questions was to find out to what extent the risk factors that were found in the literature occur in Ghanaian hospitals.

These instruments were composed largely of closed-ended with a few open-ended items to solicit the respondents' own ideas and gather more information than the researcher speculated. The items for the doctors, nurses and pharmacists were mostly the same, but in some instances they differ a bit just to be applicable to the subject of research. For example, Doctors could not be asked questions about the legibility of their hand writing and a nurse could not be asked how many patients she prescribes drugs to in a day.

The instrument contains two main parts; first, the biographical information of the respondents and second, the concepts on which the study is focused.

4.5 Pre-Testing of Instruments

After designing the 'trigger tool' (for research question one), it was pre-tested at the District hospital to find out whether the original 'trigger tool' adopted was applicable and could give the required outcome. The charts (N=50, Regional Hospital N=25, District Hospital N=15 and University Hospital N=10) that were randomly picked from the registry of the hospitals had the same characteristics as those used in the main study. The picking procedure for the charts for the pre-testing was that, the first five of the charts in the column of the shelves were picked the number of raised and another five picked. This procedure was repeated until the required number of charts was obtained. This was done in all the three hospitals. The original trigger tool was applied as explained earlier (4.4.2). The pre-testing helped to realize that the drugs and triggers in the original tool had to be revised to suit that of the Ghanaian situation.

During the pre-testing, questionnaires for the nurse (N=5), doctors (2), pharmacists (2) were to be pre-tested for possible problems (such as rejection or non-participation) that could be uncounited in the process of the administration of the instruments. The pre-testing was also to find out the reliability and feasibility of the items to addressing the research questions. The respondents had the same characteristics as those used in the study but the problem encountered was that most respondents did not want to take part since they thought it was going to undermine their professional integrity. Some had the idea that it was one of the usual research works of students with out the outcome being implemented and for that matter a waste of time. This outcome resulted in the researcher giving the opportunity to explain the relevance of the study and the concern of the Regional Health Administration to a cross section of health workers in the District at a seminar at the Regional Health Administration. The professionals were then visited in their consulting rooms, offices and wards where applicable but out of five doctors, three welcomed me, only one pharmacist and five nurses participated. The response from the few that participated helped in identifying ambiguities in some of the items. As a resulted, some of them were changed or and others avoided. It also helped to identify possible problems likely to encounter in the study such as subjectivity in measuring. The pre-testing further helped to ascertain the validity of the data and develop a procedure for the data collection. Lacity and Jansen (1994) refer to validity as making common sense and being persuasive and seeming right to the reader. Validity of a theory refers to results that have the appearance of truth or reality, Polkinghorne (1988). The most basic aspect of information quality is the extent to which it corresponds to what one wants to measure. Pre-testing however, helps to ensure that the data collecting instruments answer the questions posed for the study and again helps check and try the planned statistical analysis.

4.6 Data Collection Procedure

The randomly selected number of inpatients charts from three hospitals were put together in a located office at the regional hospital where the researcher used officially. The review process was carried out by the researcher with the aid of a general practitioner (assistant) at the regional hospital with clarifications sought from the Medical Director at the District Hospital who was the resource person for the researcher.

The questionnaires were self administered and collected within a five days interval. This was to avoid forgetfulness and lost of instruments. Four out of the nurses' questionnaire could not be retrieved since they had gone on an outreach program but never reported till the researcher left.

Appointments were made for the interview which took place one day but on different times. I took the opportunity to interview a few patients and nurses at the wards just after the official video interview.

The data collection period in Ghana lasted for six weeks.

4.7 Data Analysis Plan

Since the information retrieved from the patients charts were all open-ended and of varied characteristics, a statistical data processing package known as the "Epi-info" was used to captured the data and then transported to the Statistical Package for Social Sciences(SPSS version 16.0) for analysis. All the other data on doctors, nurses, pharmacists and patients were coded and put together as combination data for analysis. The combination data was created to give a general analysis of the items since the recommendation is to be used for a general policy strategy for the three hospitals (and others which were not captured in the study) by the Regional Health Administration.

For the research question two, items were processed and outcomes simplified in a table for easy analysis. In some cases, items were cross tabulated for the purpose of finding out the comparison between variables.

It is worth noting that not all the variables in the analysis were compared. In the view of the researcher, the most significant items were worth presenting in order to reduce the bulky nature of tables but capture important information.

All tables that give clarity to the response to the research questions will be presented in chapter five. In the appendices will be other tables that throw more light or give added information to the discursions of the subject matter in the various processes.

4.8 Reporting of Feedback

The final report will be submitted to the Central Regional Health Administration of the Ghana Health Services for safety improvement policies. The report will also be developed into an article and published in the Ghana Health Services Journal. This will offer first hand information about the medication situation in our health delivery system.

CHAPTER 5

RESULTS

5.0 Introduction

This chapter presents the results of the data gathered from the patients' chart review and questionnaires for the study.

The result is put into three folds; the first part describes the general characteristics of the study population while each of the remaining respond to one of the two research questions (occurrence of medication errors and occurrence of risk factors for medication errors).

5.1 General characteristics of the study populations

The table below captures the general information about the characteristics of the population sampled for this study.

Table 13; General characteristics of the study populations (i. inpatient charts, ii. questionnaire for inpatients on admission, Doctors, Nurses, and Pharmacists)

Population	
Patients (chart review)	N=160
Mean Age(SD)	31.3(11.2)
Gender	
Male n (%)	80(50)
Mean length of hospital stay(SD)	8.6(1.6)
Lengths of hospital stay n (%)	
7-9	124(77.5)
10-12	30(18.8)
13-15	6(3.7)
Disease Categories n (%)	N=160
Inflammatory (Arthritis, Cellulitis etc)	23(14.4)
Infections/Parasitic (Enteric fever, Malaria, Typhoid etc.)	112(70)
Trauma (Cervical Fracture, Cerebral concussion etc.)	
Others (Hypertension, Jaundice, Anaemia etc.)	8(5)
	17(10.6)
Patients administered questionnaire	N = 160
Mean Age(SD)	35.4(9.1)
Gender	
Male n (%)	80(50)
Doctors	N=10
Mean Age(SD)	47.9(9.9)
Male n (%)	6(60)
Years of experience n (%)	
1-3	1(10)
4-6	1(10)
7-9	1(10)
10-12	1(10)
13>	6(60)
Nurses	N=30
Mean Age(SD)	35.8(11.3)
Male n (%)	5(19.2)
Years of experience n (%)	
1-3	17(65.4)
4-6	1(3.8)
7-9	1(3.8)
10-12	1(3.8)
13>	6(23.1)
Pharmacist	N=6
Mean Age(SD)	42.8(14.9)
Male	6(100)
Years of experience n (%)	

4-6	1(16.7)
7-9	2(33.3)
10-12	1(16.7)
13-15	2(33.3)

From table 13 above, a total of 160 patients (with equal proportions for both males and females) were involved in the study. The average age was found to be 31.3, ± 11.2 . The majority (77%) of the respondents stayed in the hospital between 7-9 days.

A total of 160 questionnaires were administered to equal proportion of male and female on admission at the time of study. The mean age was found to be 35.4, ± 9.1 .

Out of the 160 diseases recorded the highest, 70% were Infection/ Parasitic whiles the lowest 5% were Trauma.

Ten doctors were involved in the study with their mean age found to be 47.9, ± 9.9 . The number of male doctors were 6(60%) and four (4) of them having work experience of between one (1) and twelve (12) years with six (6) of them found to have a working experience of thirteen (13) years and above.

The total number of nurses involved in the study was thirty (30). Five (5) of them were found to be Male representing 19.2%. The mean age of the nurses was 35.8, ± 11.3 . The working experience of the nurses were found to be as follows, 1-3years; 17(65.4%), 4-6years; 1(3.8%), 7-9years; 1(3.8%), 10-12years; 1(3.8%), 13years and above; 6(23.1%).

Six pharmacists, all males with mean age of 42.8, ± 14.9 . The distribution for their working experience is as follows; 4-6years; 1(16.7%), 7-9years; 2(33.3%), 10-12years; 1(16.7%). 13-15years and above; 2(33.3%).

5.1.1 The Occurrence of Medication Errors in Ghanaian Hospitals

In this section, Tables 14 & 15 and appendices provide the summary for the occurrence of medication errors posed in the research question one (the occurrence of medication errors in state general hospitals in Ghana) of this study.

Table 14

Displays the number of patients on each prescription, drugs, the number of times prescribed, number of signals and confirmed cases, the percentages of the confirmed cases to the total prescriptions, and the percentages of ADEs from the signals

No	Drug	No. of patients on individual prescription	Total Number of prescriptions	Number of signals	Confirmed (n)	% ADEs of total prescriptions	% ADEs of the individual prescriptions
1.	Quinine	38	41	9	7	17.1	18.4
2.	Flucloxacillin	5	5	0	0	0	0
3.	Ceftriaxin	6	7	2	2	28.6	33.3
4.	Diclofenac	30	32	9	8	25	26.7
5	Magnesium Sulphate	15	15	1	1	6.7	6.7
6	Atesunate Amodiaquine(tablets)	22	22	4	3	13.6	13.6
7	Laxis	4	4	0	0	0	0
8	Amoxycillin	15	15	0	0	0	0
9	Injection Analgin	6	10	0	0	0	0
10	Macain	12	12	1	0	0	0
11	Diclofenac Tablets	7	9	2	2	22.2	28.6
12	Analgin	6	7	1	0	0	0
13	Amodiaquine Cloxacilline Tablets	20	22	2	1	4.6	5
14	Chloroquine Injection 5mls 8hrly x3	9	11	1	1	9.1	11.1
15	IV Aminophillin	11	13	1	1	7.7	9.1
16	Nifedipine	19	19	2	2	10.5	10.5
17	Diazepam	7	9	0	0	0	0
18	Aspirin	14	14	1	0	0	0
19	Ibuprofen	12	12	0	0	0	0
20	Paracetamol	23	35	0	0	0	0
21	Morphine	15	15	1	0	0	0
22	Amitriptyline	11	11	0	0	0	0
23	Nifedipine	8	8	0	0	0	0
24	Ferric Amonium Citrate	10		0	0	0	0
	TOTAL		340	37	28		

A total of 340 prescriptions were recorded in the charts reviewed with 37(10.9%) signals and 28(8.2%) confirmed Adverse Drug Events. The drugs with the highest risk for DAEs were Ceftriaxin (33.3%), Diclofenac Tablets (28.5%). Diclofenac (26.7%), Atesunate Amodiaquine (13.6%), Chloroquine Injection (11.1%) and Nifedipine (10.5%), Fluxacillin, Laxis, Amoxicillin, and Diazepam, just to mention a few, were the drugs with the least risk for ADEs. They recorded zero ADEs. Evnthough Ceftriaxin, Diaclofenac, Niphedipinerecorded the hiest ADEs, they pose extra risk situations since all the signals identified in them resulted in ADEs.

Quinine was the highest prescribed drug (38), out of which seven resulted in ADEs. It is one of the main malaria drugs prescribed within the period resulting in 18.4% ADEs puts it at higher risk since malaria is the highest cause of OPD attendance. Paracetamol was prescribed 35 times but recorded neither a signal nor an ADE, implying that it has no risk in the medication process.

5.1.2 Distribution of number of Medication Errors registered out of 160 inpatients charts

Table 15 Distribution of number of Medication Errors registered out of 160 inpatients charts

	Distribution by Disease Category	Number of ADE Cases (28)	Percentage of ADEs by Disease Category
<u>Disease Categories</u>			
Inflammatory (Arthritis, Cellulitis etc)	23	3	13.0
Infections/Parasitic (Enteric fever, Malaria, Typhoid etc.)			
Trauma (Cervical Fracture, Cerebral concussion etc.)	112	22	19.6
Others (Hypertension, Jaundice, Anaemia etc.)	8	0	0
	17	3	17.7
<u>Occurrence by age Category</u>			
18-30	76	18	23.7
31-45			
	84	10	11.9
<u>Occurrence by gender</u>			
Male	80	14	17.5
Female			
	80	14	17.5
<u>Occurrence by length of hospital days</u>			
7-9	109	22	20.2
10-12			
13 >			
	45	5	11.1
	6	1	16.7

In table 15, all the disease categories, except Trauma (0%) were high risk for ADE considering the sample size of 160. But the highest risk for ADE was Inflammation/ Parasitic (19.6%)

The results indicate that the lower age category (18-30) were at high risk (23.7%) than the higher age category (31-45).

Both males and females were seen to be at equal risk of experiencing medication errors.

The patients with hospital stay less than ten (10) day were at high risk, whereas the patients with the between 10 and 12 days of hospital stay were at the least (11.1%) risk

5.2 The Occurrence of risk factors of Medication Errors in Ghanaian hospitals

This section deals with the research question two (2) which seeks to find out the risk factors of medication errors through the responses given by health professionals based on the indicators of medication errors found from literature.

Table16

Risk factors for Medication Errors (Response by Profession; combination data). In this table, the respondents are ten (10) doctors, thirty (30) nurses and six (6) pharmacists.

Risk Situation	Factor Description	Profession N=46			
		Doctors (%)	Nurses (%)	Pharmacists (%)	Total N (%)
Demanding Nature of work	Less Demanding-Demanding	1(10)	9(30.0)	1(20)	11(23.9)
	Very Demanding	9(90)	21(70.0)	5(83.3)	35(76.1)
Working Hours/day	12 hours	0	9(30.0)	4(66.7)	13(28.3)
	>12 hours	10(100)	21(70.0)	2(33.3)	33(71.7)
Number of patients attended to in a day	80 patients	0	7(23.3)	0	-
	>80 patients	10(100)	23(76.7)	6(100)	39(84.8)
Legibility of Handwriting	Not legible-quite legible	-	11(36.7)	3(50)	14(38.9)
	Legible-very legible	-	19(63.3)	3(50)	22(61.1)
Legibility of drug labels	Not Legible-quite legible	-	3(30.0)	0	-
	Legible-very legible	-	27(70.0)	6(100)	33(91.7)
Suggestion of new ideas to management	Not Easy-quite easy	3(30)	9(30.0)	3(50.0)	15(32.6)
	Easy-Very easy	7(70)	21(70.0)	3(50)	31(67.4)
Discussions about working difficulties	Not easy-quite easy	3(30)	6(20.0)	2(33.3)	11(23.9)
	Easy-very easy	7(70)	24(80.0)	4(66.7)	35(76.1)
Responsibility for adverse drug event	Responsible	5(50)	6(20.0)	1(20)	12(26.1)
	Not Responsible	5(50)	24(80.0)	5(80)	34(73.1)
Adverse Drug Event reporting	Self reported	1(10)	4(13.3)	0	5(10.9)
	Not self reported	0	0	0	0
Opportunities for upgrading knowledge	Easy	10(100)	23(76.7)	6(100)	39(84.9)
	Not Easy	0	7(23.3)	0	7(15.2)
Accessibility of opportunity for upgrading	Easy	10(100)	22(73.3)	5(83.3)	37(80.4)
	Not Easy	0	8(26.7)	1(16.7)	9(19.6)
Need for extra hands	Need	10(100)	24(80.0)	3(100)	37(80.4)
	No Need	0	6(20.0)	0	6(13.1)
Request for extra hands	1-3	9(90)	21(70.0)	3(100)	33(71.7)
	4-6	1(10)	9(30.0)	0	10(21.7)
Writing of Prescription	Computer aided	0	-	-	0
	Hand written	10(100)	-	-	-
Susceptibility of manual prescription to medication errors	Not Susceptible	4(40)	7(23.3)	4(66.7)	15(32.6)
	Highly Susceptible	6(60)	23(76.7)	2(33.3)	31(67.4)

Handing over	By briefing	7(70)	20(66.7)	4(66.7)	31(67.4)
	By leaving a note	3(30)	10(33.3)	2(33.3)	15(32.6)
The number of shifts	Once	5(50)	15(50)	2(33.3)	22(47.8)
	Twice	0	9(30)	0	9(19.6)
	Three times	0	6(20)	0	6(13.0)

Even though the numbers are very low, the percentages are given for easy comparison

Considering the concept of overload of work, Table 16 indicates that over 70% of the health professional work well over the twelve hours per day and that their work is very demanding. 84.8% of them have indicated that they care for more than the 80 patients per day.

On expertise and training, the table indicates that over 80% have easy opportunities for training and can easily access the opportunities.

On the use of modern technology to aid diagnosis and prescription, no health professional (doctor), and for that matter hospital uses any. 67.4% indicated that the manual diagnosis and prescription is highly susceptible to errors.

91.7% responded that the labels on the drugs are legible but on prescription errors, 38.9% indicated that the hand writing of the doctors is not legible. 32.6% of them left a note when colleagues were not present during hand over. 26.1% are involved and responsible for an ADE but only about 10% reported the incidence themselves.

5.2.1 In an attempt to find out the involvement of the patient in the care process as well as the link in the care process the questions below were designed as part of the effort to find out the risk factors of medication errors in the inpatient setting.

Table 17 Summary of response from questionnaire for patients

No.	ITEM	YES	NO
		N (%)	N (%)
1.	Were you transferred from another hospital?	46(28.8)	114(71.2)
2	Do you know the types of medication/ drugs that are given to you in this hospital?	19(11.9)	141(88.1)
3	Were you on a previous prescription before admission?	65(40.9)	94(59.1)
4	If so, did you present the previous prescription to this hospital?	18(27.7)	47(72.3)
5	Do you know the diagnoses that were made on you?	64(40.0)	96(60)
6	Have you experience any reaction to any medication since you came on admission?	29(18.1)	131(81.9)
7	Do you know the number of times you should take your drugs?	46(28.8)	114(71.2)
8	Do you know the dosage that you should take?	36(22.5)	124(77.5)
9	Do you know about medication records?	1((0.6)	159(99.4)

The table above indicates that 28% of the patients were transferred from one hospital to the hospitals under study. 88.1% of the admitted patients did not have any knowledge about the medications that were given to them. 40.9% of the patients were on previous drugs but only 27.7% presented their previous drugs to the hospital during admission. The results indicate that only 40% of the patients were aware of their diagnosis. 18.1% of the patients responded that they have experienced a drug reaction in one form or the other since they came on admission. Asked as to whether they know their dosage regimen, 22.5 % indicated yes. Only one patient indicated that he/she has knowledge about medication records.

CHAPTER 6

CONCLUSION, DISCUSSION, AND RECOMMENDATIONS

6.0 Introduction

This chapter presents the conclusions drawn from the study results, a discussion of the findings and recommendations. The conclusion is in two sections. Section 6.1.2 contains the conclusions on the occurrence of medication errors and section 6.1.3 presents the conclusions on the occurrence of risk factors for medication errors.

6.1 Conclusions

The conclusions are made upon the results obtained from the study conducted inline with the subject of the study;

6.1.2 Occurrence of medication errors

During the study, the patient chart review was the instrument used to identify the occurrence of medication errors in the hospitals studied. The following conclusions were made;

- Diclofenac presents the highest frequency for ADEs in the Hospitals.
- Quinine is the most prescribed drug in the hospitals but not the most frequent in terms of errors.
- The result implies that approximately 82 patients out of every 1000 admissions over one week experience an ADE in one way or the other in the hospitals. This rate is rather alarming as compared to studies in the United States where 32,683 admissions in a tertiary hospital in New York resulted in 12.3 rate of ADE (Leser, 2002).
- Even though Ceftriaxin and Diclofenac Tablets are among the least prescribed drugs they are the drugs with the highest occurrence of ADEs.

6.1.3 Occurrence of risk factors for medication errors

- Over 70% of doctors, nurses and pharmacist work more than 12 hours and attend to over 80 patients in a day. Working more hours in a complex environment demands rapid attention but can result in much stress which is prone to accident, Annankoma K. (1998). Hendey and Colleagues (2005) have indicated that the deficiency of doctors in the health may lead to higher errors in diagnosis and prescription and such medical errors are likely to increase especially in countries where a doctor may be responsible for the inpatient wards as well as consult for ambulant patients. The long hours of work by the professionals are a clear situation in the hospitals.

- This study has revealed that over 80% of the health professionals have opportunities to and can easily take advantage of the opportunities but the lack of personnel (see tables 2&3 on professionals /population ratio) means taking advantage of the opportunity will result in increasing the gap.
- All the diagnosis is manually done and the prescriptions communicated by hand-written. The response indicates over 67% of risk in communicating prescriptions by hand-written. Electronic prescribing is safer (Bates et al., 1998) because it eliminates handwriting and ensures that the key fields (for example, drug name, dose, route, and frequency) include meaningful data.
- The results from the questionnaire indicate that ADEs are virtually not reported. Only 10% of those who have ever been responsible for ADEs reported the incidence.
- Over 30% of the doctors, nurses and pharmacists did not wait for the next person to hand over. They left notes and went away. This is a gap that can result in miscommunication, misinterpretation, and altering of the continuity of care. This can result in the duplication and omission of therapy.
- Most of the patients were not aware of their medication status. This is because most of them were not told the diagnosis made on them and the drugs they were taking at the hospital. They neither asked nor were they informed. Because patients are highly variable in their preferences, clinicians cannot assume that they alone can make the best decision for their patients (Balint, 1993; Emanuel and Emanuel 1992). Patients have a role to play in the diagnosis of their illness (Sabbah et al. 1997). With out the patients' knowledge in the process of care in the ward, it poses the risk of the patient continuing the medication appropriately after discharge. The patient cannot even make any informed judgement about improvement in his health status.

6.2 Discussion of the main findings

This study was aimed at finding out the occurrence of medication errors and the occurrence of risk factors for medication errors in the inpatient setting of the general hospitals in Ghana. Ten doctors, thirty nurses, six pharmacists, 160 inpatients and 160 inpatients charts were the population involved in the study.

6.2.1 Occurrence of Medication Errors

It was recorded that 28 out of the 340 prescriptions resulted in ADEs, representing 8.2%. This implies that out of every 1000 prescriptions, approximately 82 are likely to result in ADEs in the inpatients setting of general hospitals in Ghana. A major study of Medication errors carried out in 36 different health care facilities found an error rate of 11 % (Barker et al. 2002). Another study carried out on 32,683 admissions in a tertiary hospital in New York resulted in 12.3 rate of ADE (Leser, 2002). 29 ADEs occurred in a study of 6000 admissions in a tertiary care hospital in Florida (Winterstein et al, 2004). 52.9 occurred in a study of 211,635 admissions in a tertiary care

hospital in New York State (Leser et al, 1997). These results put the records of occurrence of medication errors in this study very high. The results show that the young age group category (18-30) was at high risk but both males and females were at equal risk. This is possible because both genders were equally represented and so had equal chance of the outcome. Ceftriaxin and Diclofenac Tablets were among the least prescribed drugs but recorded the highest ADEs. They, thus appear to be the most frequently responsible drugs for ADEs in the hospitals.

6.2.2 The occurrence of risk factors for medication errors

Over 70% of the health professionals work over 12 hours in a day. Apart from some nurses (23.3%) who attend to at most 80 patients in a day, the rest, doctors and pharmacists (84.8%) attend to more than 80 patients in a day. This number is far beyond the threshold of 40 patients. It is obvious that working in such a complex environment (clinical setting) demands rapt attention and concentration. Attention and high concentration could result into stress if one works for very long hours just as in the study where professionals attend to very high numbers of patients.

- **Lack of Expertise and Training**

Over 80% of professionals have opportunities to upgrading their knowledge and can assess the various opportunities available easily. Most of them apart from the nurses have working experience of more than 13 years which is good to result in much experience in the profession but yet there is a high rate of errors in the hospitals. It is possible that the professionals do not take advantage of the opportunities available for them to upgrade their knowledge. According to The Institute of Medicine (2000) 'training programs are not likely to change unless the delivery setting does so, but the setting cannot change if people are not trained to practice differently'.

- **Lack of Appropriate Technologies**

The study results show that, all diagnosis were manually done and 100% of the prescription were communicated by hand-written. A greater number of the professionals indicated that the hand-written were 67% susceptible to errors. Literature has indicated that computer assisted diagnosis and prescription can improve quality of the medication (Duvieux et al., 2000). Paper-based prescribing is associated with high error rates (Kaushal et al, 2003). Bates (2001) is of the view that having all pharmacists receive prescription electronically would result in fewer errors than occur in paper or oral approach. More importantly, computerization enables the delivery of clinical decision support, including checks for allergies, during drug-drug interactions, overly high doses and clinical conditions (Evans et al, 1998).

- **Communication/Handing over**

Almost 70% of the population indicated that they could suggest new ideas to management easily. This is a sign of healthy relationship. Effective communication and healthy communication improves the medication reconciliation process especially between transition points, care settings and outpatients, intensive care units and general care units (Pronovost et al, 2003). About a third of the professionals handed over by leaving a note. This is likely to leave a gap in the process resulting in miscommunication. It is proved in some study that the most effective and recommended procedure of handing over is by briefing (Konohest 1996).

- **Victimization**

In this study, about 26% of the professionals have ever been involved in ADEs but only 10% ever reported the incidence. Kilbride and Co. (2002) have identified that non-reporting of incidence of ADEs rather reduces the chances of improving the medication process.

- **Patients Participation**

Another observation made from the patients' response is that less than 20% were aware of their medication status. This means that 80% of them were not educated on the diagnosis and the medications they were being treated with. Most patients did not have the relevant information they are suppose to know. According to Brown (1990), meeting the aims of patient-centeredness can improve the outcome of patients' desire. Kaplan et al (1989) agree that by increasing patients participation in decision making will meet the aims of patients' centeredness.

6.3 Setbacks in the study

One of the major setbacks in the study was the method of selection for the inpatients charts. The charts could have been selected by using computer selection method. Even though manually selected, the procedure was done in such a way to ensure randomness. That could not affect the outcome of the results.

The second setback was the limited time for the study. Enough time, more than the six months could have improved on the number of literature and could go a long way to improve the research questions and the use of other instruments such as interviews to gather a lot of information that might have been lost.

6.4 Recommendations

It is very important to recognize the possibility of errors in the attempt at caring for the needs of the patients. By so doing most of the underestimated situations that could result in errors will be taken care of in advance. This will however minimize the rate of occurrence or avoid it outright.

The following recommendations are given upon the results of the study.

1. It is recommended that a review be conducted into the pharmacology of the drugs that recorded higher frequencies (eg. Ceftriaxin, Diclofenac Tablets, Atesunate Amodiaquine, and Quinine) to identify whether the chemistry of the drugs are wrong or it is a drug-drug reaction.
2. Adherences to the verification of the patients' current medication list for appropriateness at each encounter and ensure accuracy of patients' medication at transition times and handing over.
3. Clarity of doctors hand writing should be a priority to all prescribers and the use of standardised abbreviations and acronyms should be adhered to.
4. There should be close collaboration between the prescription ordering and administration of drugs by the use of intercom facilities.

5. Health professionals should have access to regular distance learning (eg. virtual learning facilities) and in-service training to update their skills in modern clinical practices without leaving the hospitals.
6. Professionals involved in medication errors should be involved in the further investigations for causes and possible causes of other events rather than being reprimanded for the offence.
7. Patients should be well informed about their health status and the clinical process the patient is to be taken through.
8. Patients should be educated on their medication therapy and alternative treatments.

6.5 Recommendations for further study

1. A further research is recommended to be carried out in specific units (surgical ward, paediatric, Obstetrics and Gynaecology, Intensive care units etc) of the hospital since that will give clear indication of what is prevalent in the individual hospitals for management to take action.
2. Research is recommended to be carried out into the feasibility and effectiveness of adopting the computerized order entry with clinical decision-support systems.

6.6 Key words

Key word searches included: Patient Safety, Inpatient Ward, Adverse Drug Event, Medication Error, Prescription and Diagnosis.

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APPENDICES

Appendix 1

Questionnaire for Patients

This study is concerned with finding out the occurrence and causes of medication errors in the inpatient adult wards of Ghanaian hospitals and come out with recommendations to mitigate the problem. You may take five minutes to contribute to this study by checking YES or NO.

; For Patients participation in their health care;

No.	ITEM	YES	NO
1.	Were you transferred from another hospital?		
2	Do you know the types of medication/ drugs that are given to you in this hospital?		
3	Were you on a previous prescription before admission?		
4	If so, did you present the previous prescription to this hospital?		
5	Do you know the diagnoses that were made on you?		
6	Have you experience any reaction to any medication since you came on admission?		
7	Do you know the number of times you should take your drugs?		
8	Do you know the dosage that you should take?		
9	Do you know about medication records?		

Appendix 2 Questionnaire; Doctors

These items are designed to find out the possible causes of medication errors in the health care system in Ghanaian hospitals. I would appreciate your contribution to this study if you could take a short time (5 minutes) to fill in your response to the items below.

Biographical information of respondent.

Gender ☐ Male ☐ Female

Age ☐

Over-load of work on health professionals

You may kindly indicate your choice by underlining the applicable response;

1. How long have you been practicing?

1-3yrs

4-6yrs

7-9yrs

10-12yrs

13 and above

2. How many hours are you suppose to work in a day?

8hrs

10hrs

12hrs

14 and above

3. Indicate how many hours you work in a day in the space below

.....

4. How many days do you work in a week?

3days

4days

5days

6days

7days

5. How would you describe your duties in this hospital?

- a. not demanding
- b. less demanding
- c. demanding
- d. very demanding

6. Would you ask for extra hands in your line of duty?

Yes

No

7. If yes, indicate the number of hands you would require by assigning a number in the space below.

8. On the average how many patients are you suppose to see in a day? Indicate in the space below

9. On the average how many patients do you attend to in a day? Indicate in the space below

Prescription

10. In what form do you issue prescriptions?

- a. hand written
- b. typed
- c. fax
- d. telephone

11. On the average how many prescriptions do you issue in a day? Indicate in the space provided

12. Do you consult the pharmacist before prescribing medicine/drugs?

Yes

No

13. If yes, how often?

a. very often,

b. quite often

c. often

d. not often

14. Do you ask patients whether they have allergies before prescribing?.

Yes

No

15. If yes, how often?

a. very often

b. quite often

c. often

d. not often

Communication among care professionals

Communication is very vital in every human setting more especially critical and complex settings such as in health care process. The following items are to find out the communication situation in the care process.

16. How do you relate to each other as colleagues in this hospital?

very well

not very well

poorly

17. What is the relationship between you and your superiors?

cordial

very cordial

not the best

18. If not the best, kindly state one reason why you think it is so in the space provided

19. How do you discuss your working difficulties (example, diagnosing, prescriptions etc?)

freely with colleagues
only to superiors
only at professional board meetings

20. Do you discuss emotional problems with your colleagues?

Yes
No

21. How easy is it to complaint about setbacks in your working situation?

very easy
have to go through protocols
not possible

22. How easy is it to suggest a new idea you think is helpful to your working setting?

very easy
not easy
through protocols

Victimization of culprits

23. Do you have an idea about medication errors?

Yes
No

24. Do you have any idea about Adverse Drug Events?

Yes
No

25. Have you ever been responsible for an Adverse Drug Event?

Yes
No

26. If yes, how did you feel?

a. very bad
not too well
indifferent
not too worried

27. Did you report it yourself?

Yes
No

Never reported.

28. If no please kindly state three reasons why you did not report the issue in the space below

1-----

2. -----

3. -----

Technology

The complexity of diseases and the complex nature of the health care system demand appropriate technologies (computer aided diagnosis) in the care process. These items are aimed at finding out as to whether such technologies are available.

29. By which of the following means do you diagnose patients?

manually

computer aided diagnosis

others -----

30. If manual, indicate how susceptible it is to commit an error.

not likely

likely

very likely

less likely

Handing over

31. How many shifts are you involved in a day?

one

two

three

not at all

32. How do you hand over to the next colleague?

briefing

handing over a note physically

leaving a note

leaving without a note/briefing

33. What do you usually do when a colleague is to report late?

wait till he/she arrives
leave a note in his/her absence
hand over through telephone

Education/Training

34. Are you a specialist or a general practitioner?

Yes
No

35. Do have opportunities for further training and education?

Yes
No

36. If yes how easy are you able to access such opportunities?

not easy
quite easy
easy
very easy

37. Are peer review programs available?

Yes
No

38. If yes, indicate how often.

every six months
annually
biannually

39. Choose from the list below, all applicable means of upgrading your knowledge.

surfing the internet
medical journals/magazines
colleagues
library
peer review
in-service training
research projects
medical conferences

By completing this exercise you have contributed to the patient safety improvement process of this hospital.

Thank you very much for your time and contribution

Appendix 3 Questionnaire; Nurses

These items are designed to find out the possible causes of medication errors in the health care system in Ghanaian hospitals. I would appreciate your contribution to this study if you could take a short time (5 minutes) to fill in your response to the items below.

Biographical information of respondent.

Gender ☐ Male ☐ Female

Age ☐

Over-load of work on health professionals

You may kindly indicate your choice by underlining the applicable response;

1. How long have you been practicing?

1-3yrs

4-6yrs

7-9yrs

10-12yrs

13 and above

2. How many hours are you suppose to work in a day?

8hrs

10hrs

12hrs

14 and above

3. Indicate how many hours you work in a day in the space below

.....

4. How many days do you work in a week?

3days

4days

5days

6days

7days

5. How would you describe your duties in this hospital?

- a. not demanding
- b. less demanding
- c. demanding
- d. very demanding

6. Would you ask for extra hands in your line of duty?

Yes
No

7. If yes, indicate the number of hands you would require by assigning a number in the space below.

8. On the average how many patients are you suppose to see in a day? Indicate in the space below

9. On the average how many patients do you attend to in a day? Indicate in the space below

Prescriptions

You are requested to indicate your choice by underlining one response from each of the items below;

10. How are prescriptions communicated?

hand written,
typed
by telephone
by fax

11. If by hand written, how legible is the hand writing?

clear
not clear
quite clear

12. If by typing, how often do you see typographical errors?

- a. very often
- b. quite often
- c. often

d. not often

13. Indicate on the average how many prescriptions you interprets in a day?

14. How do you handle difficulties in interpreting prescriptions?

by consulting a colleague
by consulting a physician
by consulting the pharmacist
by your own discretion

Medication Reconciliation.

15. How do you reconcile patients' prescription and previous drugs?

by comparing present and previous medications
by calling or faxing patients pharmacist
by consulting the physician
by consulting the patient's folder

Labelling of drugs

16. How legible is the labelling on the package of the drug?

a. poor
b. not clear
c. clear
d. very clear

17. How easily are you able to differentiate between drugs? Tick as many as possible;

a. by colour
b. by container
c. by smell
d. by label

Communication among care professionals

Communication is very vital in every human setting more especially critical and complex settings such as in health care process. The following items are to find out the communication situation in the care process.

18. How do you relate to each other as colleagues in this hospital?

very well
not very well
poorly

19. What is the relationship between you and your superiors?

cordial
very cordial
not the best

20. If not the best, kindly state one reason why you think it is so in the space provided

21. How do you discuss your working difficulties (example, diagnosing, prescriptions etc?)

freely with colleagues
only to superiors
only at professional board meetings

22. Do you discuss emotional problems with your colleagues?

Yes
No

23. How easy is it to complaint about setbacks in your working situation?

very easy
have to go through protocols
not possible

24. How easy is it to suggest a new idea you think is helpful to your working setting?

very easy
not easy
through protocols

Victimization of culprits

25. Do you have an idea about medication errors?

Yes
No

26. Do you have any idea about Adverse Drug Events?

Yes
No

27. Have you ever been responsible for an Adverse Drug Event?

Yes
No

28. If yes, how did you feel?

a. very bad
b. not too well
indifferent
not too worried

29. Did you report it yourself?

Yes
No
Never reported

30. If no please kindly state three reasons why you did not report the issue in the space below

1-----
2. -----
3. -----

Handing over

33. How many shifts are you involved in a day?

one
two
three
not at all

34. How do you hand over to the next colleague?

briefing
handing over a note physically
leaving a note
leaving without a note/briefing

35. What do you usually do when a colleague is to report late?

wait till he/she arrives
leave a note in his/her absence
hand over through telephone

Education/Training

36. Do you have opportunities for further training and education?

Yes
No

37. If yes how easy are you able to access such opportunities?

not easy
quite easy
easy
very easy

38. Are peer review programs available?

Yes
No

39. If yes, indicate how often.

every six months
annually
biannually

40. Choose from the list below, all applicable means of upgrading your knowledge.

a. surfing the internet
medical journals/magazines
colleagues
library
peer review
in-service training
research projects
h. medical conferences

By completing this exercise you have contributed to the patient safety improvement process of this hospital.

Thank you very much for your time and contribution.

Appendix 4 Questionnaire; Pharmacists

These items are designed to find out the possible causes of medication errors in the health care system in Ghanaian hospitals. I would appreciate your contribution to this study if you could take a short time (5 minutes) to fill in your response to the items below.

Biographical information of respondent.

Gender ☐ Male ☐ Female

Age ☐

Over-load of work on health professionals

You may kindly indicate your choice by underlying the applicable response;

1. How long have you been practicing?

1-3yrs

4-6yrs

7-9yrs

10-12yrs

13 and above

2. How many hours are you suppose to work in a day?

8hrs

10hrs

12hrs

14 and above

3. Indicate how many hours you work in a day in the space below

.....

4. How many days do you work in a week?

3days

4days

5days

6days

7days

5. How would you describe your duties in this hospital?

a. not demanding

b. less demanding

c. demanding

d. very demanding

6. Would you ask for extra hands in your line of duty?

Yes

No

7. If yes, indicate the number of hands you would require by assigning a number in the space below.

8. On the average how many patients are you suppose to see in a day? Indicate in the space below

9. On the average how many patients do you attend to in a day? Indicate in the space below

Prescriptions

You are requested to indicate your choice by underlining one response from each of the items below;

10. How are prescriptions communicated?

hand written,

typed

by telephone

by fax

11. If by hand written, how legible is the hand writing?

clear

not clear

quite clear

12. If by typing, how often do you see typographical errors?

a. very often

b. quite often

c. often

d. not often

13. Indicate on the average how many prescriptions you interprets in a day?

14. How do you handle difficulties in interpreting prescriptions?

by consulting a colleague

by consulting a physician

by your own discretion

15. Are you normally consulted by a physician before prescription are issued/made?

Yes

No

16. If yes, how often are you consulted?

very often

quite often

often

not often

Medication Reconciliation.

17. How do you reconcile patients' prescription and previous drugs?

by comparing present and previous medications

by calling or faxing patients pharmacist

by consulting the physician

by consulting the patient's folder

18. Do you protocols in the issuing of drugs to patients?

Yes

No

19. If yes, please indicate any three of such protocols best known to you in the space provided below;

Labelling of drugs

20. How legible is the labelling on the package of the drug?

- a. poor
- b. not clear
- c. clear
- d. very clear

21. How easily are you able to differentiate between drugs? Tick as many as possible;

- a. by colour
- b. by container
- c. by smell
- d. by label

Communication among care professionals

Communication is very vital in every human setting more especially critical and complex settings such as in health care process. The following items are to find out the communication situation in the care process.

22. How do you relate to each other as colleagues in this hospital?

very well

not very well

poorly

23. What is the relationship between you and your superiors?

cordial
very cordial
not the best

24. If not the best, kindly state one reason why you think it is so in the space provided

25. How do you discuss your working difficulties (example, diagnosing, prescriptions etc?)

freely with colleagues
only to superiors
only at professional board meetings

26. Do you discuss emotional problems with your colleagues?

Yes
No

27. How easy is it to complaint about setbacks in your working situation?

very easy
have to go through protocols
not possible

28. How easy is it to suggest a new idea you think is helpful to your working setting?

very easy
not easy
through protocols

Victimization of culprits

29. Do you have an idea about medication errors?

Yes
No

30. Do you have any idea about Adverse Drug Events?

Yes
No

31. Have you ever been responsible for an Adverse Drug Event?

Yes
No

32. If yes, how did you feel?

a. very bad
not too well
indifferent
not too worried

33. Did you report it yourself?

Yes
No
Never reported

34. If no please kindly state three reasons why you did not report the issue in the space below

1-----

2. -----

3. -----

Technology

The complexity of diseases and the complex nature of the health care system demand appropriate technologies (computer aided diagnosis/ordering) in the care process. These items are aimed at finding out as to whether such technologies are available.

35. By which of the following means do you identify drugs?

manually
computer aided
others -----

36. If manual, indicate how susceptible it is to commit an error.

not likely
likely
very likely
less likely

Handing over

37. How many shifts are you involved in a day?

one

two
three
not at all

38. How do you hand over to the next colleague?

briefing
handing over a note physically
leaving a note
leaving without a note/briefing

39. What do you usually do when a colleague is to report late?

wait till he/she arrives
leave a note in his/her absence
hand over through telephone

Education/Training

40. Do have opportunities for further training and education?

Yes
No

41. If yes how easy are you able to access such opportunities?

not easy
quite easy
easy
very easy

42. Are peer review programs available?

Yes
No

43. If yes, indicate how often.

every six months
annually
biannually

44. Choose from the list below, all applicable means of upgrading your knowledge.

surfing the internet
medical journals/magazines
colleagues

library
peer review
in-service training
research projects
medical conferences

By completing this exercise you have contributed to the patient safety improvement process of this hospital.

Thank you very much for your time and contribution.